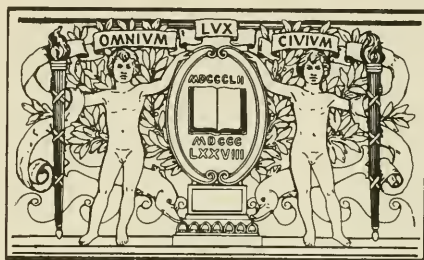


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# SMITHSONIAN YEAR 1969

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# Smithsonian Year

## 1969

ANNUAL REPORT OF  
THE SMITHSONIAN INSTITUTION  
FOR THE YEAR ENDED 30 JUNE 1969



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1969

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## 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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SPIRO T. AGNEW, Vice President of the United States

WARREN E. BURGER, Chief Justice of the United States

WILLIAM P. ROGERS, Secretary of State

DAVID M. KENNEDY, Secretary of the Treasury

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ROBERT H. FINCH, Secretary of Health, Education, and Welfare

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JOHN A. VOLPE, Secretary of Transportation

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30 June 1969

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ington, D.C.  
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Chancellor (Board of Regents)  
CLINTON P. ANDERSON  
CARYL P. HASKINS (Chairman ad  
interim)

## *The Secretary*

S. DILLON RIPLEY

## *Assistant Secretaries*

JAMES BRADLEY, Assistant Secretary  
SIDNEY R. GALLER, Assistant Secre-  
tary (Science)  
CHARLES BLITZER, Assistant Secretary  
(History and Art)  
WILLIAM W. WARNER, Assistant Sec-  
retary (Public Service)

A listing of the professional staff of the Smithsonian Institution, its  
bureaus, and its offices appears in Appendix 4.

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STATEMENT BY THE SECRETARY

S. DILLON RIPLEY



## Statement by the Secretary

**I**N AN AGE OF FRAGMENTATION, when there seem to be more nations and nationalities than ever before, when scientists and artists alike are concerned with myriad specialties and subsects, how may the Smithsonian live up to its mandate? There are curious countervailing currents at large in the world today. On the one hand the knowledge of things—technological and scientific—is growing exponentially and forcing all of us apparently to live more and more in an homogenized state as we become universally more dependent on our crutches, industrial and private power, communications and transportation. On the other hand the spirit of independence, of “doing your own thing” at all levels from individuals to communes, tribes and on to nations, is having a strong revival. Beyond producing discontent and tension, will these antagonistic currents finally clash, or will they seek out an integrative middle course? Can man live with himself and still be part of a world community?

At the Smithsonian we seek to study and hope to explain areas which can increase man’s knowledge of his environment as well as his knowledge of himself. From the point of view of environment the single most important need of humans today is a grasp of the patterns, the functioning of ecosystems, the total environmental milieu in any one of our major climatic zones. On this understanding our physical future depends.

The nature of man continues to evade definition, although we seem to come closer each year. It is worth pointing out in this regard, as Caryl Haskins, the President of the Carnegie Institution, did recently, that man’s innate mental equipment is still superior to any known computer and that no one has been able to invent a single interlocking system with as many as ten billion discrete units, or the equivalent of the neural potential of a single human brain.

In many ways this Institution’s history of research and study has been helping to set the stage for some of the most engrossing and enthralling achievements of the present. Let us at least as Americans take credit for some triumphs in this age of questioning and confusion. We can single out one supreme feat of the past year, the flight around the moon—the dawn of a new age—followed in July by a very tangible

triumph indeed. That prescient moment this past year was the one during which perhaps half the world's human population watched, in apparently full realization of what was happening, while a foot in a clumsy shoe and then a leg encased in wrappings, but obviously a human leg, emerged from the bulky shadows in the television screen, and edged its way downward into bright light toward what—moonground, grayish-white and staring as if in some deathly lamplight. The light—twenty times brighter than that we see at the time of the full moon—was earthlight. And so man touched the lunar surface and the rest of us saw it and felt it palpably. Through the astronauts all of us have now somehow touched the moon.

There was a new truth in all this besides the touch, the contact. That was the screen. It was more real to watch it than to read about it. We are perhaps in the beginning of an age when the printed word will suddenly be less like holy writ. All of us have been brought up to believe printed words. From the Bible, or religious writing of some sort right on, we are educated to believe what we read. In the welter of ignorance in which we exist, we still feel that to obtain facts one only need use his training, and so we read history as written by historians, and we read newspapers for instant facts. We use words in the same way, words like "war," "love," and "country." We use words like "environment," "race," and "enemy," and we think they have a meaning even though they are incapable of providing one to our senses. When we use such words—even though they are mere ideas or generalities—and when we believe exactly what we read we are proving a rather sad point about education and textbooks today, namely that, as Jules Henry puts it, much of education serves to confirm us in a state of legitimate social stupidity. It is hard to conceive of this as a goal of education, even though Henry appears to believe this is all some sort of plot. At the same time, constant repetition of slogan phrases—like so many *sieg heils*—as well as the numbing belief that what we read is true even if our senses tell us otherwise, does tend to create a penumbra, a twilight zone in which the reassurances of conformity can dwell.

When they turned homeward the astronauts affirmed that our planet earth had a warm and receptive look. Not only was it this earth of ours, "this precious stone set in a silver sea," but it was the only planet around which looked colorful and homey. Home is the hunter, home from outer space. Neil Armstrong reminded us in a moving phrase that the effect of that noble adventure for him had been to generate the hope that as man sets out to know more about space, he may come in the process to learn somewhat more about himself.

In this moment of shared pride and renewed dedication, we of the Smithsonian have our own small part. We can identify ourselves as



concerned with the origins of this whole vast achievement. Charles D. Walcott, fourth Secretary of the Smithsonian, worked for the passage of the National Advisory Committee for Aeronautics enabling act of 1915, served as Chairman of its first executive committee until 1917, and as a member of the committee until his death in 1927. The National Advisory Committee was transformed into the National Air and Space Administration in 1958. From such small beginnings, organized by Walcott as a mark of scientific respect to his predecessor, former Secretary Samuel P. Langley, have sprung the whole vast panoply of NASA—this creator of the “Spirit of Appollo” as President Nixon has termed it.

We live in a biological universe, that of the earth, and so far as we know it is the only one we will ever live in. Our own age of enlightenment, our own mastery of facts as distinct from ideals or slogans, has shown us that everything in the cosmos—from heavenly bodies to human beings—has developed and continues to develop through evolutionary processes. Thus theoretical biology now pervades all of western culture indirectly through the concept of progressive historical change. Man and his culture have evolved simultaneously, certainly after some finite point, if not before. Increases in brain size must have occurred simultaneously with the unfolding of patterns of social behavior. Primitive forms of art, of religion and even forms of scientific discovery also must have played their part in affecting the development of neural processes and capacity, and their integration. New reaction patterns provide physiological adaptations to man’s own evolving culture. What would seem to be almost certain is that the various components of human culture are now required, not only for the survival of man but also for his existential realization. In our biological universe, man’s continuing evolution helps create his evolving culture, and thereby the two become interdependent, even as they continue to evolve.

A truism in evolutionary studies is the presence of diversity at all levels of systems. In this past year, the Smithsonian opened the first National Portrait Gallery, a long-awaited event, achieved only with the willing cooperation of some of the Nation’s great art galleries, and friendly private collectors, for famous portrait paintings have long since been gathered up largely into state and local historical collections or private institutions. The successful opening exhibition of the Gallery was centered around the theme—what is the American, this man evolved in a New Land? What is this new creation, this “promiscuous breed,” as Oscar Handlin called Americans in his introduction to the catalogue of the exhibition? Only a few were left out in this rich brew of portraits. There were few poor men, no beggarmen to speak of, and perhaps only a thief or two.

But the exhibition did give a clue to the student of populations. A variety of disparate types of populations, set down in a variety of heterogeneously diverse environments, has demonstrated another truism in evolution theory. Even though the original individuals may have separate origins, there is a tendency for a continuing interplay both within and without, so that segregated, small groups tend to develop small cultural as well as physical resemblances. These resemblances aggregate into regional resemblances. These last may eventually aggregate into traits of culture, or character, which do in fact produce recognizable characteristics. So subspecies are born, of geographical isolation, and resulting cultural and physical resemblances in spite of a wide diversity of original genetic combinations. At the same time other changing influences may be at work to break down and recombine these combinations, and so the melting pot continually forms and reforms, blending and blurring the evolving differences.

Looking at this splendid panorama of Americans, one does receive an impression that at least in past years our people had developed a certain series of recognizable types with regional overtones. The New Englander has some shared resemblances with northeasterners. The southeastern mountains have their types, and the Texans are characteristic with shared resemblances to the southwest in general. The differing nationalities have preserved many of their customs as well as certain morphological minor differences. Racial differences seem to have been on a submerging course. Indian tribes have been slowly and steadily losing their distinctness, sometimes stampeding themselves in the race to be like everyone else. Negroes, following the predictions of Raymond Pearl, have been gradually integrating and assimilating themselves into the rest of the general population, especially in cities as they migrated from the farms until recently. Now it remains to be seen if this gradual evolutionary process can be arrested by a conscious effort of will by racists among the blacks. Our great new National Portrait Gallery, so ably started under the direction of Charles Nagel, and now to be continued under his talented successor, Marvin Sadik, is thus a scholarly resource for the other branches of the Smithsonian in history and anthropology as well as in portraiture. Its exhibits and its collections extend in cross currents throughout the Institution.

In the meantime it would seem as if a portrait gallery or any art museum is in some ways more closely akin to what people accept nowadays as the new inculcation by television, than it is to the previous learning by reading and writing. Perhaps TV and museums are more closely allied than we think. The new generation's familiarity with ingestion by TV may serve to habituate them to museum-like education. If this be so, let us hope that museums realize it before someone else takes them over.

The two basic themes which can be demonstrated in a museum setting are perhaps central to our survival on our homey planet. On the one hand there is man's evolving culture, so closely tied in with man's own physical evolution. That culture can be demonstrated more effectively by the use of objects than in almost any other way. And it is that very culture which plays such a fundamental role in our second great theme, man's relation to his environment and the biosphere—that small existing envelope of available land, water, and air within which we can survive. For the present phenomenon is that our culture and our environment are no more at war with each other on terms of rough equality, but that rather our material culture is in danger of destroying our old presumed enemy, nature.

Americans especially have been brought up to be at war with nature, beginning with a European heritage in which it was assumed that nature itself was an enemy against whose onslaughts one built houses and walls, made fires, hunted wild animals, and ate whatever could be wrenched out of the soil. Having hacked and burned our way across the frontier, having been prompted to do this by everything from poetry and English literature (whose word pictures constantly remind us to fear nature) to our new technological culture, we have at last turned the scales. As Ian McHarg and others have recently reminded us, we are about to dominate and subjugate nature and in the process destroy it. Can we demonstrate these facts through visual means, so long as people are more or less unimpressed by reading about them? Can we teach people to care about their future enough to stop the present relentless progression into war, starvation, or suffocation? How can we learn enough about ourselves to stop in time?

During this past winter, the Smithsonian celebrated the third of its annual symposia, this one on recent advances in the understanding of social behavior of higher animals. The implications to be drawn from the symposium, titled "Man and Beast," were fairly clear, even though no one assumed that primate behavior research can tell us all we need to know about man's behavior. Quite obviously it cannot, and yet the conference was a fine escape from anthropocentrism. There are many things that other creatures from ants to birds to baboons can tell us, which can serve as guides along the way to knowing ourselves. The event was a splendid one, well attended, and the speakers were greeted with enthusiasm not always reserved for such occasions. Much of the credit for all of this must go to Wilton Dillon who took over the complex organization of seminars for us during the past year.

This seminar revealed a characteristic of the Smithsonian. A meeting such as this, assaying relations between human social behavior and principles drawn from the scientific study of animal behavior, seems instantly

to knit together so many common concerns from within the Institution's disparate bureaux. The field is one in which the Smithsonian's Tropical Research Institute in Panama has done leading work for many years. In addition the Office of Ecology, the National Zoological Park, and the Primate Biology Program of the Museum of Natural History have all been involved creatively.

From 13 through 16 May the eleven speakers, several hundred invited participants, and staff members widely drawn from the Smithsonian explored the extent to which aggression, cooperation, competition, and territoriality were common to man and other species. The symposium yielded a rich perspective on the emergence of cultural factors whose operation attenuates the influence of our biological heritage, correcting an overemphasis attributed to innate behavior by a number of popular writers. The opening academic procession represented symbolically the fulfillment of the ideal of a scholarly community which the succeeding days of seminars, colloquia, formal papers, and social events realized in strikingly tangible manner. We are most grateful to the Russell Sage Foundation, The Grant Foundation, the Alfred P. Sloan Foundation, The Commonwealth Fund, and other contributing sponsors, and also to the inspiring chairmanship of Dr. Alex A. Kwapong, Vice Chancellor of the University of Ghana, who so ably presided. The proceedings of the symposium will shortly appear from the Smithsonian Institution Press under the title *Man and Beast: Comparative Social Behavior*.

An aspect of the Smithsonian's ideal of functioning as a community of scholars consists of improving communication among the complex of universities and research establishments in the Washington area. In July 1968 we inaugurated a regular bulletin, *The Washington Academic Calendar*, listing seminars and lectures being given throughout the metropolitan area. This bulletin is mailed as a service to university and independent laboratory staff members. The mailing list for the *Calendar*, which now contains more than 6,000 names, will serve as the nucleus of a continuing file of Washington area academic interests, listing recipients by discipline and institutional affiliation. We hope eventually to be able to correlate the pattern of academic events with the array of interests in the city and its institutional patterns—a study, as it were, of the academic ecology of an urban area.

As a visible manifestation of our function as a community I can think of no better indication than the award, in a pleasant ceremony before the Joseph Henry statue, on 5 June 1969, of Certificates of Academic Achievement to postdoctoral associates and graduate students on appointments from the Office of Academic Programs. Not a degree, and awarded with advance approval of each student's university, the Cer-



tificate attests to the satisfactory completion of an assignment chosen by the student himself in consultation with a supervisor. Professor Henry understood the Smithsonian to be a "College of discoverers," with students participating intensively in its work. To the extent that we have helped to perpetuate his concept of the Institution as an auxiliary academic establishment we have helped to underscore one very important objective of the Institution. Despite the monolithic tendency of our federal government to wish to centralize and combine efforts and funds continually in the name of efficiency, the administration of pure research tends to elude such neat solutions. In connection with work on the President's Marine Sciences Council, all the members were asked to comment on the council report at the end of 1968. I was struck by the reference to the importance of small independent institutions such as the Marine Biological Station at Woods Hole, Massachusetts. Like the MBS, as it is called, the Smithsonian operates independently on its own small budget, but serves as part of an interlocking network of a national community of scholars. Dr. Leland Haworth, then Director of the National Science Foundation, when writing to Vice President Agnew on 10 March 1969 in regard to oceanographic research, said (speaking of Woods Hole) ; "we can see merit in having such independent research organizations." The same seems to apply to the Smithsonian.

Our symposia can thus serve as points of focus for a wide range of associated Institution activities, from seminar series to exhibits, from productions for the media to special publications. The coming year will be devoted in large measure to studies of cultural change and displays bearing upon this theme. In the year following we hope to conduct an intensive examination of the impact of technology upon society, including a major exhibition on technology and art, the preparation of curriculum materials for educational institutions, and a large number of scholarly sessions devoted to detailed aspects of this general theme. In this way we begin to bind together the different parts of the assemblage and orchestrate a theme uniting their efforts toward a given end.

A second major goal is to achieve reinforcement within our arrays of reference resources. A curator's expertise and personal knowledge, built up over a lifetime of study, represent an information resource, as do the books and reprints he has gathered around himself; then, as in an outer concentric circle, come the ordered materials of a collection. We are purposefully seeking ways to conduct these activities so that each reinforces the others to the maximum practical extent. Not books separate from objects; not specialized information services separate from either, but rather integrated reference systems which can unite all three. The Smithsonian's uniqueness and value depends upon our success in being a different kind of marshalling center where recorded knowledge gives

wide access to pertinent inquiry and is not regarded as a burdensome encumbrance or permitted to weigh down our ventures into ideas.

Out of this springs a kind of neo-economy. Our collections in biological and geological materials—often gathered at random—may by their very size and multiplicity end up being our single most important asset. Our data bank of specimens, even though we may not today be able to extract the ideal information we need, may turn out in a hundred years to represent four or five times the genetic diversity then available to us, for by that time seventy-five to eighty percent of the species of living animals or plants may be extinct.

The very variety of resources of the Institution may have begun to work against effectiveness in our exhibits. Too many aspects of a given subject may be out of sight in other buildings where they are excluded from consideration in preparing exhibits. This year I have appointed a special commission to reappraise the exhibits function within the Institution and seek ways to unify our presentations, to make them more responsive to visitors' interests and more appealing to all of our citizens. Exhibits that merely display objects from the collections, individually labeled and placed behind glass, reinforce the fragmentation of the Smithsonian, while those whose aim is to interpret a wider domain of knowledge help to realize its converging interests.

Cohesive programs must be given concerted management. This year an enormously important step was taken in re-establishing the position of Treasurer of the Institution as a central office to oversee budgeting, control, planning, development, and fiscal management. The Office of Programming and Budget has begun an intensive analysis of the use of Institution resources—both public and private—in the context of a statement of objectives and the analysis of functions. We have been fortunate indeed that T. Ames Wheeler, formerly of the Allegheny-Ludlum Steel Corporation, joined the Smithsonian staff as Treasurer in September 1968. Under his care both public and private funds can be marshalled to achieve true effectiveness.

This has been a year of continued questioning in America—insistent, sometimes shrill, penetrating, skeptical, above all, iconoclastic. Critics charge the entire educational system with grave deficiencies, doubt the wisdom of our acceptance of technology, and find all too small a return from massive social investments in government programs. The Smithsonian has not been invaded by angry protesters or disrupted by dissidents but it cannot escape the need, which is becoming so general in our time, to subject its activities to the most searching review and to reappraise its objectives in the light of the more rigorous expectations of the day. No institution is too venerable or too valuable to be exempted from such scrutiny. In government jargon the phrase is, "let us get back

to the base." An "open" university such as ours should thrive on self-examination.

The first thing we must expect from any institution is that it frame socially valuable objectives and conduct its affairs in accord with them. Yet charitable and governmental establishments are shaped in large measure by past legacies. Once-plausible aims may shrink with time into nostalgic obsolescence. Bureaux, divisions, working groups, committees, and a host of other administrative entities are set up within institutions, given separate charters, and thereafter pursue independent and conflicting courses until what was meant to be an orderly flotilla comes to resemble a park basin cluttered with children's toy boats of every conceivable description in total disarray. The word institution comes from the Latin verb *statuere*, to set up, implying an end in view. Only as ends are served can an institution be maintained as a viable whole whose parts, like those of any functioning organism, must be interdependent.

To many people the Smithsonian Institution must seem improbably heterogeneous, built up over the years like a midden heap of collected objects, many priceless and all interesting. As I have suggested, the collections may be priceless but they are not the institution any more than buildings are a university. It is the scholars who for one reason or another have been attracted to us, full time or part time, as permanent or transient workers, who can perhaps learn to grasp the meaning of the collections. By being in touch with real objects and by being attentive to the real situations in which these objects were placed or developed, perhaps our scholars can develop what Kant, speaking of the spontaneous interplay of our own intellectual powers, called the "synthetic unity of apperception." This is learning, and curators are capable of this even if teachers are not always so. But if a curator understands such a situation in nature or in a culture coherently and wholly, then he is better as a teacher than most teachers.

The whole problem of teaching today revolves around whether teaching really teaches people how to learn, or whether it comes down to getting people out of schools fast, having coerced them through fear and competitive pressure into getting meaningless diplomas. Recently graduate students in a survey conducted by the American Political Science Association have been complaining about college work performed under a climate of "threat and fear." Learning to learn must certainly be a failure if it merely means aping the teacher, becoming an "apple-polisher," or picking up the innate structure of a teacher's behavior. Or is that really what we all should do in order to get on in life? I am inclined to think not, as I doubt that we can survive this way.

Museums teach us about real things, which is one reason why young

people like them. They also tend to put things in perspective, in a historical context, which young people tend not to learn in other ways. One failure of teaching in the social sciences has been to eliminate dates as having any contextual value. Thus the steppingstones which an earlier generation memorized, from the defeat of the Persian fleet at Salamis right onward, tend to be left out. The Persian fleet might have been defeated at the Battle of the Coral Sea for all young people today know. One of the failures of TV is also in the scale of time. Everything is instant. It is happening now in an existential manner, which fails to convey reality.

Museums offer an opportunity for training in reality which few pedagogues suspect or know. Museums are open universities. Only examples really count, especially when they can be grasped in the round. How then can young people plan for the future without tenable examples and a historical context? Planning is probably the most important aspect of the future, along with the understanding of ecosystems. It would seem that we may be heading into a form of civil war as far as planning is concerned. Education today being reductionist in emphasis, technology being dominant and reductionist in principle, there can perhaps be no solution so long as our economics persists as it does. The quiet voices of rational and studious students of the environment will probably not suffice. We may well be swept aside by the groundswell of opinion of those—from militant students on through the middle-aged middle class living in quiet desperation—who, mindful of the futility of growing old, finally reject our social and economic goals based on subjective private initiative.

One major task of this Institution should be to experiment with learning techniques. If this research could ever produce a method to create a sense of reality, and to awaken interests in people, then the Smithsonian would indeed have lived up to its mandate.

## HISTORY AND ART

Another notable event of this year besides the opening of the Portrait Gallery has been the ground-breaking ceremony for the Joseph H. Hirshhorn Museum and Sculpture Garden. Authorized under the 90th Congress, the building with its sculpture garden should be completed in another two years. The ceremony was performed 8 January 1969 by President Johnson, the Smithsonian's Chancellor, Chief Justice Earl Warren, and the Secretary before a distinguished audience of members of Congress, the Administration and the world of art.



To the superlative collection of fine art he has donated to the United States for the benefit of the people, in 1969 Mr. Hirshhorn's continued generosity resulted in the addition of more than five hundred new paintings and sculptures—an average of over ten new works each week received, cataloged, and stationed by Abram Lerner and his staff of three. Since November 1966, the date of Mr. Hirshhorn's gift, his generosity has led to the acquisition of outstanding new paintings and sculptures valued at over one million dollars each year, in addition to the one million dollars he has agreed to donate for future purchases upon the opening of the Hirshhorn Museum.

In this first year since its opening, exhibitions have been a major part of the activity of the National Collection of Fine Arts in trying out its new space. The first of these areas to be developed has been the low-vaulted, crypt-like spaces of the Granite Gallery, which proved admirably suited to the bronze sculpture of an exhibition of the works of Alexander Archipenko.

A major achievement of the year was the retrospective exhibition of paintings, drawings, and photographs by Charles Sheeler organized by the NCFA staff, with its full and richly documented catalog as a permanent reminder of the exhibition and as a scholarly reference. The Sheeler exhibition continued with showings at the Philadelphia Museum of Art and at the Whitney Museum of American Art in New York.

During the year David Scott—who had done so much to help in the installation of the National Collection in its new quarters and who had, with the NCFA staff done a great deal to attract interest to the collections—resigned. Robert Tyler Davis, a new member of the staff as assistant director, took over as acting director, until late summer 1969, when the appointment of Joshua Taylor, Professor of the History of Art at the University of Chicago and a specialist in the history of American Art, was announced.

During the year negotiations have proceeded to bring the Archives of American Art to a new headquarters within the Smithsonian in Washington, part of a proposed network of art historical reference centers to be planned across the nation. This enormous resource, when added to the holdings in the Smithsonian, will go far toward making the National Collection what it should be, the heart of a documentation and research center in the history of our own indigenous art.

Efforts of the Museum of History and Technology to expand the scope of our activities beyond those traditional to museums have been reflected in a number of directions. Under contract the Museum has undertaken the collection of data on Afro-American history, and has made a small beginning in the collection of materials for exhibition in this field. A 19th-century sharecropper's cabin has been acquired and

is presently being installed as part of an exhibit of the history of American Negro culture. In other areas of ethnic cultural history our staff has conducted research on the church of San Xavier del Bac (circa 1783) near Tucson, Arizona, and on early pottery making in California. A shopfront from a gold-rush period community near San Francisco is presently being put on exhibit. The Museum has undertaken a program of research and recording in the folk music of an eastern mountain community at Galax, Virginia.

The Computer History Project, supported by the American Federation of Information Processing Societies, is now in its second year, under the direction of Dr. Uta Merzbach. This project comprehends the collection of documents and tape-recorded interviews with persons important in the development of the computer. Another major project in its second year is the New England Textile Mill survey. A report of the first summer's work, chiefly at Manchester, New Hampshire, was published this year.

This year our National Museum of History and Technology welcomes a new Director, Professor Daniel Boorstin, Preston and Sterling Morton Distinguished Service Professor of Ancient History, of the University of Chicago, and one of our most eminent living American historians. The pleasant coincidence that Professor Boorstin has also been reappointed to President Nixon's Commission on the American Revolution Bicentennial, affords us additional opportunity to cooperate closely with the Commission on plans for the Nation's observance of renewed dedication to our founding principles of liberty and equality before all men.

This has been a year of program formulation for the Cooper-Hewitt Museum of Design in New York. A lease has been arranged with the Carnegie Corporation, owner of the Andrew Carnegie mansion on Fifth Avenue at Ninety-first Street, and it is hoped that the Museum will be installed there in its own quarters by 1971.

The kinds of programs and services offered by the Cooper-Hewitt Museum bring to the Smithsonian new educational opportunities in the world of design. In today's ever-rapidly evolving concept of fashion and beauty, the need for a museum showcase, in which an endlessly rich variety of historical decorative arts material can be drawn upon, utilized, and enjoyed, provides a springboard which the Smithsonian can be influential in offering guidelines to more beautiful design in everyday life. The Museum's future move to upper Fifth Avenue will place us on New York's "Museum Row." Thus we hope the Cooper-Hewitt Museum will be able eventually to assume its proper place as a showcase of international reputation in the world of design. Particular thanks are owing to the newly formed Advisory Board under Mrs. Alice M.

Kaplan, in recognition of the hard work, enthusiasm, and generous contributions, both in time and money, that it has made in reestablishing the Cooper-Hewitt Museum as a new, visible entity in New York.

One of the ways in which the Smithsonian increases knowledge is by stimulating those not on its staff to work on intellectual problems that need solving. The Smithsonian is able to do this not only by offering visiting appointments to outside scholars but by training graduate students from universities with whom it maintains a relationship. The Smithsonian has for many years guided small numbers of graduate students in the sciences. More recently it has provided advanced training for graduate students in the humanities, most notably through its American Studies Program, now in its fourth year of operation. Graduate students in American history and American studies from four universities are this year pursuing courses of study under Smithsonian advisors. Most of them are *not* receiving fellowships or scholarships from the Smithsonian. Some are writing dissertations which when completed will enlarge important areas of human knowledge and, in many cases, interpret Smithsonian collections to the scholarly world for the first time. By such means the Smithsonian with a minimum expenditure can obtain a maximum effect in carrying out its historic mission.

Under the direction of our discerning editor, Nathan Reingold, the Joseph Henry Papers staff has come nearly to the end of its extensive search, in domestic and foreign archives, for documents on the life and work of the first Secretary. Some 16,000 documents are in hand. The staff is now beginning to edit material for the first volume (of an anticipated twenty on Henry's years in Albany, New York (1797-1832), where he educated himself, began his teaching career, and carried out some of his most important work in electromagnetism.

In April 1969 Congressional Regent Frank T. Bow introduced House bill H.R. 10001 incorporating the Smithsonian's legislative proposal to provide for the establishment of a National Armed Forces Historical Museum Park and study center to be designated the Dwight D. Eisenhower Center for Historical Research. The proposal also includes authority for the Board of Regents and the Secretary of the Interior to enter into an agreement for the joint use of lands now under the jurisdiction of the Department of the Interior as the site for the museum park. This legislation seeks to fulfill the goals of three presidentially appointed panels of distinguished Americans, including the current National Armed Forces Museum Advisory Board, dedicated to the conviction that an armed forces museum can be, as the late President Eisenhower put it, "a dynamic educational venture . . . [making] . . . substantial contribution to our citizens' knowledge and understanding of American life."

The choice of President Eisenhower's name for the proposed study center is most appropriate in that it was he who in 1958 convened the President's Committee on the Armed Forces Museum under the chairmanship of former Chief Justice Earl Warren. The recommendations of this Committee led to enactment of Public Law 87-186, establishing a permanent Advisory Board and providing the concept on which the pending legislation is based. Indeed, only a few weeks before his death, President Eisenhower in a letter to our Chancellor reiterated his commitment to a national armed forces historical museum and study center.

Our hopes for the Eisenhower Center received a most substantial boost during the year, when the American Military Institute placed on long-term deposit with the Smithsonian its large and valuable library. The collection contains more than 15,000 volumes concentrated on military history and other areas of social sciences having relevance to military affairs. The AMI collection will serve most admirably as the nucleus around which to build the sort of reference library which will be indispensable to the Center.

Two major events in the areas of air and space during the year focused public attention on the National Air and Space Museum. The first was the celebration—in collaboration with the United States Navy—of the fiftieth anniversary of the first transatlantic flight by the NC-4, in May of 1919. The second was the build-up of activity throughout the year of the Apollo Program in preparation for the moon landing, including the successful circum-lunar flights of Apollo 8, 9, and 10.

Although the NC-4 had been in the Smithsonians' custody for many years, it has recently been in protective storage, pending the availability of a new building large enough to house it. The Navy's request for its public display during the month of May 1969 necessitated an accelerated restoration program. The job was completed, and the aircraft was ready for public display on the Washington Mall for the entire month. Many thousands of visitors were thus reminded of its famous flight across the Atlantic, now fifty years ago.

With the accelerating interest in the Apollo program as it approached its great objective of a manned lunar landing our 1967 Agreement with NASA began to pay significant dividends. The opportunity to see full-scale Saturn and Apollo artifacts—including Apollo 4 (with the related F-1 and J-2 engines), plus "Surveyor" and the Lunar Orbiter—all of which would have been impossible without our close cooperation with NASA—attracted thousands of visitors to the South Hall of the Arts and Industries Building. These large hardware items were exhibited in a setting of space-oriented TV display, photography, paintings and sculpture which were continuously updated to keep visitors informed of significant events as they occurred.



In addition the operation of the NASA agreement has brought into the Air and Space Museum's inventory a large amount of material for future use, from which can be drawn display material for loans to other museums. During the year such Smithsonian artifacts were on display in London, Lucerne, Barcelona, Munich, Tokyo, and Brisbane, as well as in a number of cities of the United States.

## SCIENCE

Scientific activities of the Smithsonian commence locally with the National Museum of Natural History and spread out widely in fields as superficially diverse as astrophysics and ecology. In this past year, the Natural History Museum has acquired a Scanning Electron Microscope (SEM) a major step in the planned research activities of our staff. This marvelous new instrument is able to magnify the images of tiny objects from 20 to 140,000 times and with several hundred times greater resolution than the conventional light-optical system. For the first time, the basic architecture of thousands of species of organisms, can be seen and studied as whole individuals, whereas formerly elaborate sectioning and replication techniques were required.

The SEM which was developed at Cambridge University in England represents a major breakthrough in the field of microscopy. In only four years since it became commercially available, it has become a dominant research tool in such diverse fields in biology as pollen analysis, microfossil identification, and textile fiber-wear studies. In one area of basic research being done at the Smithsonian, Dr. R. H. Benson is using the SEM for the study of the history of a minute fossil crustacean, the ostracode, which has lived on the floor of the deep ocean basins. His recent discovery of these microfossils in the rocks of the Alps suggests new dimensions to the ocean that once separated Europe from Africa during the time when dinosaurs dominated the landscape. The SEM allows for much greater precision in the identification and analysis of the living as well as fossil deep-sea ostracodes. Through their study it is hoped that massive movements of the ocean floor, which took place during the formation of mountain systems, can be discovered. This instrument will be available for use, when needed, by scientists in all departments of the Museum, many of whom have already made plans to use it in their research.

One does not ordinarily imagine collaboration between researchers in volcanology and archeology but a joint field effort of the Departments of Anthropology and Mineral Sciences is underway to establish the historical background for the eruption of Mt. Arenal in Costa

Rica last year, as well as to study the volcanic phenomena it presented.

Similarly, the sedimentologists in the Department of Paleobiology have collaborated with Mineral Sciences to contribute to a rapidly growing accumulation of evidence favoring the theory of continental drift. The spatial relationships between sedimentary rocks and the crustal ones along the mid-Atlantic Ridge have clearly indicated the phenomenon of sea-floor spreading.

Meanwhile two teams of Smithsonian investigators, one at Cambridge in the Astrophysical Observatory, the other at the Natural History building in Washington are preparing for interdisciplinary research on lunar samples, one of soil, the other of rock, jointly to be studied by geochemists, meteorists, petrologists, and physicists.

A signal triumph this year has been that of G. Arthur Cooper who has successfully devised means of sampling the entire brachiopod fauna of the Glass Mountain beds of the Permian era. His work will have significant consequences for all students of population biology as well as for paleontologists.

## ECOLOGY

The Smithsonian's concern with ecology spreads across a number of scientific disciplines as well as organizations and finally comes home to rest in the social sciences, within the purview of our new concern in post-doctoral research. The Office of Ecology participates directly in research, sponsors other research, and is related to other departments and offices through interdisciplinary programs. On its own, the Office has participated in investigations of the ecology and ethology of wild elephants in Ceylon.

In the past year emphasis was placed on studies of the population dynamics, inter- and intra-specific competition, food habits, patterns of movement and land use, reproduction state, and the density of habitat usage. Also in Ceylon, the basic structure of the domestic elephant reproductive cycle was worked out for the first time.

As Smithsonian participants in the International Biological Program (IBP), Lee Talbot and Raymond Fosberg assisted with an inventory of Pacific islands and parts of islands as preserves of rare scientific resources. Areas are being listed for conservation where they have been relatively uninfluenced by human activity and contain unique flora and fauna. As a result of the IBP conservation section meetings on Palau and Guam, data have been assembled and will be published.

Requests for advice and consultation on ecological problems were answered from the National Park Service and the United States Fish

and Wildlife Service of the Department of Interior; the Pacific Science Board, the Environmental Sciences Board, and the Division of Behavioral Sciences of the National Academy of Sciences and the National Research Council; the Office of Science and Technology, the Department of Defense, the Department of Agriculture, the Congress, and such international organizations as the International Union for Conservation of Nature and Natural Resources, the International Council for Bird Preservation, the World Wildlife Fund, the United Nations, and the Pacific Science Association.

The Chesapeake Bay Center for Field Biology completed one level of its laboratory building and operated as a research arm of the Smithsonian through a consortium with the Johns Hopkins University and the University of Maryland. Studies of the physical conditions and the populations of organisms in the estuary continued. Dr. Charles Southwick of the Johns Hopkins University found that the Rhode River estuary apparently was heavily enriched in September. Drs. William D. McElroy (on leave as Director of the National Science Foundation), Howard H. Seliger and William G. Fastie, also of Johns Hopkins University, began measurements of the night and day patterns of bioluminescence as an index of primary productivity. In the past year a further effort to raise funds for land acquisition for this most valuable field station has met with remarkable success. Nearly fifty percent of our goal of \$800,000, to increase our holdings on the western shore of Chesapeake Bay to some 2000 acres, has been met. We are deeply grateful to the farsighted foundations; the Ford Foundation, The Research Corporation, the Scaife Foundation, the Old Dominion Foundation, the Fleischmann Foundation, and the Prospect Hill Foundation; all of whom have helped us in our project to create a national resource in ecological research, not only near Washington but also as part of a network of comparative study areas, an environmental consortium of universities and private and public institutions from Massachusetts to the Caribbean and Panama. Dr. George Watson completed a three-year study of the productivity of breeding ospreys at Poplar Island, a Chesapeake Bay Center property near the eastern shore of the Chesapeake Bay. The osprey population is believed to be holding its own in the Bay despite its susceptibility to pesticides. Whistling swans meanwhile are being studied by Dr. William J. L. Sladen of Johns Hopkins. More than half of the North American population of these birds winters in the bay. Studies of their local and long distance movements, feeding ecology, social behavior, and diseases are being achieved by observation of unmarked, conspicuously dyed, and radio-tagged birds.

## HYDROBIOLOGY

In oceanography and limnology, direct observations of plants and animals living on the bottom of the shallow ocean and in the upper pelagic areas received considerable attention during the year. A wide spectrum of activities ranged from sponsorship of a special Edwin A. Link lecture on underwater man by Jon Lindberg and Dr. Joseph B. MacInnis and the offering of diver-training courses to field investigations using scuba apparatus, submersible diving chambers, and small research submersibles. A multidisciplinary study of sharks and the coral reef environments was undertaken under the sponsorship of Edwin A. Link, Seward Johnson, William Mote, Ocean Systems Inc., and the Smithsonian Institution in February and March of 1969. Five small vessels and a submersible diving chamber were assembled off British Honduras for the project known as SHARK 1969.

Sponsorship through working group 23 of the Scientific Committee on Ocean Research of the International Council of Scientific Unions resulted in a definitive study of plankton preservation being undertaken at the Smithsonian. Dr. Hugh Steedman of the University of Bath spent the months of July, October, November, March, and June planning and conducting experiments at the Smithsonian Oceanographic Sorting Center. Plankton preservation has sometimes been excellent and sometimes unsatisfactory using the traditional preservatives under differing field conditions. Histochemical and other work on carefully preserved collections will provide information on the causes of the variable results. Tests will be made to attempt to find better preservatives.

An "Ocean Acre" research program has been initiated by Drs. William Aron, Robert Gibbs, and Clyde Roper in cooperation with the Navy Underwater Sound Laboratory, the University of Rhode Island, and the Naval Oceanographic Office. Four cruises, using navy ships *Gilliss*, *Sands*, and *Trident* of the University of Rhode Island, were undertaken during this fiscal year. The area selected for achieving a fuller understanding of its total biology is southeast of Bermuda in water depths greater than 2000 meters. Preliminary analyses of the distributions of cephalopods and fishes reveals variations in their migratory behavior patterns which may be associated with sound-scattering layers.

This year was one of great progress in converting the older manual records of the Smithsonian Oceanographic Sorting Center into an automatic data-processing system. Specimen labels are prepared in an automatic typewriter system which simultaneously produces duplicate labels and punches the data on paper tape. This tape is converted to magnetic tape automatically and goes into storage with a minimum of error.



Nearly all of the several years production of Antarctic data covering thirteen million specimens has been entered in the machine system.

Installation of basic petrographic laboratory equipment was completed in the Sorting Center. A specimen inventory has been prepared to meet the needs of specialists interested in specific mineralogic, textural, or lithologic features of oceanic rocks. As a backup for the specimens being distributed, a major catalog of oceanic rocks has been produced to include all that have been described in the scientific literature. Specific mineral groups and lab information in the literature may be found through the catalog.

## RADIATION BIOLOGY AND ASTROPHYSICS

The Radiation Biology Laboratory of the Institution has participated actively in interdisciplinary ecology during the year. Under the Laboratory, the third seminar series sponsored by the Smithsonian Institution and the Consortium of Universities of the Washington Metropolitan Area was introduced on 6 February by Dr. Sidney Galler, Assistant Secretary for Science. The Seminar in Environmental Biology was presented for graduate credit and attracted large audiences of students and other interested people from the community. Thirteen lectures were presented by authorities in ecology and environmental biology from all over the United States, with topics ranging from arid-land to arctic ecology and from fresh-water productivity to aspects of controlled environments for space biology.

For the past year the Smithsonian Radiation Biology Laboratory has recorded continuous daily measurements from sunrise to sunset of several color components of the white-light spectrum in those wavebands that control growth and development of plant and animal organisms. This is the only complete set of data of this kind obtained for biologists to use in studying photobiological responses. Under the joint sponsorship of the Smithsonian Institution and the National Physical Laboratory of Israel, a station in Jerusalem has begun operation to obtain similar information for that latitude. The measurements from the two stations will provide comparative records on ratios of color bands present in natural incident daylight and resultant cycles of growth and reproduction, leading to new interpretations of the effects of light stimuli as a factor in the environment controlling physiological development.

In the course of recording measurements of normal incident solar radiation at the Smithsonian, it was discovered that the amount of the sun's energy falling on Washington, D.C., now is approximately fifteen

percent less than that measured and recorded here by Dr. C. G. Abbot in 1907 at the same time of the year. Measurements are continuing to be taken and efforts are in progress to confirm the preliminary data. The results should be of the greatest interest to those ecologists concerned with the energy-exchange phenomena between biological systems and the atmosphere, as well, indeed, to urban planners concerned with human health.

During the past year the Center for Short-Lived Phenomena, an organization set up by the Astrophysical Observatory, participated in 127 geological, astrophysical, and biological events including 21 major earthquakes, 18 volcanic eruptions (one involving the birth and disappearance of an island), 21 fireballs, 11 major oil spills, 9 fish kills, 4 rare-animal migrations, 3 freshly fallen meteorite recoveries, the discovery of a stone-axe tribe, and several dozen other land and marine ecological events.

The Center assisted in the coordination of activities for reconnaissance missions and scientific field expeditions to the Fernandina Caldera collapse in the Galapagos Islands, the Mt. Arenal volcanic eruption in Costa Rica, the Cerro Negro volcanic eruption in Nicaragua, the Appalachian squirrel migration in the eastern United States, the Mt. Merapi volcanic eruption in Indonesia, and the Pueblito de Allende meteorite shower in Mexico.

During the Apollo 11 Manned Lunar Mission, the Center arranged communications between 207 astronomical observers in thirty countries and maintained daily contact with the Manned Spacecraft Center, NASA, at Houston, Texas. Reports from ground-based observers were relayed to the MSC for transmittal to the astronauts en route to and orbiting the moon; this mission provided an opportunity for astronauts to confirm (by observation and photography) ground-based observations of transient lunar events.

The Center has established an effective global reporting network of 1510 scientists in many disciplines and from 118 countries.

During the past year the Center issued 127 event notification reports, 764 event information reports, 16 final event publications, and 11 preprints of scientific papers on the preliminary results of field investigations.

By all odds it would seem the Center for Short-Lived Phenomena (a Gilbertian title if ever there was one) is here to stay. In addition to its brainchild, the Smithsonian's Astrophysical Observatory has had a notable year. On 23 October 1968, the Observatory opened its Mount Hopkins, Arizona, facility, a celebration presided over by Representative Morris K. Udall of Arizona. The station will have a tracking camera, a pulsed ruby-laser ranging system, a 12-inch telescope already installed

preparatory to a 60-inch telescope for investigation of stellar and planetary atmospheres, and a 10-meter light collector designed for the detection of gamma rays from celestial sources. In conjunction with NASA, experiments have been started at Mount Hopkins to establish criteria for the selection of sites for future ground-based astronomy research.

On 7 December 1968, the National Aeronautics and Space Administration launched the second Orbiting Astronomical Observatory (OAO-2) from Cape Kennedy, Florida. The two-ton satellite contained two major scientific experiments, including Project Celelescope, a Smithsonian-designed, television-telescope system for observing stars in ultraviolet light.

One week later, at 2:49 A.M., 14 December, the Celelescope cameras made the first ultraviolet photographs of the heavens, showing three 6th-magnitude stars in the constellation Draco.

Between launch and the end of June 1969, the Celelescope experiment obtained nearly 2500 photographs of stars. Although one camera has stopped operating and the three remaining systems are experiencing some loss of sensitivity owing to prolonged exposure to space radiation, the Celelescope experiment is expected to continue to return valuable scientific data for several more months.

An early evaluation of the photographic data indicates that very few of the stars measured by Celelescope are appreciably brighter than expected. Also, about twenty percent of the objects found by Celelescope near the plane of the Galaxy do not appear in identification atlases, whereas nearly every object more than ten degrees from the plane does. Presumably, the extra stars are mostly faint O and B stars; but, additional ground-based observations may be necessary to confirm this theory.

The optical tracking network of the SAO participated in all the Apollo manned-spacecraft missions during this period.

The most spectacular result of this participation occurred on 21 December 1968, when the SAO camera station at Maui, Hawaii, photographed the burn of the booster rockets that injected the Apollo 8 spacecraft into the translunar phase of its flight to the moon. The same day, the SAO tracking station at San Fernando, Spain, photographed the cloud of excess fuel dumped by the Apollo 8 spacecraft some 30,000 miles from earth.

On 4 March 1969, the SAO stations at Hawaii and Mount Hopkins again photographed an Apollo 9 fuel-release cloud at a distance of approximately 70,000 miles from earth. The photographs of these fuel dumps proved highly valuable to NASA engineers and scientists attempting to understand the behavior of liquids in space.

## TROPICAL BIOLOGY

Environmental studies continued at an increased rate at the Tropical Research Institute in Panama. The nation's unique tropically based laboratory has been working on interspecific and intraspecific competition in terrestrial and marine organisms. An event of the past year, tragic yet perhaps fortuitous was the grounding of oil tanker *Witwater* off the Galeta Station of the Institute on the Atlantic coast of the Canal Zone. Research on recovery rates of marine organisms subjected to oil, may prove to be beneficial in the long run to studies of oil spills, bound to become more frequent round the world as time goes on. Meanwhile comparative base-line studies in tropical ecosystems remain our primary goal for this Institute.

For many years a large but rather scarce impressive looking, spiny, poisonous, multi-armed starfish has been observed from the coral reefs of the Indian and Pacific Oceans, and from the Red Sea to Hawaii. Little was known of its habits, life history, or ecology. It is commonly known as the Crown of Thorns Starfish, zoologically as *Acanthaster planci*.

In 1960, near Green Island on Australia's Great Barrier Reef, a sudden population explosion occurred. *Acanthaster* began to swarm in large numbers over the reefs, and was seen to feed on the living coral animals, leaving nothing but the bare limestone skeletons. Under the stress of hunger, as their food supply diminished, the starfish changed from nocturnal habits to venturing out in broad daylight in their search for food.

Large areas of the famous Great Barrier Reef were changed from living animal communities to masses of bare dead limestone skeletons. All of the multitudes of animals that depend directly or indirectly on the corals for food were starved out of the affected areas. These include large numbers of fish, lobsters, crabs, and other economically important reef animals.

Two years ago a similar outbreak occurred on the reefs that line the coast of Guam in the western Pacific. Here it spread rapidly until at last report, an area twenty-six miles off the Guam coast was practically stripped of living corals. More recently outbreaks have been reported from a number of other areas in the Trust Territory of the Pacific Islands administered by the United States.

The citizens of Guam, fearing the loss of the reefs, brought the catastrophe to the attention of an International Biological Program meeting on island conservation problems (November 1968), which included two Smithsonian biologists. Subsequently the Interior Department undertook a crash survey of the situation in Micronesia to develop a synoptic



picture of the phenomenon and try to isolate the causal factors. This investigation now being conducted by Westinghouse Ocean Research Laboratory, includes three Smithsonian marine scientists, Dr. Porter Kier, Dennis M. Devaney, and Thomas F. Phelan, as well as other United States and foreign experts. These men are specialists, some of the very few in the nation, and the Smithsonian is proud to be able to participate in such an important study. Potentially a starfish explosion could undermine and destroy fringing reefs throughout the Pacific threatening the entire economy of the area. Fortunately present evidence indicates that the starfish can conquer coral reef animals only in areas that have been disturbed by dynamiting. Controls can presumably be worked out to prevent man's wreaking further hardship upon himself and his environment for short-term gains.

Interdisciplinary research continues to develop effectively within the Natural History and Anthropology disciplines. Not only has primate biology proved a useful bridge between these broad areas of science, but also geology and paleoclimatology are closely related to archeological research in Central and South America.

Of great interest in this connection is the work of Drs. Evans and Meggers of the Anthropology staff, with Dr. Melson of the Mineral Sciences division, in dating volcanic ash falls and determining special characteristics and age of volcanic activity at El Arenal, Costa Rica, and Quijos Valley, eastern Ecuador, with the archeological specimens from levels in the sites that had been covered by volcanic materials.

Similarly petrographic studies have been made, especially by electron microprobe analysis, of obsidian artifacts that had been used in obsidian dating of the archeological cultures from sites in the Quijos Valley to determine unique features of composition that might be affecting the hydration rates. Through this technique new information on dating for archeology and volcanology has been obtained.

## NATIONAL ZOOLOGICAL PARK

One of the aims of the National Zoological Park is to have a truly professional staff. The addition of a pathologist, Robert M. Sauer VMD, has been a step toward achieving this goal. We now have a trained zoologist at the head of the department of living vertebrates, another in charge of the bird collection, another heads the reptile division, and still another has been appointed as assistant to Dr. John F. Eisenberg in the scientific research department.

The National Zoo has continued its efforts to protect and conserve wildlife and natural resources. In addition to cooperating with national

and international organizations devoted to wildlife protection, the Zoo has made its special contribution. The International Union for the Conservation of Nature publishes a list of rare and endangered species throughout the world. The list mentions golden marmoset, orangutan, scimitar-horned oryx, Père David's deer, Laysan duck, Hawaiian duck, and Swinhoe's pheasant. Each of these has been born or hatched at the National Zoological Park during the past year.

## PUBLIC SERVICES

Through the impetus established several years ago by the Institution's undertaking to direct and coordinate research for United States anthropology and biology programs overseas, using dollar equivalents of stated excess currencies, the Smithsonian has been able to help more than forty-four American learned institutions and universities in the conduct of original research.

The initial implementation of the Smithsonian's role as executive agent for the Iran-United States science cooperation agreement occurred this year with the exchange of visits between Dr. Faryar, Underminister of Science and Education in Iran, and the Director of the Office of International Activities. Methods of disseminating research plans of scientists from each country interested in cooperative work have been established and efforts are now underway to locate funding sources.

The Smithsonian's expertise in assessing the environmental consequences of an isthmian sea-level canal was recognized by the appointment of Dr. David Challinor of our Office of International Activities to the National Academy of Sciences special Committee on Ecological Research for the Interoceanic Canal.

During the past year Morocco was added to the list of "excess" currency countries and already several projects have been initiated by Smithsonian scientists for work there. The addition of Morocco has been particularly welcome because of the pending removal of Tunisia and Ceylon from the list of countries in which the Smithsonian's Foreign Currency Program operates.

The Smithsonian Associates membership now stands at 9,200 compared with 6,500 a year ago. This includes individuals, double and family membership, meaning that our memberships serve approximately 20,000 people. Our renewal average stands at a phenomenal 89 percent.

Some of the Associates activities have included luncheon talks on collecting (painting, sculpture, prints, drawings, ceramics, glass, and furniture) now in its third year. Once again this has proved extremely



popular with 375 members attending the talks each month over a period of six months.

The Ancient Crafts Revived series was oversubscribed. Our workshops included batik, weaving, mosaic, stained glass, bookbinding, paste paper, marble-and-paste, cloisonné, enamel, plique-à-jour, decoupage and tôle. For the first time this series was offered to young people (ten to thirteen years). The classes included enameling, puppet making, papier maché, wire sculpture, Egyptian paste, and paper weaving.

A particularly memorable event was that of the New York Chamber Soloists' performance of music from the Court of the Sun King, Louis XIV, with recitations from Molière, Racine, and La Fontaine given by Jean Louis Barrault and Madaleine Renaud.

This year marks the signing of an official agreement between Mrs. Merriweather Post, to whom the Institution owes so much, and the Smithsonian on the maintenance of her wonderful house, "Hillwood." The tours to Hillwood have had a continuous waiting list and are repeated as often as possible.

One of the most popular activities in which the Smithsonian has engaged continues to be its division of Performing Arts. To bring the instruments out of glass cases, to evolve the magic of folk crafts and music, all this is to communicate directly to all people. How better can our Institution demonstrate the worth of collecting *things*.

Our highlight of the year was the Festival of American Folklife which was enhanced this past year by the addition of several continuing programs. To the half million people who attended the four-day festival of craft demonstrations and concerts we added five programs conceived for the National Park Service's "Summer in the Parks." These mobile art demonstrations, jazz concerts, folk concerts, puppet theater, and film theater, traveled to twenty different city parks over a period of ten weeks.

The Smithsonian libraries continue to command a high priority in our efforts to increase the Institution's research and education capability. Many times throughout the year various departments of the Institution assisted in financing the purchase of library materials vital to the support of their research programs. The professional staffs of the museums and the libraries displayed their mutual concern for maintaining the high quality of the libraries' collections by working diligently together to use their limited funds for the purchase of only those titles that were of immediate and long-term importance to research. The same cooperation, along with strong policy guidance and management by the office of the Director of Libraries was applied to the negotiations and acquisitions of five gift collections of research materials that contribute directly to current bureau programs. This ability to attract donors remains one

of the most essential characteristics of the libraries. Even without a full-time team of specialists, the libraries have been able to continue the inevitable introduction of automation of library processing routines, albeit rather slowly.

The libraries' training program concentrated on improving the data-processing skills of their staff members at various organizational levels. With the assistance of the Information Systems Division, the libraries attained a design for an automated serials purchase system and have begun data input for the creation of machine-readable records. Still ahead, but very much in the libraries future, is work on a system for the integration of files of information in the literature with those pertaining to specimens and artifacts in the museums, to create a totally responsive and integrated computerized information storage and retrieval system.

Computers comprise one of the most important frontiers of science today. The science of computer technology offers a means whereby the storage of data accumulating throughout the museum complex may be reduced to useful information. In recognition of this fact, the Information Systems Division has continued to develop computerized systems and techniques to make information more available. The expanding volume of information, the increasing complexity of concepts, and the demands for rapid application of knowledge to useful ends require an increasing coordination of effort in the management of information.

Efforts this year revolved around enlarging the area in which the Information Systems Division's technology could be put to use. In a cooperative effort with historians, researchers, and scientists our computers and the technical expertise of our staff are joined to solve problems. Like all technical contributions thus far invented by man, computers represent an extension of man's physical and mental capabilities. Calculations, comparisons, and in-depth analysis that would ordinarily cost many man hours, or even years of toil, can now be accomplished in seconds with the help of a computer programmed to the particular need. A few examples of this may be seen in the systems developed this year for research in the fields of biology, paleobiology, anthropology, botany, and the fine arts where time consuming tasks of sorting, analyzing, and coordinating have been conducted by the computer, freeing scientists and researchers to pursue more intellectual activities based upon the information supplied by the automated processing of data.

This was a year of major progress, for the Institution as a public communicator. It began with establishment of the still motion picture unit through a contract with Eli Productions. At the end of the year we were engaged in discussions with the Corporation for Public Broadcasting to support a number of productions, including our long-sought

definitive visitor's orientation film. This obviously flowering relationship with the CPB is built upon a foundation with three primary components: intellectual resources, the national collections, and a demonstrated film-making capability.

Another aspect of film and television programs was represented by the continuing conversations in which the Institution has been involved over a period of months with regard to increasing our contribution to public television in Washington and throughout the nation. Public television, which itself is in an early stage of development in most parts of the United States, appears to be moving toward a real accomplishment with the support of the new Corporation for Public Broadcasting, as well as from foundations and private companies. The Smithsonian, with a continuing concern for the diffusion of knowledge dating to its very origin, looks with great interest on future developments in this area.

In the closely related field of educational radio, the Smithsonian moved energetically during this year, once again combining an enhancement of its own in-house capabilities and a most gratifying relationship with the public broadcasting community. An educational radio service designated "Radio Smithsonian" was established and began the continuing process of producing and making available recorded material covering the full range of the Smithsonian's enlightening and exciting activities.

Coupled with development of the Smithsonian magazine, this evolution of our radio, television, and film programs helps to bring a new dimension to the Institution in its ability to create channels from its vast academic-cultural reservoir to people in their homes throughout the nation.

Turning to another aspect of our public affairs, I believe it is clear that the Smithsonian has during the past several years once again assumed the central status within the Washington community, and indeed the national community, that it occupied at least until the end of the 19th century. There is a broad body of evidence that this is the case. The Inaugural Ball for President Nixon in January, for example, echoed the earlier inaugural festivities for President Garfield at the A & I Building. Not only was the Museum of History and Technology the scene of one of this year's Inaugural Balls and other such celebrations marking the start of a new administration, but the Institution was also the scene of a number of farewell events for top officials in the outgoing administration, including several members of the Cabinet, and an unofficial farewell for President and Mrs. Johnson themselves.

Every department in the Cabinet held at least one, and in most cases several, conferences, meetings or other events at the Smithsonian this

year, as did fourteen other governmental agencies ranging from the FBI to the Weather Bureau to the Peace Corps. Fourteen foreign nations—geographically ranging from Ceylon to Brazil to the Netherlands—sponsored or played a principal role in exhibitions or other events. A considerable number of major national corporations, particularly in the areas of advanced technological and communication fields, sponsored events in relation to Smithsonian exhibits or other activities.

Can it be that the Smithsonian has a mission to make a real contribution toward public understanding through a union of exhibits and TV, as I have suggested earlier? Once television can be related to everyday learning, once open education is understood for what it is, I suspect that pedagogues will realize that like a mystical third eye—the Buddhist concept of the survival of the pineal neural apparatus—we may be able to translate aperceptive techniques into reality.

At present TV is merely floating on the edge of aperception, and making money. But perhaps, that pale cyclopean staring eye, possessed subjectively by everyone, in kitchen, bedroom, or parlor can be realized to be merely in its infancy, the tin lizzie of what it could be for the future, wedded to a continuing series of object-oriented exercises in a neighborhood museum.

It is the mission of the Smithsonian Institution Traveling Exhibition Service (SITES) to make the museum experience a living one to millions who do not come to the central setting.

A recent check of contracts with educational institutions in the United States revealed that SITES had sent exhibitions to 240 schools, universities, or junior colleges in all of the fifty states in the last eighteen months. It is becoming increasingly clear that SITES could render much greater service all over the country if some subsidy could be found to finance exhibitions for very small communities which cannot secure the prorated costs of the most modest exhibitions. As a conservative estimate, however, more than three and a half million people saw Smithsonian traveling exhibits in the United States and Canada in 1969. These exhibits were of painting, sculpture, architecture, photography, history, science, decorative arts, and children's art.

An extension of the Mall institutions has been the Anacostia Neighborhood Museum, described in detail in last year's report.

This concept of neighborhood museums located in large urban centers where massive social, economic, and political problems abound, gives direction and purpose to every division previously situated in the central museum complex. The natural scientist, historian, anthropologist, and ethnologist can make their research and exhibits relevant



to current human situations. The neighborhood museum must meet the practical needs of its community; indeed, its existence is predicated upon the proposition that there are close-up, person-to-person techniques to meet critical neighborhood needs. The neighborhood museum must attract a significant number of neighborhood people at all levels to insure its involvement and strengths. It should also make every effort to analyze and interpret the history of its community.

This past year the educational programs, directed by Miss Zora Martin, covered a broad spectrum from guiding children and adults through exhibits and workshops for Community Reading Assistants of the Anacostia Model School Project to special science units led by a part-time teacher on loan from the District of Columbia Board of Education.

In February of this year, the educational staff provided a well-organized series of lectures, discussions, films, and dramatic performances for our celebration of Negro History Week. In addition to this, the staff provided guided tours for the exhibit "The Sage of Anacostia," a graphic history of the Afro-American featuring the life of Frederick Douglass. This was the most successful exhibit executed by the Anacostia Museum and, undoubtedly, one of the most informative. It was attended by approximately twenty-seven thousand metropolitan area school children.

This year also saw the establishment of the museum's Research Center and Library for the purpose of furthering the development of the neighborhood museum concept. The center will serve not only the needs of Anacostia but a wider area as well. The Research Center and Library is directed by Larry Erskine Thomas, the museum's research and design coordinator. The development of this research facility will enable the community, the general public, and all who make use of its services to understand the true significance of the black man's social and cultural environment and his influence on the progress of a great nation. The Center has already consulted with and provided services to a wide variety of museums and organizations as they seek to reshape their programs and exhibits.

## ASSOCIATED ACTIVITIES

The Woodrow Wilson International Center for Scholars was established by Act of Congress (P.L. 90-637) on 24 October 1968, to be "a living institution expressing the ideals and concerns of Woodrow Wilson. . . . symbolizing and strengthening the fruitful relation

between the world of learning and the world of public affairs." Congress placed the Center in the Smithsonian Institution under the administration of its own fifteen-man Board of Trustees, subsequently appointed by President Johnson and President Nixon.

The Trustees met at the Museum of History and Technology on 6 March 1969, and created an executive committee consisting of Messrs. Humphrey, McPherson, Moynihan, Ripley, and Rogers. In addition, they approved the selection of Mr. Benjamin H. Read, formerly Executive Secretary of the Department of State, as acting director, and accepted with thanks temporary quarters in the Smithsonian Institution Building.

Concurrently, a contract has been let with Smithsonian Institution planning funds under which the Urban Design and Development Corporation, a new District of Columbia nonprofit corporation established by the American Institute of Architects and headed by Mr. Ralph G. Schwartz, will explore the feasibility of the recommended site for the Center on the future Market Square at 8th Street and Pennsylvania Avenue. The feasibility study is due on 1 September 1969.

The Woodrow Wilson International Center for Scholars has obtained a \$45,000 grant from the Ford Foundation to permit it to get started, and an initial appropriation request of \$100,000 for fiscal year 1970 has been submitted to the Congress.

A milestone in the life of our affiliated Institution, the National Gallery of Art, has been the retirement, after thirty years of devoted service of John Walker, the Gallery's second Director. The Smithsonian through its Secretary has served on the Gallery's guiding Board since its inception, and has watched with marvelling eyes, sometimes tinged with human envy, the remarkable development of the collections under his able hands. Would that other art collections in this city had been able so to increase their holdings!

To his ability, must be added Mr. Walker's prescience in the guidance of the Gallery's assistant director, Carter Brown, who now succeeds him. We salute Carter Brown as a brilliant successor to the indefatigable John Walker.

The "topping out" of the Kennedy Center's massive steel framework in September launched a year of continuing tangible progress for the John F. Kennedy Center for the Performing Arts. As the steel contract was completed, the contract for the erection of hundreds of tons of the marble from Italy for the building's facing began, and the Center took on a new look.

Although construction proceeded at a good pace, the Kennedy Center has not been immune to the meteoric rise in construction costs. In



October, Roger L. Stevens, Chairman of the Board of Trustees, announced that an additional \$15 million was needed in order to complete the building. In the spring, after a private fund-raising campaign was well along, Representative Kenneth Gray introduced H.R. 11249 in the House of Representative providing for an increased matching federal grant to the Kennedy Center and an increased loan from the United States Treasury.

Plans for the Center's opening early in 1971 progressed as George London assumed his position as Artistic Administrator last September. In December it was announced that the American Ballet Theatre, one of world's foremost dance groups, would be the Center's resident ballet company.

Perhaps the most historic moment of the year was the announcement last October that the Center's Theater would be named in honor of General and Mrs. Dwight D. Eisenhower. It was President Eisenhower, of course, who initiated the Center in 1958.

More than a score of ancillary activities will be reported on in later pages, not least of which is the development of the museum shops program, the continued planning for a conservation-analytical laboratory of major national proportions and our traditional program of exchange of information through the publication of books and research reports, the shipping of documents, and the maintenance of a conference center at Belmont.

To the vital participation of the Regents this past year should be added the special news of the reappointment for a six-year term of Mr. John Nicholas Brown, citizen of Rhode Island, and the new appointment of Mr. Thomas J. Watson Jr., citizen of Connecticut.

These multifarious extensions of a central theme to "increase and diffuse knowledge" are part of the Smithsonian. They form a core of the knowledge industry which we attempt to generate. It will be imperative in years to come that young people keep up with the changing world of technocracy. But this cannot be done by slave driving pedagogical means. It must be done by waves of ambient illumination. I do not know that this principle has been grasped as yet by sociologists or economists. It has been intuitively grasped by the so-called "media" professionals, but without a strong sense of commitment, except the laws of individual enterprise. These are to some extent outmoded, however, hence the conflict and the tension of everyday life. It is our hope in the Smithsonian to bridge this intelligence gap, for this surely we owe, as a consequence of our original creation.

## THE BOARD OF REGENTS

The annual meeting of the Board of Regents was held on 15 January 1969 at Hillwood, the home of Mrs. Marjorie Merriweather Post. Hillwood has been deeded to the Smithsonian Institution and the transfer of the property and collections was formally accepted on this date by Secretary Ripley on behalf of the Board of Regents of the Smithsonian Institution.

The spring meeting of the Board of Regents was held on 21 May 1969 in the Fine Arts and Portrait Galleries Building. This meeting was the last one to be attended by Earl Warren, retiring as Chief Justice of the United States and Chancellor of the Board of Regents. The Regents unanimously voted the following resolution, a copy of which was presented to Mr. Warren:

Earl Warren, Chief Justice of the United States and Chancellor of the Smithsonian Institution: Your fellow regents wish to express their deepest appreciation for your devoted friendship and extend to you their warmest good wishes for the years ahead.

/s/ S. DILLON RIPLEY  
*Secretary*

# FINANCIAL REPORT

T. AMES WHEELER

*Treasurer*



## Financial Report

While the Smithsonian is a private institution, its private financial resources are distinctly limited. Operating costs of its museums, art galleries, and educational and research centers are largely met by annual federal appropriations. The same is true for necessary construction programs and, through the government of the District of Columbia, for support of operations of the National Zoological Park. In addition, federal appropriations of "excess" foreign currencies are granted to the Smithsonian for the purpose of financing academic grants to various universities and educational institutions throughout the United States to enable the latter to carry out research studies in the related overseas nations.

As a private educational and research institution, the Smithsonian may and sometimes does receive a substantial volume of gifts, grants, and contracts from private individuals and foundations and from federal agencies for the acquisition of collection items or the performance of specific projects in areas of special Smithsonian capability. These cover such diverse fields as the tracking of satellites in outer space, and underwater exploration for oceanographic research and ecological studies here and abroad. Finally, earnings on the Smithsonian's endowment funds provide private fund income of moderate proportions.

For the year ended 30 June 1969, this category of financial support for Smithsonian operating expenses may be summarized as follows:

Federal appropriations	
Salaries and Expenses—normal activities	\$26, 443, 000
Special Foreign Currency Program	2, 316, 000
District of Columbia—Operation of National Zoological Park	2, 528, 000
Research grants and contracts (federal and private)	11, 400, 000
Private funds	
Gifts (excluding gifts to endowment funds; entire amount restricted to specific projects and hence unavailable for general operating purposes)	1, 987, 000
Income from endowments and current fund investments	1, 365, 000
Total:	<hr/> \$46, 039, 000

In addition, federal appropriations to finance construction projects were received as follows:

National Zoological Park	\$ 300,000
Restoration and Renovation of Buildings	400,000
Toward construction of Joseph H. Hirshhorn Museum and Sculpture Garden	2,000,000**
Total:	<hr/> \$ 2,700,000

\*\*Plus \$12,197,000 as contract authorization

Financial statements for the private funds, as audited by independent public accountants, are shown below together with a statement of gifts received in the current fiscal year.

The gifts received for both endowment and immediate program purposes have been extremely helpful and are again gratefully acknowledged. Major contributions included the \$685,000 of funds received from Cooper Union and the Committee to Save Cooper Union Museum in connection with the Smithsonian assumption of responsibility for that Museum; \$150,000 from the Scaife Family of Pittsburgh and \$75,000 from the Old Dominion Foundation for the Chesapeake Bay Center project; Ford Foundation grants of \$208,500 and \$45,000, respectively, for "Reading Is Fundamental" and the new Woodrow Wilson Center for International Scholars; \$230,000 from the Morris and Gwendolyn Cafritz Foundation for the new Calder setting on the Mall; and a bequest of \$235,000 and a valuable collection of hemiptera-heteroptera from the Carl Drake estate.

The Smithsonian has been fortunate in securing increases in its federal appropriations for operating purposes in recent years. For its normal activities in fiscal year 1969, however, the increase amounted merely to about eight percent. Increasingly severe federal budgetary restraints are now seriously limiting efforts to keep up with the inflationary rise in salaries and supplies, to meet the difficulty of accommodating steadily rising numbers of visitors to our museums, and to maintain even minimum support of research and educational projects.

Under these circumstances, private-fund support becomes doubly valuable. The book value of private Smithsonian endowment funds increased during the fiscal year by \$1,740,000 (principally \$1,250,000 gain on sales of securities and \$437,000 from gifts), to a total of \$26,490,000 on 30 June 1969 (market value \$31,800,000). The income from roughly one half of these endowment funds is directed to the support of the Freer Gallery, and income from another one fourth of the funds is restricted to other valuable endeavors in specific fields of research and education. The remaining funds (\$6,414,000) are unrestricted as to use of income; together with other investments in current fund accounts they produce about \$400,000 of income annually.

These private funds, even in such limited amounts in relation to the overall operating requirements of the Institution, are extremely valuable in permitting experimental improvements, change, and modernization



in a variety of operating programs. It is essential to the future success of the Institution that such private fund income be substantially increased if the Smithsonian is to fulfill its mandate and keep abreast of rapidly changing needs.

Some examples of a few specific large requirements for the immediate future include purchase funds to expand our Chesapeake Bay Center for Field Biology which is conducting fundamental ecological studies. In addition we need building renovation and operating funds for the Cooper-Hewitt Museum of Decorative Arts and Design in New York City. Finally we need funds to expand the Smithsonian Associates program on a national scale. This pressing need for additional private support has not previously been made known to our friends and well-wishers. To this end, therefore, there has now been initiated an expanded program to attract important private financial support. The Institution will seek directed and unrestricted gifts, grants, and bequests from private individuals, foundations, and corporations. Some success has already been achieved. We intend to work harder.

## Financial Statement

For the Year Ending 30 June 1969

The Smithsonian Institution gratefully acknowledges gifts and bequests received from the following:

*\$100,000 or more:*

Morris and Gwendolyn Cafritz Foundation	Mrs. Marjorie Merriweather Post
The Ford Foundation	The Scaife Family of Pittsburgh

*\$10,000 or more:*

American Federation of Information Processing Society	Old Dominion Foundation
American Petroleum Institute	Russell Sage Foundation
Frank Caplan	Hattie M. Strong Foundation
John A. du Pont	Irwin-Sweeney-Miller Foundation
Daniel and Florence Guggenheim Foundation	Tai Ping Foundation
J. Seward Johnson	Charles Ulrick and Josephine Bay Foundation, Inc.
National Geographic Society	Howard Weingrow

*\$1,000 or more:*

Allison Division, General Motors Corporation	American Council of Learned Societies
American Committee for International Wildlife Protection	Andrew Archer
	R. Arundel

Mrs. Edward Ayers  
 Robert Baker  
 Bell Aerospace Corporation  
 The Louis and Henrietta Blaustein  
     Foundation  
 Estate of Mrs. Bliss  
 Boeing Company  
 Capital Cities Broadcasting  
 Coca Cola Company  
 Columbia Broadcasting System  
 The Commonwealth Fund  
 Corn Refiners  
 Clarence A. deGiers  
 Mrs. Robert Dunning  
 Earth Science Imports  
 Martin Ehrmann  
 William Elkins  
 Harvey Firestone  
 Foundation for Voluntary Service  
 Garrett Corporation  
 Geigy Chemical Corporation  
 General Dynamics  
 General Electric Company  
 Grant Foundation  
 Grumman Aircraft Corporation  
 Hughes Aircraft Corporation  
 International Business Machines  
     Corporation  
 International Music Council  
 International Telephone and  
     Telegraph Corporation  
 James Ellwood Jones  
 Junior League  
 Francis Keppel  
 Hoffmann LaRoche Foundation  
 J. Lavalend  
 Dr. George Lawrence  
 M. Lebowitz  
 Eli Lilly & Company  
 Charles A. Lindbergh

\$500.00 or more:

Acquavella Gallery  
 Walter Annenberg  
 John Beck  
 Bell & Howell Foundation  
 Leigh Block  
 George Brown  
 William A. Burden  
 H. Curtis  
 C. Douglas Dillon

Ling-Temco-Vought Aerospace,  
     Incorporated  
 The Link Foundation  
 Litton Industries  
 Lockheed Aircraft Corporation  
 Louwana Fund, Incorporated  
 Marriott Foundation  
 L. Marschael  
 Mead Corporation  
 Fearson Meeks  
 The Merck Company  
 Irene Morden  
 National Home Library  
 Olympia Airways  
 Sidney Printing & Publishing  
     Company  
 Josephine Bay Paul and C. Michael  
     Paul Foundation  
 Charles Pfizer Company  
 Population Council  
 Raytheon Company  
 Research Corporation  
 Herbert and Nannette Rothchild  
     Foundation  
 Ryan Aeronautical Foundation  
 Tom Sawyer  
 Alfred P. Sloan Foundation  
 Sperry Rand Corporation  
 Dr. Walter Stryker  
 Eugene Thaw  
 Allen Tucker Memorial Fund  
 United Aircraft Corporation  
 University of Michigan  
 Lila Acheson Wallace Foundation  
 Washington, D.C., Library  
 The Washington Post  
 Thomas J. Watson, Jr.  
 Weedon Foundation  
 Westinghouse Corporation  
 Xerox Corporation

Mrs. Robert Dranign  
 Electric Indicator Company,  
     Incorporated  
 H. Elwell  
 Fairchild Hiller Corporation  
 Faoun  
 Dr. Gordon D. Gibson  
 Arnold Gingrich  
 Cecil Green

Wenner-Gren Foundation  
 Donald Hall  
 Gordon Hanes  
 Henry Heinz  
 Mrs. Oveta Culp Hobby  
 Hughes Tool Company  
 Edgar Kaiser  
 Kamen Corporation  
 Alice Kaplan  
 David I. Kreeger  
 Estee and James Lauder  
 Dorothy Lee  
 The Lilliputian Foundation  
 James Ling  
 John Loch

Martha Love  
 Arjay Miller  
 J. Irwin Miller  
 J. Jefferson Miller  
 Roy Neuberger  
 North American Rockwell  
 Pan American Airways  
 PRD Electronics, Incorporated  
 Reader's Digest  
 Dr. Harold Rehder  
 David Rockefeller  
 Shorewood Products  
 Arthur O. Sulzberger  
 Joseph Wilson  
 Anne Windfohr

We also gratefully acknowledge other contributions in the amount of \$16,655.92 received from 201 persons during 1969.

## PEAT, MARWICK, MITCHELL & CO.

CERTIFIED PUBLIC ACCOUNTANTS

1025 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, 1969 and the related statement of changes in fund balances 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.

In our opinion, the accompanying statement of changes in fund balances presents fairly the operations of the unrestricted funds of Smithsonian Institution for the year ended June 30, 1969, in conformity with generally accepted accounting principles; and, with respect to all other funds, subject to the matters referred to in note 1, the accompanying balance sheet of private funds and the related statement of changes in fund balances present fairly the assets and fund balances of Smithsonian Institution at June 30, 1969, and changes in fund balances, resulting from cash transactions of the private funds for the year then ended, all on a basis consistent with that of the preceding year.

PEAT, MARWICK, MITCHELL & CO.

October 27, 1969

# SMITHSONIAN BALANCE SHEET OF PRIVATE

*Assets*

## Current funds:

## Cash:

In U.S. Treasury	\$492, 380
In banks and on hand	577, 687

Total cash	1, 070, 067
------------	-------------

## Receivables:

Accounts	\$268, 120
Advances—travel and other	156, 963
Reimbursements—grants and contracts	1, 261, 875
	<hr/>
	1, 686, 958

Inventories at net realizable value	618, 804
-------------------------------------	----------

Investments—stocks and bonds at cost (market value \$3,030,124)	3, 250, 305
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Prepaid expense	19, 907
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Equipment—museum shops (less accumulated depreciation of \$26,407)	86, 397
--	---------

Total current funds	\$6, 732, 438
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## Endowment and similar funds:

Cash	98, 932
------	---------

Notes receivable	99, 128
------------------	---------

Investments—stocks and bonds at cost (market value \$29,281,837)	23, 955, 702
--	--------------

Loan to U.S. Treasury in perpetuity	1, 000, 000
-------------------------------------	-------------

Real estate (at cost or appraised value at date of gift)	1, 336, 175
--	-------------

Total endowment and similar funds	\$26, 489, 937
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See accompanying notes to financial statement

## INSTITUTION

FUNDS, 30 JUNE 1969

*Liabilities and Fund Balances*

## Current funds:

Accounts payable		\$667, 754
Accrued liabilities		39, 972
Unrestricted fund balance		2, 851, 411
Restricted fund balance:		
Gifts	\$1, 074, 983	
Grants	1, 034, 867	
Contracts	270, 087	
	<hr/>	2, 379, 937
Unexpended income:		
Freer	472, 272	
Other	321, 092	793, 364
	<hr/>	
Total current funds		<hr/> \$6, 732, 438 <hr/>

## Endowment and similar funds:

## Endowment funds—income restricted:

Freer	13, 170, 032	
Other	6, 905, 852	
	<hr/>	20, 075, 884

Current funds reserved as an endowment—income  
unrestricted

6, 414, 053

## Total endowment and similar funds

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\$26, 489, 937

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## Commitment (note 2)

SMITHSONIAN  
Statement of Changes  
Year Ended

	<i>Current funds</i>	
	<i>Total current funds</i>	<i>Unrestricted funds</i>
Balance at beginning of year	\$5, 491, 751	\$3, 086, 153
Adjustment: to reflect unexpended funds held by principal investigators	220, 117	10, 718
Adjusted balance at beginning of year	5, 711, 868	3, 096, 871
Additions:		
Grants and contracts—net of refunds	11, 398, 918	.....
Investment income	1, 302, 532	379, 150
Gifts and bequests	1, 986, 830	181, 143
Gross profit on sales	413, 561	413, 561
Rental	1, 118, 951	1, 118, 951
Dues and fees	904, 957	904, 957
Reimbursement from grantors or contractors	16, 632	(109, 989)
Other	503, 813	304, 002
Net gains on sales and exchanges of investments	62, 098	62, 098
Total additions	17, 708, 292	3, 253, 873
Deductions:		
Salaries and benefits:		
Administrative	3, 138, 543	3, 138, 543
Research	6, 069, 693	.....
Purchases for collection	764, 833	210, 175
Travel and transportation	689, 020	132, 274
Equipment and facilities	723, 286	63, 518
Supplies and materials	668, 776	268, 436
Rents and utilities	918, 468	319, 566
Communication	297, 243	102, 416
Contractual services	3, 118, 926	1, 272, 522
Computer rental	918, 039	40, 068
Depreciation	21, 462	21, 462
Admin. expenditures applicable to other funds	.....	(2, 196, 569)
Total expenditures	17, 328, 289	3, 372, 411
Transfers to (from):		
Income added to principal	(49, 614)	.....
Transfers for designated purposes	.....	(109, 377)
Transfers to endowment funds	(17, 545)	(17, 545)
Total transfers	(67, 159)	(126, 922)
Balance at end of year	\$6, 024, 712	\$2, 851, 411

See accompanying notes to financial statements.



INSTITUTION  
in Fund Balances  
30 June 1969

Current funds—Continued				
Restricted funds		Endowment and similar funds		
Gifts, Grants, and Contracts	Unexpended income	Total endowment and similar funds	Endowment funds	Current funds reserved as an endowment
\$1, 526, 607	\$878, 991	\$24, 749, 750	\$18, 553, 392	\$6, 196, 358
191, 030	18, 369	.....	.....	.....
1, 717, 637	897, 360	24, 749, 750	18, 553, 392	6, 196, 358
11, 398, 918	.....	.....	.....	.....
.....	923, 382	.....	.....	.....
1, 805, 687	.....	419, 507	419, 507	.....
.....	.....	.....	.....	.....
.....	.....	.....	.....	.....
126, 621	.....	.....	.....	.....
99, 408	100, 403	3, 330	(77)	3, 407
.....	.....	1, 250, 191	1, 035, 903	214, 288
13, 430, 634	1, 023, 785	1, 673, 028	1, 455, 333	217, 695
.....	.....	.....	.....	.....
5, 659, 758	409, 935	.....	.....	.....
253, 389	301, 269	.....	.....	.....
508, 022	48, 724	.....	.....	.....
627, 885	31, 883	.....	.....	.....
354, 281	46, 059	.....	.....	.....
598, 902	.....	.....	.....	.....
183, 469	11, 358	.....	.....	.....
1, 704, 671	141, 733	.....	.....	.....
877, 971	.....	.....	.....	.....
.....	.....	.....	.....	.....
2, 117, 504	79, 065	.....	.....	.....
12, 885, 852	1, 070, 026	.....	.....	.....
.....	(49, 614)	49, 614	49, 614	.....
117, 518	(8, 141)	.....	.....	.....
.....	.....	17, 545	17, 545	.....
117, 518	(57, 755)	67, 159	67, 159	.....
\$2, 379, 937	\$793, 364	\$26, 489, 937	\$20, 075, 884	\$6, 414, 053

SMITHSONIAN INSTITUTION  
Summary of Grants and Contracts  
Year Ended June 30, 1969

	<i>Total</i>	<i>Grants</i>	<i>Contracts</i>
Department of Health, Education, and Welfare	\$272, 397	\$272, 397	.....
Department of Defense	1, 667, 184	50, 616	\$1, 316, 568
National Aeronautics and Space Ad- ministration	7, 265, 134	4, 900, 423	2, 364, 711
National Science Foundation	2, 098, 267	120, 391	1, 977, 876
Other	320, 635	131, 423	189, 212
<b>Total Grants and Contracts.....</b>	<b>\$11, 623, 617</b>	<b>\$5, 475, 250</b>	<b>\$6, 148, 367</b>

Summary of Endowment and Similar Funds Investments  
Book Values at June 30, 1969

	<i>Total</i>	<i>Consolidated Fund</i>	<i>Freer Fund</i>
Short-term bonds	\$2, 650, 279	\$1, 096, 371	\$1, 553, 908
Medium-term bonds	1, 361, 226	617, 060	744, 166
Long-term bonds	8, 518, 126	3, 113, 624	5, 404, 502
Preferred stocks	878, 151	565, 840	312, 311
Common stocks	10, 534, 534	5, 381, 263	5, 153, 271
<b>Totals.....</b>	<b>\$23, 942, 316</b>	<b>\$10, 774, 158</b>	<b>\$13, 168, 158</b>
<b>Other Stocks &amp; Bonds</b>	<b>13, 386</b>		
<b>Total.....</b>	<b>\$23, 955, 702</b>		

Note 1. *Basis of Accounting.*—The accounts for unrestricted funds are maintained on the accrual basis of accounting. Accounts for other funds are maintained on the basis of cash receipts and disbursements, except that reimbursements for work performed pursuant to a grant or contract are accrued and certain real estate is carried at cost or appraised value as explained below.

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.

Note 2. *Commitment.*—Pursuant to an agreement, dated October 9, 1967, between the Institution and The Cooper Union for the Advancement of Science and

Art, the Institution acquired, on July 1, 1968, all funds belonging to The Cooper Union for use exclusively for museum purposes, and certain articles of tangible personal property as defined in the agreement.

The agreement provides, among other covenants, that the Institution will maintain a museum in New York City and has pledges in excess of \$800,000 for the support of such a museum. During the year pledges of \$200,000 were collected.



OFFICE OF ACADEMIC  
PROGRAMS

PHILIP C. RITTERBUSH

*Director*





# The Office of Academic Programs

PHILIP C. RITTERBUSH, *Director*

LEARNING IS INTENSELY INDIVIDUALISTIC. Yet teaching is almost always offered to groups. Formal education is organized for economy of teaching effort, not for maximum learning. Like the formal set-piece battle, which was the only way some generals knew how to fight, the formal curriculum too often reflects the inability of faculties to teach in any other way. The course given in sequence to a group of students marching through it in tight formation for some predetermined interval is obsolete. And so are school tours in museums if children are made to stop obediently at successive stations to absorb doses of facts soon to be forgotten. Educational programs must afford proper scope to the rhythms of interest and respond to the directions of curiosity prompting each student.

The basis of higher education within the Smithsonian is the mature scholar conducting research in a field and helping to guide the efforts of a student seeking greater competence. Starting this year, applicants for educational appointments at the Institution have been asked not only for records of previous achievement but also for essays specifying their intellectual goals, enabling prospective supervisors to judge which students will most benefit from the Smithsonian. Terms of admission and the award of fellowship support are determined by steering committees of professional staff members, to whom these powers have been delegated for the first time this year. Within each major field of study, programs of associated tutorials and seminars are being developed to foster more intensive exchanges of ideas and to serve community interests of investigators whose work is related.

The summary of higher education for academic year 1968-69 is given by each discipline, as follows:

In *American Studies* the equivalent of fourteen credit hours of instruction has been offered, including the graduate-level survey course in American material culture, conducted by Harold Skramstad, a teaching associate whose extensive knowledge of our nation's development has enabled him to draw widely on Smithsonian resources. Of the twenty-

six professional staff members whose primary concern is American history, four hold ancillary university appointments.

In *Anthropology* a total of thirty-two credit hours (equivalent) of instruction has been offered and three PhDs and two master's degrees have been earned from the universities of students holding academic appointments. Of eighteen professional staff members, two hold university appointments.

A program in *Cultural Studies* is being established to serve the Institution's scholarly enterprises in art and music history and the study of folk culture. Three PhDs have been earned in this area and one master's degree, while the equivalent of twenty-one credit hours of instruction has been offered by a total of twenty-three professional staff members. Dr. William Gerdts has been appointed a teaching associate and has conducted a graduate seminar on 19th-century American art in the National Collection of Fine Arts.

In *Environmental Biology*, with twenty-three professional staff members, of whom five hold joint university appointments, the equivalent of eight credit hours of instruction has been offered, including the third year of the spring lecture course in environmental biology, conducted in cooperation with the D.C. Consortium of Universities.

In *Evolutionary and Behavioral Biology* (Tropical Zones), the growing interest of biologists in unique tropical ecosystems and evolutionary patterns has resulted in a group of excellent students taking advantage of consultation with the Panama staff of seven scientists, of whom one held a university appointment. Seven PhDs have been earned and a total of forty-three credit hours (equivalent) of instruction have been offered.

In *Evolutionary and Systematic Biology*, comprising the biological research departments of the National Museum of Natural History and sixty-five investigators, with twenty-four holding university appointments, the level of instruction offered has been equivalent to ninety-four credit hours. Six PhDs and two master's degrees have been earned. Dr. Richard Boardman has conducted a widely praised seminar on bryozoa, covering techniques of study as well as analyses of fine structure.

In the *History of Science and Technology*, defined broadly to include technology as applied to social needs such as agriculture, coinage, and the postal system, the Institution employs thirty investigators, of whom three hold university appointments. The equivalent of nineteen credit hours of instruction has been offered and one PhD has been earned.

*Museum Studies* comprises three broad concerns of the modern museum: display systems including communications arts, reference systems including data management, and preservation systems including

all aspects of the analysis of materials. The program being developed in this area looks beyond traditional approaches to museum training toward a wider academic foundation. Internships at the grade level for academic credit are now regularly arranged with George Washington University and the University of Maryland.



Miss Joyce Perry, participant in the Office of Academic Programs' 1969 Summer Institute in Museum Display Systems has a lively discussion with a group of inner-city sixth graders as part of an experiment in pupil reactions to museum objects. Data obtained will be used in the development of new teaching exhibits at the Smithsonian.

Almost any curator might be counted as a potential contributor to the study of these practical museum arts, as well as a dozen or so staff members for whom they are the primary professional commitment, as is true for conservators and reference system analysts. One PhD and one master's degree have been earned. Dr. Robert Organ, director of the Conservation Analytical Laboratory, has offered a course of lectures on chemistry. The equivalent of eighteen credit hours of instruction has been offered. Two staff members hold university appointments.

In the *Physical Sciences*, forty-seven of seventy research staff members have held academic appointments, reflecting the close interdependence of the Smithsonian Astrophysical Observatory and Harvard University.

Fourteen PhDs have been earned and two master's degrees. In all, the equivalent of 188 credit hours of instruction has been offered.

## SCHOOL SERVICE PROGRAMS

The Smithsonian's school tour program has provided almost 1,600 escorted tours, serving more than 45,000 school students, in the National Museum of History and Technology, the National Museum of Natural History, and the National Air and Space Museum. At the National Collection of Fine Arts 135 tours have been provided, serving 4,050 pupils. Tours at the National Zoological Park have numbered 165, serving 9,390 children. Of these, 130 tours have been prescheduled, and 35 have been unscheduled classes that docents have been able to assist once they arrived at the Zoo.

These tours have been made possible through the volunteer activities of about 150 women recruited from many parts of the Washington metropolitan community. By giving, on the average, one morning a week during the school year, the volunteer docents are able to offer a wide variety of tours in eighteen areas of the Smithsonian Institution.

A central scheduling office has now been set up for the tours, allowing the instructor staff to devote more time to special class visits and the production of educational materials. Mrs. Joan Madden has joined the staff as Volunteer Representative and has greatly improved all aspects of scheduling. The number of volunteer docents has more than doubled this year and the school tour total has increased by 235 percent. Far more important than numbers have been the efforts to transform the tours into freer learning experiences. Within the National Collection of Fine Arts, for example, young children are encouraged to act out their responses to works of painting and sculpture. Under the guidance of Miss Susan Sollins the docents have worked up a remarkable improvisational tour.

Exciting new departures in education were discussed for the entire cadre of docents in a day-long meeting in May 1969: "Museum Education Day," which brought six inspiring speakers, who described ways to use the museum as an effective environment for visual learning. At an appreciation ceremony in June 1969 the docents were given a delightful concert on period musical instruments, a wonderful example of the museum come alive, which is of course the mission they seek to perform for youngsters.

The Division of Elementary and Secondary Education "Tailored Tour" program has seen much activity during the year. This program, one which provides carefully custom-designed museum experiences



planned in terms of specific needs of subscribing school groups, has continued to gain popularity among teachers and curriculum specialists in the Washington, D.C., public, private, and parochial school community. During the year approximately 1,260 pupils representing forty-two schools have taken part in the program. Slightly more than fifteen percent of the Office of Academic Programs instructional staff time has been spent in planning sessions with classroom teachers and in direct teaching of visiting classes. Eight volunteer docents have been involved in implementation of certain of these special museum experiences when the design was one that touched upon museum exhibits within the scope of their general preparation.

In addition to a museum staff of instructors available to consult with school people, the availability of two classrooms in the Division of Elementary and Secondary Education complex in the National Museum of Natural History makes the tailored tour concept functional. This facility permits discussions, use of various types of media, participation of visiting resource persons, demonstrations, creative activities (such as clay modeling, painting, creative writing), and other teaching and learning techniques to be planned as part of a comprehensive teaching plan.

Groups participating in the tailored tour program during the past year include the Model Schools Innovation Team, Pupil Personnel Department Tutorial Program, United States Department of Labor Day Nursery School, and Project Headstart.

The school service program introduces groups of young Americans to educational opportunities outside of school that will be available to them for life. In hopes of improving the effectiveness of museums in providing educational experiences, the Institution has issued an invitation to encourage research by psychologists and others into the learning process as it may actually be observed in our halls and galleries. Effective learning necessarily involves pupils in active responses and free discussion of exhibits, which can be studied for clues to questions of interest and comprehension. To see children come alive with the joy of knowing is to share in a museum's greatest success. But as Hans Zetterberg argues in his recent book, *Museums and Adult Education*, there has been far too little discerning study of who comes to see what and how they profit by it. Here the Smithsonian has a special responsibility to sponsor studies that will be of value throughout the world of education. An experimental student information guide program and an invitational conference on innovation and relevance in museum exhibits are other special activities devoted to this objective, which will also be of primary concern within the higher education program in museum studies.

An acute shortage of financial resources has blocked expansion of education programs for the past three years. Outside support from the National Science Foundation, the National Endowment on the Humanities, the Junior League of Washington, and the Home Library Foundation has helped to maintain the program level. Support for the Third International Symposium has been generously provided by the sponsors. The United States Congress has approved a centralization of educational funding within the Office of Academic Programs, which is expected to result in better communication of student numbers and program needs. More effective administrative procedures for scheduling school tours, for making appointments in higher education, and for certifying instruction to universities have been worked out and put into effect, made possible by an unusually dedicated staff. Wilton S. Dillon, a versatile social anthropologist who has seen distinguished service with the Phelps-Stokes Fund and the National Academy of Sciences, became Director of the Division of Seminars in January 1969. He is ably assisted by Mrs. Ruth Frazier. David Chase and Mrs. Grace Murphy direct the production of the *Washington Academic Calendar* and other special projects in urban and environmental affairs. Edward Davidson, a paleontologist who has done much of the work for his doctorate within the National Museum of Natural History, has joined the Division of Graduate Studies as a Program Associate, bringing to it an intimate knowledge of Smithsonian research.

Director Ritterbush has joined the deliberations of the working group on intellectual institutions of the American Academy of Arts and Sciences-sponsored Commission on the Year 2000 and also a commission on governance of universities cosponsored by the Academy and the Danforth Foundation. He also has organized a symposium on the relations of art and science to biological form for the annual meeting of the American Association for the Advancement of Science, has presented a number of scholarly papers, has addressed the sesquicentennial of the University of Cincinnati ("The Educated Man in the Year 2000"), the silver anniversary observance of the National Science Teachers' Association ("Science Teaching and the Future"), and has consulted on education with the governments of Israel and the United Kingdom.

### *Staff Publications*

- DILLON, WILTON S., *Gifts and Nations*. Foreword by Talcott Parsons. The Hague and Paris: Mouton and École Pratique des Hautes Études, 1968.
- RITTERBUSH, PHILIP C., *The Art of Organic Forms*. Washington, D.C.: Smithsonian Institution Press, 1968.



- . "Environment and Historical Paradox." *Yearbook of the Society for General Systems Research* (1968), volume 13.
- . "The Biological Muse." *Natural History* (October 1968), volume 77, number 8, pages 26–31.
- . "The Educated Man in the Year 2000." *American Oxonian* (January 1969), volume 56, number 1, pages 1–13.
- . "The Educated Man in the Year 2000." *Vital Speeches* (1 March 1969), volume number 10, pages 295–300.



# SCIENCE

SIDNEY R. GALLER

*Assistant Secretary*



# National Museum of Natural History<sup>1</sup>

RICHARD S. COWAN, *Director*



ONE NEEDS TO HAVE ONLY SOME AWARENESS of the world around him—and a conscience—to recognize that enormous, often traumatic, changes of many kinds are demanding attention. Demands for change in social institutions, reversal of environmental degradation, and changing values in the face of rapid scientific and technological advances provide us with challenges well beyond anything that has ever been faced by civilized man. Directly and indirectly, the disciplines of natural history can, and must, contribute to the solution of these problems. The first step in the application of science to human problems is that scientists must *care*, must be concerned. The research staff of this, the largest natural history museum in the country, increasingly reflects a growing involvement with today's problems in today's world.

Perhaps the single concern of greatest magnitude is the accelerating impact of man on his surroundings or, in many cases, the actual destruction of the environment. Formal direct action, through participation in organizations of national and international scope, is evidenced by our participation in such undertakings as the International Biological Program, the Charles Darwin Station in the Galapagos Islands, the joint effort with British scientists to protect the biota and habitats of Aldabra Island. At the personal level, however, numerous individuals of the research staff at the year's end were: (1) planning a colloquium on the threatened biota of Hawaii; (2) organizing preliminary exploratory field studies of a starfish population explosion that threatens the coral Pacific islands; (3) preparing for a reconnaissance of the Marshall Island Test Area; (4) developing plans for massive biological research programs in Southeast Asia that can serve as the foundation for an expanded standard of living for the people of that area; (5) completing plans for large-scale systematic studies in collaboration with ecologists, geneticists, physiologists, and others concerned with the complexity and

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<sup>1</sup> Formerly Museum of Natural History. Name change effective 24 March 1969.

potentials of the tropical forest ecosystem; and (6) conducting experiments similar to those that will be used in our studies of the first lunar samples.

If one is truly involved in current problem-solving, he realizes that today's research programs, by themselves, do not provide for the future, even if they were adequate to meet today's problems (and they are not). This realization has produced an involvement by the Museum staff in educational activities far beyond all expectations of a few years past. High school students, doctoral degree candidates, scores of volunteer workers of all ages, and serious visiting researchers use the facilities of the Museum in ever-growing numbers. It is noteworthy that they come not only because of the more than fifty million specimens that serve as the documentation base for a full panoply of research but also because of a vital research climate in the Museum.

With the increase of interdisciplinary use of the collections-tool, there has been generated a vast demand for the information they contain. If museums are to continue to serve a vital role in the biological research process, they must contribute fully to the research-educational process by making the collections and their accompanying data more accessible to the community of scholars. Rising costs of collections maintenance—along with large numbers of new materials obtained in the course of major, large-scale biological programs—have discouraged, or even prevented, museums from fulfilling this function as adequately as required. Electronic data-processing techniques, though costly both in time and money provide the means by which museums may meet these problems. Under the direction of Donald F. Squires,<sup>2</sup> pilot studies have been underway for the last two years with the support of the Department of Health, Education, and Welfare (HEW) and with the collaboration of the Smithsonian's Information Systems Division. The information that comprises the data base is derived from the collections of sea birds, marine crustaceans, and rocks. Data recorded in the field and in the laboratory are prepared in machine-readable form as a part of the specimen documentation process, read into a computerized system of storage, and retrieved according to the requirements of the researcher. The systems devised are now being applied in other parts of the collections by the Museum and the future expansion into many of the national collections is a long-term, high-priority objective that may serve as a model for the entire museum community.

Application of the techniques of data processing to the enormous bibliographic needs of biology is a closely related goal that is also being

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<sup>2</sup> Formerly deputy director of the Museum but now in charge of the marine research programs at the State University of New York at Stony Brook.



studied for future development. Already, the data base may be queried successfully in specific areas, and at the end of the year a study was underway of the economic factors involved—how much it costs to put a set of data in the base and to retrieve that information.

One final example of the Museum's deep commitment to the study of fundamental human problems is provided by a Smithsonian-National Institutes of Health program initiated several years ago to study the occurrence of cancer-like, abnormal growths in lower animals. The project has much potential significance to other larger, broad-gauged research programs in the Museum, as well as to medical research on tissue abnormalities. The implications and accomplishments of this program are described later in this report by the project director, John C. Harshbarger.

While major concepts in the understanding of disease processes (particularly in infectious disease, immunity, and genetics) have been made in studies of the lower animal phyla, much of the work has been done by independent investigations widely separated in time and location, and very little coordinated support for bio-medical research has been extended to animals below mammals.

In the field of oncology (the study of tumors) the paucity of information regarding neoplasms in invertebrates has stimulated a search for anti-tumor materials in these animals and some success has been reported.

The thymic-dependent defense system of cellular immunity, which phylogenetically appeared at about the level of the cyclostomes (lampreys), is claimed by some researchers to have evolved because of the survival value it provided as a surveillance system against aberrant (neoplastic) cell populations. Neoplasia, therefore, must not have been much of a threat to primitive animals and should be rare in the lower phyla today.

The majority opinion, however, as to why neoplasia seems rare in invertebrates and cold-blooded vertebrates is that these tumors are seldom recognized and the small size of many of these animals discourages autopsy even when illness and death is observed. Moreover, there has been little attempt to survey lower animal populations specifically for neoplasia since many zoologists discard abnormal specimens in favor of more normal ones for study.

There was no center for the collection and study of the pathology of animals in the lower phyla until 1965, when the Registry of Tumors in Lower Animals was activated by the National Cancer Institute at the National Museum of Natural History under a contractual arrangement. The primary objectives of the Registry are: (1) to collect and study neoplasms and related disorders of growth and form in inver-

tebrate and cold-blooded vertebrates, (2) to serve to collect the pertinent tumor-related literature, and (3) to serve a liaison role among the various workers in the field. Another, secondary objective of the Registry is to carry out field collections of neoplasms where these are of special interest to pathologists. A study of epithelial papillomas of the mouth—enzootic in white croakers off the coast of California—is in progress. A study of invertebrates exposed to radioactive fallout at the Bikini Atoll has just been initiated.

The Registry now has 244 accessions, only about one fourth of which have been classified as neoplasms. Another fourth are problematic lesions of indeterminate nature, illustrating the degree of difficulty experienced in identifying disease processes in unfamiliar species. One half of the specimens represent inflammatory, parasitic, reparative, developmental, and other types of non-neoplastic phenomena.

One of the most valuable of the Registry's accomplishments has been the organization of an international symposium conducted at the Smithsonian Institution 19–21 June 1968. This was the first such symposium devoted entirely to neoplasms of invertebrates and cold-blooded vertebrates and the proceedings will be published (*National Cancer Institute Monograph 31*).

Largely as a result of the Registry's efforts, a reevaluation of the occurrence of tumors is being made. It is now recognized that neoplasms occur in the vertebrates as low as the cyclostomes and that neoplasms apparently comparable to those in mammals occur in insects and mollusks. For example, in two laboratories transplantable, although not invasive, growths have been found in the fruit fly, *Drosophila melanogaster*. These tumors arise from the continual proliferation of imaginal disk cells that have lost their ability for maturation. Another transplantable tumor of *Drosophila* arises in the larvae of a specific strain. In this case the larval neuroblast cells proliferate rapidly, invade, and replace the host tissues. Because of the wealth of knowledge of *Drosophila* genetics and the occurrence of polyteny in the salivary gland chromosomes, these transplantable tumors are likely to become valuable tools for the cancer researcher and the developmental biologist.

Since naturally occurring leukemias, epitheliomas, and a variety of mesenchymal tumors have been found in oysters, mussels, clams, snails, and crabs, one can begin to see potential advantages of cancer research on these lower animals. Suspicion has been raised, for example, that environmental factors will be found to explain the high incidence of some neoplasms in particular populations of a species, which factors may be of importance in explaining the distribution of cancer in human populations. We already know that the epizootic of liver cancer in hatchery-reared rainbow trout led to the discovery that aflatoxin, the

by-product of a fungus, was its cause, and aflatoxin is now under careful scrutiny as a possible carcinogen in man. A similar situation is the association of a herpes-like virus with the Lucké renal tumor (adenocarcinoma) of frogs. This animal system is being used to obtain information that may be useful in explaining the association of a similar virus with the leukemic disease in Africans known as Burkitt's lymphoma.

With the growth of aquaculture as a means of food supply, pathology of marine animals is becoming a growing science. As greater numbers of animals come under careful observation, it is inevitable that new epizootics of neoplasia will be discovered and will require investigation of their relationship to human disease.

Investigation of the natural occurrence of neoplasms in the lower phyla eventually may enable us to make some generalizations concerning trends toward higher incidences of neoplasia in species of more recent evolutionary origin, in species with more numerous systems, or in species with greater degree of specialization in particular organs and tissues. A board overview of neoplasia on the phylogenetic scale is not now possible, for the current state of knowledge covers less than three percent of the animal species on earth and only about twenty percent of evolutionary time.

The relationship of carcinogenesis to immunologic effectiveness is a question that may prove more readily answerable by investigating lower animals. The invertebrates offer special advantages because they do not produce humoral antibodies—by classical definitions—but they do have cellular responses that are effective in “recognizing” foreign cells and may be effective in “recognizing” tumor antigens. Since these animals lack antibody formation as a complicating factor, they represent a simplified experimental system for study of cellular immunological mechanisms.

The study of neoplasia in lower animals has enormous potential. The Tumor Registry has taken the lead by putting together a collection of specimens which demonstrate that neoplasms exist widely in the animal kingdom. Primarily through this collection and the symposium held last year, considerable interest has been stimulated throughout the world. We should now proceed to use populations with endemic neoplasms to answer some of the pertinent questions of etiology and the influences of environmental factors, as well as to expand our knowledge of tumor formation in the lower animal phyla.

Although today's problems seem staggering, they may be viewed as opportunities for extending man's understanding of the natural world, which is the ultimate objective of the National Museum of Natural History.

## NATIONAL MUSEUM OF NATURAL HISTORY

## Specimen Transactions — Fiscal Year 1969

(Prepared by Office of the Registrar)

Departments	New acces- sions	Ex- changed with other institu- tions	Trans- ferred to other govern- ment agencies	Re- ceived on loan	Lent for study	Identi- fied
Anthropology	79	325	0	47	458	4, 176
Botany	225	8, 892	428	4, 984	23, 580	8, 025
Entomology	412	3, 274	4	0	61, 143	11, 352
Invertebrate						
Zoology	392	2, 331	0	4, 535	12, 039	37, 272
Mineral Sciences	333	6, 095	82	10	686	388
Paleobiology	145	2, 651	0	856	11, 537	4, 800
Vertebrate Zoology	184	849	0	2, 155	25, 276	75, 368
Totals	1, 770	24, 417	514	12, 587	73, 576	141, 381

## Specimens in the National Collections 10 June 1969

	<i>Additions</i>	<i>Totals</i>
Department of Anthropology:		
Archeology	4, 471	815, 575
Ethnology	2, 125	195, 935
Physical Anthropology	39	37, 929
Totals	6, 635	1, 049, 439
Department of Botany:		
Cryptogams	8, 556	552, 434
Ferns	2, 239	265, 461
Grasses	2, 441	403, 936
Phanerogams	32, 895	2, 114, 001
Plant Anatomy	1, 989	50, 771
Totals	48, 120	3, 386, 603
Department of Entomology:		
Total in former Division of Insects, 1963		15, 978, 513
Totals for new divisions. since 1963:		
Coleoptera	165, 149	723, 390
Hemiptera and Hymenoptera	131, 981	595, 071
Lepidoptera and Diptera	127, 982	569, 278
Myriapoda and Arachnida	2, 913	440, 095
Neuropteroids	32, 585	406, 280
Totals	460, 610	18, 712, 627



	<i>Additions</i>	<i>Totals</i>
Department of Invertebrate Zoology:		
Crustacea	24, 129	1, 594, 328
Echinoderms	19, 105	111, 065
Mollusks	20, 513	10, 114, 238
Worms	44, 087	716, 343
Totals	107, 834	12, 535, 974
Department of Mineral Sciences:		
Meteorites	248	11, 393
Mineralogy	5, 415	167, 639
Petrology	3, 753	303, 198
Totals	9, 416	482, 230
Department of Paleobiology:		
Invertebrate Paleontology	56, 532	13, 452, 756
Paleobotany	614	6, 138
Sedimentology	0	1, 908
Vertebrate Paleontology	5, 653	58, 687
Totals	62, 799	13, 519, 489
Department of Vertebrate Zoology:		
Birds	8, 440	537, 084
Fishes	23, 509	2, 108, 958
Mammals	25, 946	411, 300
Reptiles and Amphibians	1, 612	172, 609
Totals	59, 507	3, 229, 951
Grand Total		52, 916, 313

OFFICE OF SYSTEMATICS

Because of general budgetary restrictions in the National Museum of Natural History, much of the activity of this Office has been directed toward support of systematic research within the Museum, especially innovative techniques.

The Office has continued to assist with the development and application of data-processing technology to research problems by its support of the type-registry project in the Department of Botany. The location and status of type collections of plants constitute information that conventionally requires a large investment of time and effort. The availability of a unified, computerized data-base—including such information from the major botanical collection-centers—can ultimately release very significant amounts of professional research time for more productive activities.

The Office has joined the Office of Ecology in sponsoring an international research study of a group of grasses, involving investigations

of their cytology, karyology, anatomy, and morphology. Such broadly based projects have a large potential significance for an understanding of the evolution and relationships of this, the largest and economically most important flowering plant family.

The single most externally directed activity of the Office has been the organization and execution of the third Summer Institute in Systematics, held 23 June–11 July 1969. Again the National Science Foundation jointly supported this highly successful series with the Office of Systematics. The Society of Systematic Zoology and the Smithsonian Institution were cosponsors and the Institute was held at the Smithsonian. The best, most provocative speakers available presented "lectures" on a wide range of subjects: "The Current Diversity of Systematic Methods and Philosophy" (Charles D. Michener), "Statistical Approaches to Phylogenetic Approaches" (Lynn H. Throckmorton), "Growth and Form in Systematics" (Stephen J. Gould), "Molecular Systematics" (Morris Goodman), "Ecological Strategies and the Evolution of Ectoparasites" (Rodger D. Mitchell), "Behavioral Studies and Systematics" (Howard E. Evans), and "Experimental Zoogeography" (Daniel Simberloff). In addition to the twenty-five selected participants, many of the systematists from the Museum, from government agencies, and from the Washington academic community attended some or all of the sessions. As usual, the presentation of continuing research projects by many of the participants in informal afternoon and evening seminars was one of the important benefits.

Finally, the Office of Systematics has joined the National Museum of Natural History in providing funds for the purchase of an exciting new research tool, the scanning electron microscope, which was ordered near the end of the year. Researchers in paleobiology, invertebrate zoology, and botany, among others, eagerly await its arrival for application in their studies.

Future efforts of the Office will be directed toward the establishment of palynological research in the Museum and to the expansion of experimental approaches to both the gathering and use of biological data for solving the complex interrelationships of the natural world about us.

## ANTHROPOLOGY

On 29 October 1968, the Office of Anthropology resumed its status as the Department of Anthropology.

At the end of the year the River Basin Surveys were transferred to the National Park Service as the result of negotiations between that agency and the Smithsonian. Although administratively separate hence-





Long strips of floating artificial islands on Dal Lake, Kashmir, on which watermelons, melons, cucumbers, and tomatoes are grown.

forth, many of its records and files have been added to the Smithsonian's National Anthropological Archives. Smithsonian anthropologists will continue to provide scientific advice and on occasion may conduct research studies under contract with the Park Service.

Departmental chairman Saul H. Riesenbergr spent the summer of 1968 in research on Micronesian ethnohistory in the documentary archives of museums, historical societies, and libraries at New Bedford, Nantucket, Martha's Vineyard, and Providence. Most of the rest of the year has been devoted to the description of the native systems of navigation and to a remarkably involuted and circumlocutory mode of speech and oral literature that occurs on Puluwat in the Caroline Islands, where Riesenbergr had done field work two years before.

Henry B. Collins, archeologist emeritus, has been engaged in organizing his Eskimo archeological materials from the Canadian Arctic for



William C. Sturtevant collecting ethnobotanical specimens on a floating artificial island on Dal Lake, Kashmir.

incorporation in the Museum collections. This is an extensive collection of prehistoric Dorset and Thule culture artifacts of stone, bone, ivory, baleen, wood, and other material resulting from four seasons' excavations, conducted jointly with the National Museum of Canada at old sites near Resolution Bay, Cornwallis Island, Northwest Territories.

Aided by a grant from the Wenner-Gren Foundation, senior ethnologist John C. Ewers has studied early examples of Plains Indian painting and carving in museums in Paris, Stuttgart, Offenbach-Main; Toronto and Calgary in Canada; and Rochester, New York. These studies have been important in enlarging and revising his standard work, *Plains Indian Painting* (1939), out-of-print for more than a decade. The data will also be used in preparing a pioneer work on Plains Indian carving.

A large part of a manuscript dealing with archeological field researches during 1964-67 in central and southwestern Kansas has been completed by senior archeologist Waldo R. Wedel. Concerned largely with the historical and environmental background and with general descriptions of the sites involved, the results of the four field seasons of work will be combined into one monograph focused on the human ecology and prehistory of the region, complementing his introductory monograph on Kansas archeology published in 1959. The nature and extent of cultural contacts between the prehistoric and early historic Indian



Farmer collecting weeds and mud from the bottom of Dal Lake, Kashmir, for use as mulch on floating artificial islands.

populations of Kansas and their contemporaries in the Pueblo Indian communities in the Rio Grande valley of New Mexico are becoming clearer as the research in Kansas goes forward. There are archeological indications that the semi-arid southwestern section of the state may have been of greater importance to nonhorticultural, hunting peoples in prehistoric times than it was to maize-growing peoples; farther east, with increased rainfall and improved conditions for growth of domestic crops, the reverse appears to have been true.

A research paper has been accepted for publication, based on studies some years ago by Wedel and the late John R. Swanton, that presents the documentary evidence concerning the route of the first European exploring expedition under Coronado into central Kansas in 1541. Two other manuscripts by Wedel are nearing completion—one dealing with the hafting of stone scraper blades as revealed for the first time by direct evidence gathered during 1965 field work, the second with Pueblo trade pottery in the central Plains and its cultural and chronological implications.

Associate curator Eugene I. Knez has consulted with Sindhi scholars and officials in the Lower Indus Valley, West Pakistan, to obtain views and suggestions for initiating a binational research program on the social implications of disappearing traditional crafts, industries, and technologies. Most of the sketches, based upon field drawings, for his



manuscript *An Illustrated Study of Korean Material Culture*, have been compared by Knez in the South Korean village previously studied with the original objects. Supplementary information and maps have been obtained to update the presentation of land ownership. His current research activities include the preparation of a report on Ensign John B. Bernadou, USN, a pioneer ethnographer in Korea, and a brochure on Sindhi textiles, costumes, and accessories of West Pakistan.

Associate curator William Trousdale, who has served as assistant director of the University of Michigan Expedition to Qasr al-Hayr in central Syria, has worked on preparation of preliminary reports of the third season of excavations that took place in June of 1968. He has been in the field again this year for the fourth season of work at this early Islamic site. He also has completed research on Hellenistic bronze mirrors in Egypt, at the Egyptian Museum in Cairo, and at the Greco-Roman Museum in Alexandria. During the early part of the year, he conferred with government officials in Kabul, Afghanistan, on plans to conduct an ecological project in southwestern Afghanistan and continued his preliminary survey of this region. In September 1968 he visited Bhutan to explore the possibility of arranging an exhibition of the arts and crafts of that country to be shown at the Smithsonian and at other American institutions. During the year Trousdale has completed revision for publications of a work on the origin and diffusion of the equestrian long iron sword in Asia. He also has completed papers on Chinese jade, a folk tradition in Afghanistan reflected in a peculiar manner of clipping donkey manes, and an inscribed Achaemenian stone weight from the 6th-century-B.C. reign of Darius I, the first identifiable Achaemenian find from Afghanistan.

In July 1968 Curator Clifford Evans and Research Associate Betty J. Meggers, directors of the archeological survey of Brazil, with support of the Smithsonian Research Foundation and in collaboration with the Patrimônio Histórico e Artístico Nacional and the Conselho Nacional de Pesquisas, convened the eleven Brazilian survey participants for a two-week working seminar at the Museu Paraense Emilio Goeldi in Belém. This second seminar of the program was held at the end of the third year of field work to review current scientific results and to select the regions for the remaining two years of field work. By the end of the third year, twenty-three detailed regional chronologies had been constructed, permitting relative dating of more than a thousand archeological sites and extending from the pre-ceramic through the Neo-Brazilian periods. A volume of preliminary reports by the survey-participants, based on the second year of field work, appeared as a publication of the Museu Goeldi in May 1969. A general summary of the archeological cultures recognized and their distribution in time and

space has been accepted by *American Antiquity*. A resumé of the results was given at the 34th Annual Meeting of the Society for American Archaeology in 1969.

In August 1968 Evans and Meggers met with Peruvian archeologists, Ramiro Matos M., Hernan Amat O., and Hermilio Rosas L. in Lima and Huancayo to review the results of the archeological survey training program for the central and north highlands of Peru, with special reference to the Formative Period. Preliminary work has revealed important early archeological sites in highland valleys at distinct altitudes and in special ecological niches. A grant from the National Geographic Society to the Smithsonian Institution for the Andean Project in May 1969 will permit the work to move ahead. Evans and Meggers went to Peru in late June 1969 to consult with the three archeologists to coordinate the field research and to work out fiscal matters.

*Himba Wedding*, an edited film in color and with commentary and natural sound effects, derived from motion picture footage, slides, and tapes obtained by curator Gordon D. Gibson during field work among the Himba people in South-West Africa, was produced in 1969 under Gibson's direction. This ethnological document has been shown to audiences at the annual meeting of the American Anthropological Association in Seattle and at an anthropological film festival at Temple University in Philadelphia. An annotated bibliography of anthropological bibliographies of Africa, prepared under Gibson's direction and now in press, provides information on more than 800 listings of references on the peoples, cultures, languages, history, and related human aspects of Africa. This compilation is expected to be especially useful in the development of programs of African studies at both the university and secondary school levels. At the year's end, he was writing up ethnographic materials derived from field work, collated with such data as is available from the published literature, on the Gciriku, a little-known Bantu people who occupy the banks of a section of the Okavango River, where it forms the boarder between Angola and South-West Africa.

Curator Richard B. Woodbury spent the summer of 1968 in New Mexico doing research on the changing patterns of land use and resource exploitation in the Zuni Valley, in collaboration with Mrs. Woodbury. He has completed three manuscripts, which have been accepted for publication. At the end of July 1969, he left the Smithsonian to become chairman of the Department of Anthropology at the University of Massachusetts.

The first half of the year has been spent by associate curator Paul H. Voorhis at the Mesquakie Indian settlement near Tama, Iowa, studying the language of the Mesquakie Indians. He has spent the remainder



Farmers spreading earth on a field on a nonfloating artificial island, Dal Lake, Kashmir.

of the year analyzing the data collected and preparing it for publication.

After a year's sabbatical leave as Fulbright Lecturer at Oxford University, curator William C. Sturtevant returned by way of Germany (for the International Congress of Americanists at Stuttgart-Munich), India (where he conducted brief field work on a system of artificial-island agriculture in Kashmir), and Japan (to attend the International Congress of Anthropological and Ethnological Sciences in Tokyo-Kyoto). The remainder of the year has been spent in Washington on research, and on planning connected with the new Smithsonian Center for the Study of Man.

The first season of an archeological survey of Nejran, a major wadi in the southernmost region of Saudia Arabia, has been completed by curator Gus W. Van Beek. The purpose of the project is to determine the extent to which the pre-Islamic civilization—often referred to as Himyaritic Culture—penetrated this region from its center in Yemen and South Yemen, and to assess the degree of its influence on the local cultures of the Asir (along the Red Sea coast) and Nejran. Furthermore, the project should shed light on man's use of his environment by probing the nature and means of subsistence and the effects of trade. Altogether, four pre-Islamic town sites have been recorded, three of which are new discoveries; in addition, a mountain fortress of the same period has been discovered in the Asir. The remains of ancient rock-cut





Brazilian archeologists and Smithsonian coordinators Evans and Meggers attending the second seminar of the National Archeological Survey of Brazil Research Program, held at the Museu Paraense Emilio Goeldi in Belém, Pará, Brazil, July 1968.

sluices for water control were investigated, and several hundred pre-Islamic rock drawings and inscriptions were recorded. Field work resumed in the autumn of 1969 in the wadies and on the plateau to the north of Nejran. En route from his field work, Van Beek examined ten archeological projects, financed by the Foreign Currency Program, in Egypt and in Israel; he has prepared an evaluation of these projects for the Office of International Activities of the Smithsonian Institution.

During the year, Van Beek, in collaboration with Mrs. Colyn Van Beek, completed nearly one half of the manuscript and about one third of the drawings of a volume entitled *The Timna' Temple*. This volume is to be published by the Johns Hopkins Press in the Arabian Publication series of the American Foundation for the Study of Man.

Associate curator Robert M. Laughlin has made two field trips to Chiapas, Mexico, to prepare maps from aerial photographs of Zinacantan, Chiapas. Working with local informants, he has pinpointed on the maps 1,200 place names occurring in the community. This material will form part of a Tzotzil-English, English-Tzotzil ethnographic dictionary that now contains over 30,000 entries and that presently is being prepared for computerization and editing prior to publication.

In August 1968, associate curator William H. Crocker presented two papers on taboo practices of the Canela Indians of Brazil to the 38th International Congress of Americanists in Stuttgart, Germany. He then visited several museums in Western Europe in search of Canela artifacts produced in earlier periods, and in February 1969 he went on sabbatical leave to prepare for final field work with this savanna tribe of the Brazilian planalto, which he has been studying since 1957.

Senior Physical Anthropologist T. D. Stewart, participated by invitation in a symposium on Pleistocene Man in Asia, during the VIII International Congress of Anthropological and Ethnological Sciences in Tokyo and Kyoto, Japan. He gave a paper on the evolution of man in Asia, and in the section on museology he also spoke concerning methods used for exhibiting physical anthropology in the National Museum of Natural History.

By arrangement with the Support Services, Department of the Army, Stewart organized a seminar on Personal Identification in Mass Disasters, which was held in the National Museum of Natural History in December 1968. The 105 registrants included, in addition to some of the country's top forensic pathologists, a number of officers engaged in identification work in United States Army Mortuaries around the world.

At the request of the National Park Service, Stewart assisted Erik K. Reed, Park Service research anthropologist, in the identification of the skeletal remains (which were believed to have been molested) of Osceola, the leader of the Seminole uprising in the late 1830s. Osceola died a captive in January 1838 at Fort Moultrie, Charleston, South Carolina, shortly after George Catlin painted the portrait owned by the Smithsonian. Upon opening the grave, the investigators found the skeleton to be in a good state of preservation and to conform to the available descriptions of Osceola.

In April 1969, Stewart presented a paper on the Laguna Beach man at the annual meeting of the American Association of Physical Anthropologists in Mexico City. The human skull described in this study is the most ancient thus far recognized in America; the Carbon-14 age of  $17,150 \pm 1,470$  years was obtained from the bone collagen by Rainer Berger of the University of California at Los Angeles.

Curator J. Lawrence Angel's research on paleodemography and disease in the eastern Mediterranean has concentrated on extending the story of man's biological adaptation from the critical hunting-to-farming period transition up to the beginning of large cities. After the decline in health of the early farming period, with its new disease incidence, especially malarias, there was a considerable and steady improvement from the third millennium to the first millennium B.C. Longevity rose, despite stresses of childbearing; the death ratio of infants to adults



Peruvian archeologists participating in Andean Archeological Project with one of three vehicles given to the Smithsonian Institution by the Kaiser Jeep International Corporation for use on the project.

dropped; stature increased almost to the modern level; arthritis and dental disease decreased; and anemia almost vanished, indicating disappearance of falciparum malaria. This real biological advance was reached at the time when the Olympic Games began and city states flourished and struggled. Diet was adequate, with importation of grain from rich soils in the Ukraine and adequate local pasturage still available for domestic animals. Population density was not overwhelming and the socio-economic problems of slavery and warfare were relatively new stimuli. With the development of cities like Rome, Alexandria, Antioch, and Ephesus, health declined again. In the Eastern Mediterranean, longevity, juvenile deaths, dental disease, and anemia all have returned to approximately their higher Bronze Age levels. One of the villains certainly is malaria.

In the bone biology laboratory, with support of a National Institutes of Health grant entitled "Developmental Variations in Human Osteon Chemistry," the amino-acid analyzer nears completion, awaiting delivery of a specially sensitive recorder for signals of color-intensity changes as these traverse the spectrophotometer. When the laboratory is fully equipped, it will be possible to determine the amino-acid composition of single, excised osteons. Besides the application of this technique to the

study of age change, which Donald J. Ortner and David Von Endt are developing, determination of changes in the ratio between amino acids should provide a measure of time in dating of buried skeletons, especially where the protein is relatively protected, as in the enamel of teeth.

Ortner, currently completing his requirements for the PhD degree in physical anthropology at the University of Kansas, is working on the developmental phases of the osteon in their relation to effects of age, disease, and dietary deficiency in individuals ranging from birth to old age. Pilot research, which indicates that the frequency of different types of osteon is affected predictably by these three factors, opens new areas of research in evaluating health status in ancient populations. This research also will aid identification of unknown skeletons in forensic osteology by helping to identify dietary or disease influences on the physiological aging processes.

David W. Von Endt has focused on a third problem: to determine the effect of external conditions on the rapidity of protein breakdown and nitrogen loss from human bone buried for periods ranging from several months to millennia. This project, supported by a Smithsonian Research Foundation grant, depends upon strict standardization of the Kjeldahl-Nesslerization method. Mrs. Barbara Fairfield has set up a standard curve for known amounts of nitrogen with proper statistical limits, has tested against this curve bone samples ranging from fresh bone to archeological samples, and has started burial simulation experiments using varying dry or wet heat levels to simulate decay over long periods of time. With a theoretical nitrogen-decay curve, nitrogen values from Byzantine, Roman, and Middle Bronze Age skeletons, as well as those from wet sites in prehistoric Turkey and the eastern United States, can be compared. Empirical observation on preliminary curves last fall suggests that nitrogen loss is retarded under arid conditions in Egypt and the southwestern United States.

Associate curator Lucile St. Hoyme has completed a manuscript on the origins of New World diseases in which she has presented evidence that organisms causing pathological changes in prehistoric American Indian bones are probably native to the New World and not brought with man from the Old. She also has begun the statistical analysis of a large series of Maroon men, women, and children living in Mooretown, Accompong, and other communities in Jamaica, measured in 1966 in cooperation with Jane Philips of Howard University. Toward the end of the year she was working with Richard T. Koritzer, a local practicing dentist, on a survey of the etiology of caries, periodontal disease, and other dental problems in American Indian, Egyptian, and other crania in our collections.



M. Yaşar Işcan from Ankara University is the first recipient of the Aleš Hrdlička Memorial Scholarship. During the last half of the year he has conducted a study of race differences in the pelvis, using skeletal material from the Terry collection, which is an assemblage of remains of people with birth dates ranging from the mid 19th century to about 1920. The results confirm the sensitive response of pelvic depth to nutrition and show race differences that have not been clear before.

George Metcalf, museum specialist in the Anthropology Processing Laboratory, supervised the excavation of a site in the near vicinity of Volcan Arenal, Costa Rica, with the joint support of the National Geographic Society and the Smithsonian Institution. He accompanied William Melson, Department of Mineral Sciences, who is engaged in a study of this volcano, which erupted last year for the first time in recorded history. It is hoped that data from the excavation of the site, which was buried by an ash fall of a previous eruption, will allow dating of the eruption that buried it.

Research associate Theodore A. Wertime was in the field from 29 July to 26 September 1968 with a team of experts on a pyrotechnical reconnaissance of Afghanistan, Iran, and Turkey, a project that was financed by a National Geographic Society grant and a foreign currency grant from the Smithsonian Institution. The specialists from several different countries included geologists, archeologists, metallurgists, a ceramicist, and a glass expert. The team inspected old mines where gold, iron, lead, zinc, and copper had been obtained in the countries visited. They procured metallurgical samples and slags at premodern smelting sites, obtained old glass samples for analysis, and observed the survival of ancient technologies and crafts in bazaars and small villages. The significance of this pyrotechnological reconnaissance and the need to expand the work into more detailed research projects is just now being realized as some of the reports are being prepared.

The study of disappearing traditional crafts, small household industries, and technologies of South Asia has continued in collaboration with the University of New South Wales, Australia, supported by funds from Public Law 480, the Department of Anthropology of the National Museum of Natural History, and the Department of Industrial Arts of the University of New South Wales. Two independent field teams have operated this year. One was in Ceylon, under the direction of Leslie M. Haynes with J. M. Waddell as associate investigator, in cooperation with the National Museums of Ceylon and other officials. Field data and craft objects have been collected, reflecting the arts and technologies that are rapidly changing as a result of industrialization and the large tourist influx. Official Ceylonese bureaus have been very interested in the practical aspect of the research in order to upgrade and to make

more authentic and accurate the crafts and arts of the various ethnic and caste groups. In addition to Sinhalese crafts, attention will have to be given to those of the minority groups, such as the Tamils and the Muslims. Significant collections have been obtained for both the University of New South Wales and the Department of Anthropology.

The other team has spent a second field season in Pakistan, directed by Donald M. Godden, assistant to the late Hans Wulff, with his co-investigators, Charles Walton and Roswitha Wulff. Official cooperation has been excellent, for the provincial government of West Pakistan appointed a full-time staff member, who served as guide, interpreter, and consultant, and the West Pakistan Small Industries Corporation appointed a full-time liaison officer. Some of the most significant data has come from northern states such as Swat and Peshawar. Fifty-eight crafts have been investigated, a total of 339 artifacts have been collected for the Smithsonian, and another representative collection has been made for the University of New South Wales.

Research associate Victor A. Núñez Regueiro from Argentina has spent the full year at the Smithsonian working with Evans and Meggers as a fellow of the Guggenheim Memorial Foundation. He has completed the classification and has prepared a monograph on material acquired during earlier field work in the Provinces of Misiones and Corrientes, Argentina, in collaboration with the archeological studies going on in Brazil under the Smithsonian direction of Evans and Meggers. His site sequence correlates excellently with datable colonial European artifacts from the sites, as well as with various dates in Spanish historical documents.

Research associate Edwin N. Wilmsen, with National Science Foundation support, has conducted a comprehensive study of the collections and field data from the seven years' work by the late Frank H. H. Roberts, Jr., at the Lindenmeier site, Colorado. This is the largest and best documented, but unstudied, body of material from an "early man" site in the United States. Wilmsen will complete the work at Ann Arbor where he will become curator of archeology at the University of Michigan.

Research associate Olga Linares de Sapir has actively renewed her earlier interest in the archeology of Panama and nearby regions. With the appearance of two publications, her monograph *Cultural Chronology of the Gulf of Chiriquí, Panama* and her article "Ceramic Phases for Chiriquí, Panama and Their Relationships to Neighboring Sequences," the significance of this area to a better understanding of aboriginal cultural development of Central America has been revealed.

The monograph *An Archeological Survey of Southwest Virginia*, resulting from the research conducted by research associate C. G. Hol-



land, has been completed and accepted for publication in *Smithsonian Contributions to Anthropology*. Holland also has conducted an archeological survey of the reservoir for two dams to be built by the Appalachian Power Company on the New River in southwest Virginia and northwest North Carolina.

Ecuadorian archeologist Pedro I. Porras G. has spent a year in the department with the support of the American Philosophical Society and the Guggenheim Foundation. During this period he has classified, analyzed, and described archeological materials excavated in the Baeza region, Province of Napo-Pastaza, and in the Ecuadorian highlands. The former area is significant because it sheds light on cultural connections between the highlands and eastern lowlands in pre-European times. The abundance of obsidian artifacts and chipping debris from the archeological sites, as well as a series of charcoal samples, has provided a basis for testing the correlation between these two independent methods of dating and the relative sequence established by ceramic seriation. Colonial pottery at several sites links the prehistoric with the historic occupation, which is well documented by 16th-century chronicles. A monograph on this culture, known as the Cosanga Phase, is being prepared in collaboration with Evans and Meggers for publication.

Numerous college and high school students have worked on research projects with staff members. John Bear, senior at the University of Pennsylvania, has worked as a National Science Foundation summer fellow to complete his report on Iron Age skeletons from Afghanistan; D. Gentry Steele, a doctoral candidate at the University of Kansas, as an NSF summer research fellow advised by T. D. Stewart, has worked on the estimation of stature from incomplete long bones, using landmarks on identified bones of people of known stature in the Terry collection; Mrs. Catherine Wimsatt Mecklenberg (University of Washington), research fellow under Lucile St. Hoyme in the Summer Research Assistant Program of the Smithsonian Research Foundation, has worked on demographic and population analysis of a Virginia Indian cemetery, interrelating cultural customs, disease, nutrition, and physical differentiation in a study used as a master's thesis.

Michael Blakey, sophomore student at Coolidge High School supported by a research grant from the American Dental Association through Howard University, has worked on a correlation of dental and facial structure with diet in American Indians from Florida (Canaveral) and New Mexico (Hawikuh), with the advice of Donald Ortner. Reed A. Mathis, junior at Langley High School supported by the NSF American University Training Program for high school students, has worked with J. Lawrence Angel on aging and sexing techniques as

observable in sorting the Terry collection, and occasionally he has assisted in the bone biology laboratory.

### *The Collections*

Among the larger and more important collections accessioned and placed in storage for study during the fiscal year is one illustrating the traditional crafts of Iran, and another of the same type from West Pakistan. Both were collected by a team headed by the late Hans Wulff and Donald Godden of the University of New South Wales, Australia.

Also worthy of mention is a collection of 521 African objects collected by Miss Genia de Galberg and one of 31 ethnological specimens of carved wood from New Guinea. Three other important ethnographic collections from Africa have been acquired: Walter Deshler of the University of Maryland has assembled examples of Tuareg clothing for the Smithsonian Institution during a trip to the central Sahara; Miss Janet Stone has sold to the Museum a group of carvings and ornaments that she had acquired in Mali and Ivory Coast; and Miss Katherine Lavery has donated a portion of her collection of masks and sculptures from Upper Volta. A particularly important collection accessioned during the past year has been that made by Province M. and Eleanor R. Henry from the Paiwan and Atayal tribes of Taiwan. These are particularly valuable in that the objects are accompanied by unusually complete data. Also accompanied by complete records is a collection, mainly clothing, made in several highland communities in Ecuador and archeological collections from the Valdivia, Machalallila, Guangala, and Jambali cultures of coastal Ecuador. Two other large, documented collections are the Phebus collection of 2,912 items from California and the Hruschka collection, 984 items, from Prince Georges, Charles, and St. Marys counties, Maryland. The collections of named types of southwestern sherds has been increased by additions from Mesa Verde National Park, Gran Quivera National Monument, Jemez State Park, and from Casas Grandes, Chihuahua, Mexico. Eleven accessions of skeletal material have been added to the collections of Physical Anthropology during the year.

In the Conservation and Restoration Laboratory more than 1,200 specimens have been processed. Both Joseph Andrews and Mrs. Bethune Gibson have received certificates for completion of a course in the chemistry of conservation. At the end of the year, Mrs. Gibson was in London attending a course sponsored by the British Council on the conservation of antiquities.

Effective 1 November, 1968, the archives of the former Bureau of American Ethnology and the former Smithsonian Office of Anthropology were designated the Smithsonian Institution National Anthropological Archives. This documentation center will preserve, and encourage the preservation elsewhere, of records that document anthropological research and the history of anthropology. The Archives now serve as a repository for field notes, photographs, and personal papers of anthropologists throughout the world, whatever their topical or geographical specialties, as well as the records of anthropological societies and organizations.

### *Exhibits*

At the request of the Metropolitan Museum of Art in New York, curator Van Beek prepared an exhibition of pre-Islamic South Arabian Art, which was shown there from 23 March to 10 May 1969. The objects were selected from the finest collection of South Arabian antiquities in the world, owned by the American Foundation for the Study of Man (Wendell Phillips, President). This collection is on loan to the Smithsonian Institution for purposes of research and exhibition.

During the winter and spring Van Beek coordinated activities and arrangements as curator-in-charge of the mammoth exhibition, "Masada." The Washington showing is jointly sponsored by the Washington Jewish Foundation and the Smithsonian Institution with active support by the Embassy of Israel. The exhibition deals with events that took place at the Herodian fortress overlooking the Dead Sea in Israel, where in A.D. 73 a group of 953 Jewish zealots chose to commit suicide rather than submit to Roman slavery or death. It weaves together the historical narrative of the contemporary Jewish historian Flavius Josephus with the results of the archeological excavations and vividly presents the story of Masada by means of graphics, objects, models, slides, and tape recordings. In addition, a portion of the exhibition deals with finds recovered from caves on the west side of the Dead Sea from the period of the Second Jewish Revolt, A.D. 132-135. The exhibition was opened formally by Chief Justice and Smithsonian Chancellor Earl Warren, who was presented a bronze plaque in honor of his indefatigable service in the cause of human freedom and the furtherance of civil rights.

A new exhibit on Yoruba textiles and clothing has been conceived and written by Mary S. Thieme. Mrs. Thieme, who was granted a Museum internship for the year by the National Foundation for the Arts and Humanities, prepared her script under the general scientific supervision

of Gordon Gibson. The exhibit was installed in the Hall of the Cultures of Africa and Asia in June 1969.

Much of John C. Ewers' time during the winter and spring has been devoted to planning two special exhibitions. One, entitled "Jean Louis Berlandier, a French Scientist among the Indians of Texas 140 Years Ago," opened in March 1969 to coincide with the publication by the Smithsonian Institution Press of Berlandier's *The Indians of Texas in 1830*. A larger exhibition, "The Indomitable Major John Wesley Powell, Scientific Explorer of the American West," will comprise the Smithsonian's major contribution to the observance of the Powell Centennial Year of 1969. It will present Powell's remarkable and varied career as an important contributor to both basic and applied science and as a scientific administrator in government.

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- . "Evaluation of Evidence from the Skeleton." Armed Forces Institute of Pathology, Fifth Forensic Dentistry course under Colonel William G. Sprague. Washington, D.C. 7 October 1968.
- . "Skeletal Identification and Demography." Graduate Colloquium in Anthropology at University of Pittsburgh, Pittsburgh, Pennsylvania. 11 October 1968.
- . "Early Man's Adaptation to Disease." George Washington University Medical School Anatomy Department Seminar, Washington, D.C. 7 November 1968.
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- . Workshop participation in Seminar on Personal Identification in Mass Disasters. (Organized by Dr. T. D. Stewart at Smithsonian Institution by arrangement with the chief of Support Services, Department of the Army.) Washington, D.C. 11 December 1968.
- . "The Role of Disease in Human Evolution." Luncheon talk, Armed Forces Institute of Pathology, at Officers' Club, Walter Reed Army Hospital, Washington, D.C. 16 January 1969.
- . "Biological Relations of Egyptian and Eastern Mediterranean Populations During Predynastic and Dynastic Times." Symposium on Population Biology of the Early Egyptians at Castle Montaldo, Torino, Italy. 15–18 April 1969.
- . "Skeletal Identification." Armed Forces Institute of Pathology Annual Course in Forensic Pathology, Washington, D.C. 20 May 1969.
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- EWERS, JOHN C. "Plains Indian Proteges of White Artists During the 19th Century." 38th International Congress of Americanists in Stuttgart, Germany. August 1968.
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- . Participation in a symposium on Indian Oral History, Annual Meeting of the Western History Association in Tucson, Arizona. October 1968.
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- KNEZ, EUGENE I. "Cultural Change in Japan and Korea." (Under the auspices of the American Anthropological Association Visiting Lecturer Program.) Allegany Community College, Cumberland, Maryland. April 1969.
- . "Religious Orientation in East Asian Cultures." (Same program as above.) Gettysburg College, Gettysburg, Pennsylvania. May 1969.
- LAUGHLIN, ROBERT M. "What's in a Name: An Underground View." Joint Anthropology-Linguistics Department Colloquium, Cornell University, Ithaca, New York. 9 December 1968.

- MEGGERS, BETTY J. "The Oldest Pottery in the New World." Joint Annual Meeting of Kent County Archaeological Society, Delaware and the Sussex Society of Archaeology and History, Delaware, at Dover. April 1969.
- ST. HOYME, LUCILE E. "Opportunities in Physical Anthropology." Goucher College Jobs and Careers Forum, Baltimore, Maryland. 29 January 1969.
- . Seven lectures. (Under the auspices of the American Anthropological Association Visiting Lecturer Program.) Mary Washington College, Fredericksburg, Virginia. 28–29 April 1969.
- STEWART, T. D. "The Evolution of Man in Asia as Seen in the Lower Jaw." International Congress of Anthropological and Ethnological Sciences, Tokyo, Japan. 3–10 September 1968.
- . "The Method of Showing Physical Anthropology in the U.S. National Museum." International Congress of Anthropological and Ethnological Sciences, Tokyo, Japan. 3–10 September 1968.
- . "Laguna Beach Man Re-examined in the Light of Direct C-14 Dating." American Association of Physical Anthropologists, Mexico City. 10–12 April 1969.
- . "Alš Hrdlička's Place in the Field of Human Evolution." Joint Atlantic Seminar in the History of Biological Sciences, Washington, D.C. 22 March 1969.
- STURTEVANT, WILLIAM C. "Agriculture on Artificial Islands in Burma, Kashmir, and Elsewhere." International Congress of Anthropological and Ethnological Sciences, Tokyo, Japan. 6 September 1968.
- . "Does Anthropology Need Museums?" Biological Society of Washington Autumn Meeting, Washington, D.C. 11 October 1968.
- . "Force and Constraint in Acculturation Programs." American Anthropological Association Annual Meeting, Seattle, Washington. 22 November 1968.
- . "Iroquois Ritual." Philadelphia Anthropological Society. 6 December 1968.
- . "Semiology and Material Culture." Anthropology Seminar, State University of New York, Albany. 10 December 1968.
- . "Iroquois Ritual." Anthropology Seminar, Southern Illinois University, Carbondale. 11 March 1969.
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- . "The Archeological Exploration of Afghanistan." Archeological Institute of America, at Pittsburgh; at the Pennsylvania State University, University Park, Pennsylvania; at Lancaster, Pennsylvania; and at Philadelphia, Pennsylvania. February 1969.
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- . "Dido's Heritage: A Survey of Tunisian Archaeology." Walters Art Gallery, Baltimore, Maryland. April 1969.
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## RIVER BASIN SURVEYS

Research and laboratory activities at the Lincoln, Nebraska, headquarters have continued during the year at an attenuated pace owing to reduced staff and budget. The large-scale program of field records microfilming initiated in fiscal 1968 has been completed after photographing and indexing over 3,700 sites. Laboratory personnel have continued processing specimens that now number well over 1.75 million. Staff archeologists have concentrated on interpretation and synthesis of data from a number of major excavated sites, chiefly in the Dakotas.

Five monographs by River Basin Surveys scientists have appeared in the *Publications in Salvage Archeology*: "Big Bend Historic Sites," by G. Hubert Smith, delineated certain aspects of early social and commercial history of central South Dakota; "Bibliography of Salvage Archeology in the United States," by Jerome E. Petsche, was published with the fiscal aid of the American Council of Learned Societies and the Committee for the Recovery of Archaeological Remains; "The La Roche Site," by J. J. Hoffman, discussed late prehistoric cultural continuities in the middle range of the Missouri River; "Big Horn Canyon

Smithsonian River Basin Surveys field crew making initial excavation of House 6 at the South Cannonball Site in North Dakota. The village site is about 500 years old.





Advanced stage of excavation of the pit of House 6 at the South Cannonball Site. Postholes that once held posts forming a wall of the house have been cleared of their earth fill. House 6 was a large semi-subterranean lodge with a rectangular plan.

Archeology," by Wilfred M. Husted, synthesized Paleoindian and later data from north central Wyoming and suggested correlations over a wide area of western United States; and "The Grand Detour Phase: Early Village Sites in the Big Bend Reservoir, South Dakota," by Warren W. Caldwell and Richard E. Jensen, reported the finding at several early village sites and formulated a regional sequence from the data.





Smithsonian River Basin Surveys excavators exploring postholes, pits, and other features near the entryway at the front of House 6 at the South Cannonball Site, North Dakota.

Four River Basin Surveys field parties have operated within the Missouri Basin during the year:

1. A three-man party has spent three weeks in shoreline survey of Big Bend Reservoir, South Dakota, in order to locate newly exposed sites and survey damage to known occupations. This activity has been carried out in cooperation with the South Dakota State Historical Society and the W. H. Over Dakota Museum of the University of South Dakota. New information has been gathered that appears to show a potential relationship between prehistoric occupations, soil horizons, and climatic interpretations.

2. One man has spent two days surveying prehistoric hunting camps in the southern Couteau du Missouri of South Dakota to assess their relationship to major village sites in Fort Randall Reservoir.

3. An eight-man party has spent nine weeks in the third and final season of excavation at South Cannonball Village in the upper Oahe Reservoir of North Dakota. Two additional structures, one of possible ceremonial function, have been uncovered, as well as several interhouse utility and storage areas. The accumulated data from this site promises



Completed excavation of House 7 at the South Cannonball Site. Postholes and pits are exposed on the old house floor of this semi-subterranean structure.

to reveal important information regarding early village horizons on the Northern Plains.

4. Again in cooperation with the W. H. Over Dakota Museum, a fourth party has made test excavations at Ludlow Cave, South Dakota, to determine feasibility of re-investigation. Tests have revealed that the critical cave deposits are far too despoiled to warrant further action. The same party has spent one week in a shoreline reconnaissance of Bowman-Haley Reservoir, North Dakota, pursuing previous investigations of McKean Complex occupations in this area.



For the second consecutive year two Smithsonian Institution-National Science Foundation undergraduate summer research assistants have participated in River Basin Surveys field operations. The students, from the University of North Carolina and Wake Forest University, were assigned to the field party excavating the South Cannonball Village, where they gained a thorough grounding in excavation technique, methodology, and management of site data. At the end of the season they returned to Lincoln, where they familiarized themselves with technical operations of the laboratory and office. A manuscript compiled by SI-NSF summer research assistants last year was published during the year as an article in the *Plains Anthropologist*; it described a salvaged site in Oahe Reservoir and synthesized the data with previous reports.

At the close of the year the field season was well underway. One archeologist, on detail with the National Park Service, conducted nine days of excavation at Fort Laramie, Wyoming, with a five-man crew for the purpose of salvaging remains in advance of construction. A nine-man crew, under the direction of an archeologist on detail to the National Park Service, was engaged in major excavations at Fort Union, North Dakota, preparatory to reconstruction of this famous historic trading post.

### *Staff Publications*

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### BOTANY

The main thrust of research in the department continues to center on tropical floras. Curator J. J. Wurdack has nearly completed a study of the Melastomataceae for the *Flora de Venezuela*. He has also completed

revisions of the Polygalaceae and Melastomataceae of Guayana and the Brazilian Planalto and *Tibouchina* sect. *Barbigeriae*. The flora of Santa Catarina, Brazil, and preparation of manuscript on the Bromeliaceae for *Flora Neotropica* continue to occupy the attention of senior botanist L. B. Smith. A revision of the Acanthaceae for the *Flora of Santa Catarina* has been completed by assistant curator D. Wasshausen. These long-term studies have clarified the taxonomy and evolution of several large tropical families.

The largest of all plant families, the Compositae, is being studied by associate curator H. E. Robinson and collaborator R. M. King by an application of micro-morphological research techniques. A number of previously unrecognized relationships have led to the description of both new species and new genera. Research associate J. Cuatrecasas has continued field and herbarium studies on the flora of Colombia, especially the Compositae, with emphasis on cytological surveys.

Further expanded studies on the flora of Dominica have been made possible through the generosity of Mrs. William J. Morden. A Morden-Smithsonian expedition of three weeks' duration has surveyed the newly developed logging areas, with Mrs. Morden, D. H. Nicolson, R. DeFilipps, and M. E. Hale participating. It is hoped that a basic understanding of vegetational change after logging can be gained that will lead to more intelligent land utilization. Curator M. E. Hale has made the first extensive lichen collections. Surprisingly, two crustose families, the Graphidaceae and Thelotremaaceae, comprise almost half of the lichen flora and show a high degree of speciation. Under the Bredin-Archbold-Smithsonian Biological Survey of Dominica, D. H. Nicolson and collaborator R. DeFilipps have made considerable progress on the final manuscript of the Dominican flora.

Botanical interests in Old World tropical plants by the staff are increasing: D. H. Nicolson has visited Mysore State in India to initiate a collaborative project with C. J. Saldanha. Curator V. Rudd has begun a revision of Ceylonese legumes in preparation for field work there. Associate curator T. R. Soderstrom has begun to make similar background studies of the grasses of Ceylon. Three staff members have worked in Africa: associate curator W. R. Ernst has carried out some field work in Morocco and explored possibilities of future involvement in the flora of North Africa. T. R. Soderstrom has collected grasses in Tunisia and consulted with local botanists in developing a program on agrostology. Associate curator E. S. Ayensu has conducted field work in Tunisia and Ghana in continuation of his anatomical studies on the yam family (Dioscoreaceae).

Associate curator Stanwyn G. Shetler has nearly completed his monograph on the variation and evolution of the circumpolar *Campanula*

*rotundifolia* complex and intensified his planning efforts, as project secretary, for the long-term Flora North America Project. General project definition has been completed in order that the necessary resources could be sought; the pilot phase of the automated bibliography, including the preparation of a trial data base and full documentation, has been completed; a computer analysis has been made of worldwide herbarium resources, and the main results of this study are being published.

Associate curator E. S. Ayensu has assembled equipment needed for the newly developed technique of cinematography for study of stem anatomy. Successive serial sections of stems are photographed with a movie camera and made into a film. Analysis of the four-minute film strips has helped unravel complex nodal anatomy of xylam and phloem glomeruli in the yams and related monocotyledons. Associate curator R. H. Eyde has begun collaboration with C. C. Tseng of Windham College, Vermont, on a comparison of floral structures in the Araliaceae, which it is anticipated will lead to a better understanding of the evolutionary relationships of the family.

Curator C. V. Morton has finished a major work on the ferns of the Galapagos Islands. He spent June 1969 furthering studies on fern type specimens at herbaria in England.

Curator M. E. Hale has begun a monographic revision of the lichen family Graphidaceae with research assistant B. J. Moore. The basic approach is to analyze a large, highly speciated group by comparing morphological and chemical features. Thin-layer chromatography is being employed and microscopic sections of fruiting bodies have been prepared.

Research associate F. Raymond Fosberg, assisted by Marie-Hélène Sachet, has been engaged in various activities concerning insular floras and ecology, ranging from the western Indian Ocean eastward to the Marquesas and Hawaiian islands. The new genus *Lebronnecia* (Malvaceae), discovered during the course of these investigations and almost extinct in its native habitat in the Marquesas Islands, has been successfully brought into cultivation in Tahiti and is now flowering. It will now be possible to go much further in clarifying relationships of the genus than has been possible from material heretofore available for study.

Fosberg was chairman of the meeting on conservation in the Pacific Islands held by the Conservation-Terrestrial Section of the International Biological Program in Palau and Guam in November 1968. Attention was focused at the meeting on a number of serious threats to both terrestrial and marine island ecosystems and strong recommendations were made to the governments involved to take remedial measures. A pro-



Botanists and entomologists collecting in Colombia.

posals was advanced to preserve as scientific reserves a number of uninhabited islands under international jurisdiction.

Work is progressing on the floras and vegetation of Aldabra and neighboring atolls in the western Indian Ocean, where a surprising number of new plants and interesting distributional relationships have been revealed. Other coral island studies are in progress and fifteen numbers of the *Atoll Research Bulletin* have been edited and published, making recent information available to students of coral islands and reefs. The scope of the *Bulletin* has been broadened somewhat to include tropical oceanic islands other than low coral islands.

The revision of Trimen's *Handbook to the Flora of Ceylon* is making substantial progress. Ten specialists have worked in the field during the year and important collections have resulted. A number of drafts and one final manuscript have been submitted.

Dieter Mueller-Dombois, of the Ceylon Ecology Project, has completed his own studies, resulting in vast amounts of information especially on Ruhuna and Wilpattu national parks and on the "patana" grasslands of the Ceylon mountains. Vegetation, soils, geological, and animal activities maps of the two national parks have been prepared and are in course of publication. A climatic map of the island, with accompanying text, has been published.

The department has been host to two postdoctoral fellows, Hui-Lin Li (Morris Arboretum, Philadelphia), who is completing studies on the



flora of Taiwan, and Elias de la Sota (La Plata, Argentina), who is studying the ferns of Argentina.

The staff has continued to participate in Smithsonian Associates activities, this year emphasizing a series of nature walks coordinated by S. G. Shetler.

A one-day conference was held in the department in early May 1969 on automation of herbarium collections. Six participants from large herbaria (T. Crovello, H. Irwin, W. H. Lewis, J. Mickel, D. J. Rogers, and J. Soper) attended and ten others joined the discussions. This is the first time that such a group has assembled to broadly assess the status and possible directions of automation in the herbarium.

The Flora North America Editorial Committee met for four days in late April and early May 1969. Discussions centered on progress so far in literature automation (S. G. Shetler) and the overall philosophical base for the flora (P. Raven). Organizational problems also were discussed.

## *The Collections*

Field work by staff members has been carried out in Columbia (J. Cuatrecasas, H. R. Soderstrom), in Dominica (D. H. Nicolson, M. E. Hale), in Mexico (V. Rudd), in Morocco (W. R. Ernst), in Tunisia (E. S. Ayensu, T. R. Soderstrom), and in the United States and Canada (M. E. Hale).

Additions of Old World collections have continued in significant quantities: 1,474 Nepalese plants (through P. R. Pande), 1,278 Taiwanese plants (through Hui-Lin Li), 1,067 samples of Australian woods, 1,329 African collections, and 895 Philippine plants. Important collections of Neotropical plants have been received in exchanges with the New York Botanical Garden, the University of California at Los Angeles, Stanford University, Texas Research Foundation, Gray Herbarium, and the Field Museum.

A continuing problem has been the curating of the large new accessions. While 26,550 specimens have been mounted during the year, approximately 38,000 that should be mounted have been received, leaving an unmounted backlog of about 12,000 specimens.

All outstanding loan records have now been computerized to provide more complete access and flexibility in updating. Exchange records are being treated in a similar way in order to gain a better overall view of the directions of our exchange program.

The Type Register, a cooperative, long-term, computer-based project to collect all available information on the types in the herbaria of the United States, has received support from several sources during the



Crustose lichen on a felled tree in Dominica.

year. More than 2,000 entries are on magnetic tape and another 3,000 wait for input. A trial sending to other herbaria of the information on types of *Mimulus* species has been made to prove out the systems design. Response has been generally favorable and the broad design of the project is being reassessed for future development.

Finally, the extensive and valuable research materials of the great tropical family Piperaceae (peppers) have been received as a bequest from T. G. Yuncker, through his wife.

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- . "Leaf Anatomy and Systematics of Old World Velloziaceae." *New Bulletin* (1969), volume 23, number 1, pages 315-335, 4 plates.
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## ENTOMOLOGY

Planning and supervision of the move of the Department of Entomology from the Lamont Street building to the Natural History Building has seriously impaired research productivity during the year. Personnel of the Divisions of Coleoptera, of Lepidoptera and Diptera, and of Hemiptera and Hymenoptera have devoted large blocks of time to planning for renovation of assigned areas, packing, moving, and unpacking of collections and equipment at the new location. Approximately a third of the staff and collections remain to be moved during next year. In spite of the time lost to the move, the Department has had a reasonably productive year: staff specialists have published thirty-one papers totaling more than five hundred pages.

The Smithsonian Foreign Currency Program Advisory Council has recommended approval of the departmental proposal for a four-year biosystematic study of selected groups of Ceylonese insects. If the project is approved by the Ceylonese government, the field work will begin during the next fiscal year.

Curator Oscar L. Cartwright has continued his revisional studies in the scarabaeid subfamily Aphodiinae and has made progress on several faunal studies of other scarabaeids. Much of Paul Spangler's time has been devoted to planning and supervising the divisional move to the Natural History Building, but he has made some progress on his water-beetle studies. In February 1969 he began nearly seven months of field studies on water beetles in a number of countries in South America and the West Indies.

Associate curator Richard C. Froeschner has spent three months studying lace-bug types in museums in ten European countries to confirm or correct the generic assignment in connection with his manual of world genera, on which substantial progress has been made; he also has continued work on certain families of Hemiptera for the report on the Bredin-Archbold-Smithsonian Biological Survey of Dominica.

Chairman Karl V. Krombein has completed a paper on North American cuckoo wasps describing two new genera and a new species with biological notes. He also has devised a new trap to attract wood-



nesting solitary wasps and bees and has made satisfactory field tests of it during a three-week period at the Archbold Biological Station in Florida. Gerald I. Stage has analyzed initial population samples of *Lysimachia* pollinators in the local area and has realized progress on three manuscripts dealing with pollinators and pollination of *Eucnide* and *Mentzelia*.

Senior entomologist J. F. Gates Clarke has completed his large systematic and ecological survey of the lepidopterous fauna of Rapa Island. He left in May 1969 for four months of museum study in Leiden and London in connection with a similar treatment of the microlepidopterous fauna of the Marquesas Islands.

Associate curator Donald R. Davis has substantially advanced his monograph of Nearctic Tineidae and has nearly completed the revision of American Incurvariinae. His tineoid studies have been advanced by two months of study at the British Museum.



W. Donald Duckworth and graduate assistant, R. E. Dietz, collecting insects in rain forest near Florencia, Colombia.

Associate curator W. Donald Duckworth has expanded his studies of stenomid reclassification by investigating genera of the Old World Tropics in order to assess the zoogeographical trends. His pioneering work on the Neotropical fauna has been advanced greatly by three months of collecting in Colombia, Venezuela, and Guyana.

In the relatively limited time available after moving his division, William D. Field has made some progress on revisions of the butterfly genera *Phulia* and *Vanessa* and has added 5,000 entries to his catalog of New World Lycaenidae. Field, with the assistance of divisional preparator Vira Milbank, has added 5,600 titles to the divisional bibliography of Lepidoptera.

Summer fellow Robert E. Dietz IV, working under Duckworth, has completed research on the ctenuchid genus *Horama* for his MS degree at Cornell University.

Ralph E. Crabill has made collections and ecological observations of centipedes during two field trips in eastern Tennessee and adjacent areas and to type localities in Virginia and North Carolina. Crabill has completed a number of manuscripts during the year and has nearly finished a generic reclassification of the Mecistocephalidae and a faunal study of the Nepalese centipedes.

Oliver S. Flint, Jr., has made substantial progress on a revision of a subfamily of Central American microcaddisflies and on faunal reports of large collections of caddisflies from the Amazon basin, Surinam, and Chile. An early collecting trip of two weeks in southern and central Arizona has provided Flint an opportunity to obtain valuable specimens and information concerning the relationship of the Arizona fauna with related areas in Mexico. His previous studies of West Indian caddisflies were aided at the end of the year by four weeks of collecting in Puerto Rico and the Dominican Republic.

The talented staff artists, Mrs. Elsie H. Froeschner and André Pizzini, have provided illustrations for a number of manuscripts, but the department still lacks adequate support in this area to match the research productivity of its specialists.

The Southeast Asia Mosquito Project (SEAMP), a cooperative Smithsonian and Department of the Army project under the direction of Botha de Meillon, has continued work on the systematics of mosquitoes of that vast and medically important area. Prior to his retirement, John E. Scanlon collected mosquitoes in Southeast Asia and studied types of Oriental anophelines at the British Museum. E. L. Peyton and Yiau-Min Huang also have studied the mosquito collections at the British Museum. SEAMP consultants Peter F. Mattingly, Kenneth L. Knight, J. Bonne-Wepster, J. M. Klein, Thomas Zavortink, and John F.

Reinert have continued their taxonomic studies of various mosquito genera.

Several resident research associates have continued to work actively on systematic studies in their own areas of interest. Mrs. Doris H. Blake has nearly completed her worldwide revision of the chrysomelid genus *Metachroma*, and visited the Museum of Comparative Zoology twice during the year to study types. K. C. Emerson has made progress on taxonomic studies of the Anoplura of Nepal, Nigeria, Madagascar, Senegal, Pakistan, and Botswana and of the Mallophaga of Nepal, Venezuela, and Southeast Asia; many of the specimens have been collected by personnel of the Division of Mammals. C. F. W. Muesebeck has completed his large revision of the Nearctic species of the braconid genus *Orgilus* and has continued his valued services as translation editor of the Russian journal *Entomological Review*. Robert Traub has continued his work on the ecology of viral and rickettsial infections based on the



Richard S. Cowan, W. Donald Duckworth, Thomas R. Soderstrom collecting insects and plants in rain forest near Florencia, Colombia.

rodent hosts and their ectoparasites. He hypothesizes that these data can be used to determine the geographic extent of scrub typhus infection and to indicate where it may be expected to occur. He is also collaborating on the preparation of a glossary of scientific terms for the *Catalogue of the Rothschild Collection of Fleas* and has spent three months collecting mammals and their ectoparasites in New Guinea.

Departmental specialists have received several honors and awards. Duckworth was elected vice chairman of Section A (Systematics, Morphology, and Evolution) at the annual meeting of the Entomological Society of America. Spangler has been elected vice president of the Society for Study of Coleoptera. Stage has been appointed to a three-year term as secretary of the Society of Systematic Zoology. Krombein has been elected president of the Entomological Society of Washington, reelected vice president of the Washington Biologists' Field Club, and has been appointed a chief biomedical scientist in the United States Air Force Reserve.

### *The Collections*

The National Collection of insects has received more than 460,000 specimens during the year, bringing the total holdings to 18,712,627. As usual, many of the new accessions have been of great significance in that they filled gaps in regional representation, contributed directly to continuing research programs of staff members and associates, consisted of reared specimens with associated immature stages, or were of ecological importance because of associated data on habitat, relationships with other organisms, and so forth.

There have been some extremely valuable accessions from staff members as a result of past field work. Notable among these are 10,953 specimens from Argentina and Chile collected by Oliver S. Flint, Jr.; 10,788 from Arizona collected by Flint and A. S. Menke, USDA (United States Department of Agriculture); 13,609 from the Marquesas Islands by J. F. Gates Clarke and Thelma Clarke; and 2,679 from Plummers Island, Maryland, by Paul J. Spangler. Flint's Chilean caddisflies have been put to immediate use in his continuing study of the Chilean fauna, and the Arizona specimens have provided valuable insights into the relationship between the Arizona and Mexican faunas. The Clarkes' accession have been particularly strong in Microlepidoptera and especially important because of the material reared by Mrs. Clarke; he is currently engaged in working up the Marquesan fauna through study of types in the Leiden and British museums.



Several accessions have been most welcome inasmuch as they constitute material from areas previously represented very poorly, if at all, in the National Collection. A collection of Philippine mosquitoes from Francisco Baisas, consisting of 6,700 adults and 4,000 slides, has been of immediate use to SEAMP's research program on Southeast Asia mosquitoes and has been particularly valuable because of the number of associated immature stages. Gerald I. Stage has donated 1,395 bees from all over the world, a gratifying addition because a large number of species have not been in the collection before. Mrs. Mary H. Ripley has collected 884 insects in Bhutan, most of them moths very meticulously prepared. Curtis W. Sabrosky, USDA, and Krombein have obtained a small but useful lot of some 2,500 specimens in the Uzbek Soviet Socialist Republic. The Reverend Rufus H. LeFevre has contributed 794 beetles, bugs, and moths collected during his missionary service in China. T. H. Davies has continued to favor the Department with New Zealand insects, this time with a lot of 668 specimens, mostly Lepidoptera.

SEAMP has received 72 lots of mosquitoes, comprising 23,391 adults and 16,134 slides.

From USDA the Department has received by transfer 73,550 specimens. As always, this has been a particularly noteworthy addition because so many of the specimens represent species not previously in the collection, or bear associated host data, or consist of reared series of immature and adult stages. This particular transfer has included some 7,000 specimens, mostly Coleoptera, from H. P. Lanchester. Other colleagues in USDA have made personal donations that include 2,928 specimens from W. W. Wirth, mostly Diptera from the northwestern United States; 4,000 Microlepidoptera by Ronald W. Hodges from Arizona, Florida, Michigan, and New York; and 888 water beetles from Robert Gordon.

Several research associates have enriched the collections by continued donation of material. F. S. Blanton has deposited 5,000 specimens of Ceratopogonidae, K. C. Emerson has sent in more than 2,000 slides of Mallophaga and Anoplura from his personal collection and from the Department of the Army, and H. F. Loomis has added types and other material of millipedes.

Lack of space precludes mention of numerous other individual and institutional donors who have made generous contributions of specimens; several, however, are so outstanding they merit special recognition. David G. Hall has donated some 18,000 Sarcophagidae, the result of a lifetime of systematic work on these economically important flesh flies, and a technical library on them requiring twenty feet of shelf space; the specimens include some 24 holotypes, more than 600 paratypes, and represent nearly 1,500 species. Dorald A. Allred has sent nearly 35,000



insects in numerous orders taken during faunal and ecological surveys of the Nevada test site study areas. William Rosenberg has donated nearly 6,000 Scarabaeidae from all over the world, an indispensable adjunct to Cartwright's taxonomic studies in this family. Mr. and Mrs. George Lacy have sent 3,800 specimens from British Honduras, mostly Coleoptera. Vincent D. Roth has furthered Flint's Arizona studies by a gift of some 2,000 caddisflies. Joseph W. Adams has made special efforts and has collected about 2,000 insects on flowers in Pennsylvania; the insects and associated flower-visiting data will be most useful in the pollination studies by Stage and other staff members.

When Department specialists are in the field, they do not limit their collecting activities to just the group of insects in which they are particularly interested but make a strong effort to obtain specimens in other groups on which their colleagues have research projects. For example, Flint as a specialist on one group of aquatic insects, the caddisflies, makes every effort to collect other groups of aquatic insects, thus forwarding Spangler's research interests on water beetles. Spangler's and Flint's collecting of nocturnal beetles and caddisflies at lights also yields many specimens of moths for the lepidopterists. Spangler's lot of 2,500 insects from Plummers Island is not very large, but it is significant because it consists of specimens obtained by operation of a Malaise trap for a ten-day period, the first time that this collecting technique has been employed for more than a day at a time at that famous biological preserve in the metropolitan Washington area. This Malaise trap material has provided eleven new Plummers Island records among the wasps to add to the 274 species previously known from the area.

The departmental preparator's unit—consisting of Ron Faycik, Marc Roth, and Gary Hevel—has continued its devoted service in the processing of back lots not accessioned in previous years and in handling incoming lots. They have accessioned thirty-three lots consisting of nearly 93,000 specimens and have sorted and distributed them to the appropriate divisions. In addition, they have mounted some 40,000 specimens that have not yet been accessioned. The major part of their effort, however, during the year has been directed toward assistance in preparing collections for the move from the Lamont Street building to the Natural History Building. Roth and Faycik, working with Mrs. Vira Milbank, the divisional preparator, have transferred all of the Lepidoptera from about 500 nonstandard drawers into USNM drawers and cases in preparation for the move. After the collections were moved, they assisted in getting cases installed in the proper systematic arrangement.

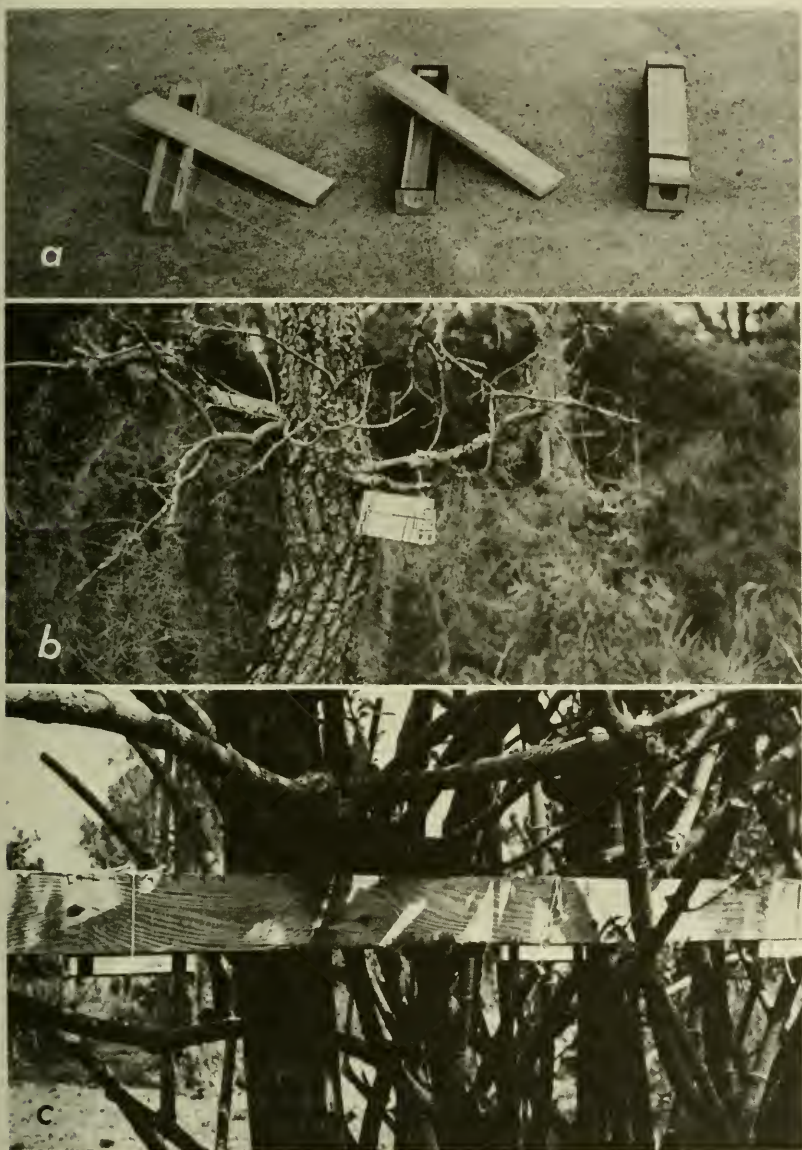
In the Division of Coleoptera, Gloria House, the divisional preparator has processed nearly 78,000 specimens, sorting 30,000 to family, mount-

ing 5,500, labeling 34,500, and transferring 28,000 from temporary storage containers to USNM drawers. Mrs. Janice White, a part-time preparator, has processed 29,000 specimens, sorting 12,800 to order and family, mounting 7,400, labeling 5,600, and transferring 15,000 to USNM drawers. Miss Ludmila Kassianoff, divisional preparator in Hemiptera and Hymenoptera, has made a great reduction in the large backlog of unmounted, unlabeled specimens that have accumulated over the years. In Lepidoptera and Diptera, Mrs. Milbank, in addition to her many services preparing collections for the move, has incorporated the large exchange shipment from the National Museum of Kenya, consisting of 8,900 specimens and 5,700 species, of which 2,600 have not been represented previously by named material. Crabill, assisted by Mrs. Sophie Lutterlough, divisional preparator in Myriapoda and Arachnida, has continued the restoration work on older collections, rehousing specimens in fresh alcohol, remounting old slides, treating desiccated specimens *in vacuo* with trisodium phosphate, and verifying unsuspected type-specimens; Crabill also has continued his attempts to develop a hydrophilic mounting medium for slide mounts more satisfactory than the standard Hoyer's formula. Mrs. Nancy Heath, divisional preparator in Neuropteroids, working part time, has continued the program of remounting and relabeling the Odonata collection, and also has mounted many thousands of small or fragile specimens collected in Africa by Krombein and Spangler.

Several miscellaneous projects have been completed or begun during the year. Concurrently with the move of the Division of Coleoptera, the extremely valuable Casey collection of Coleoptera has once more been moved into a separate "Casey Room" along with associated reprint and map files. Old manuscripts and associated historical materials from two pioneer federal entomologists, C. V. Riley and Townsend Glover, have been sent to the Smithsonian Archives for cataloging and safekeeping.

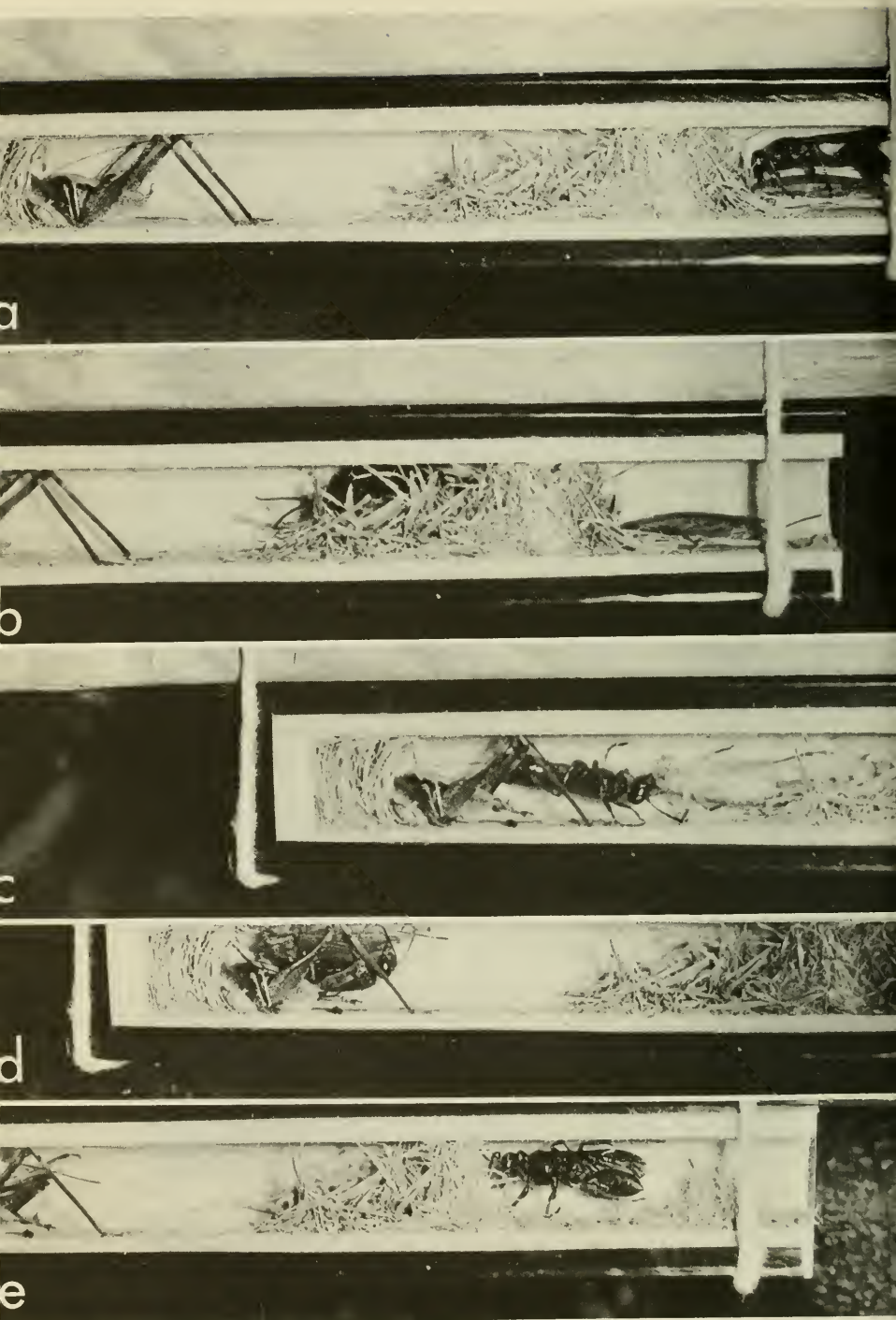
Negotiations have been instituted with several other institutions looking toward the extended long-term loan deposit in the Smithsonian of collections in which the Institution has current research efforts and where the lending institution has no specialist and, reciprocally, similar long-term loan deposits of Smithsonian materials in other institutions having a specialist where the Institution has none. Such deposits will be undertaken only under the most careful stipulations providing for proper curatorial care of the loans, access to the collections by interested and qualified third parties, and recall of the collections when the lending institution obtains a specialist in that group or when the borrowing institution no longer has a specialist in the group.

## A NEW TRAP-NESTING TECHNIQUE FOR WASPS

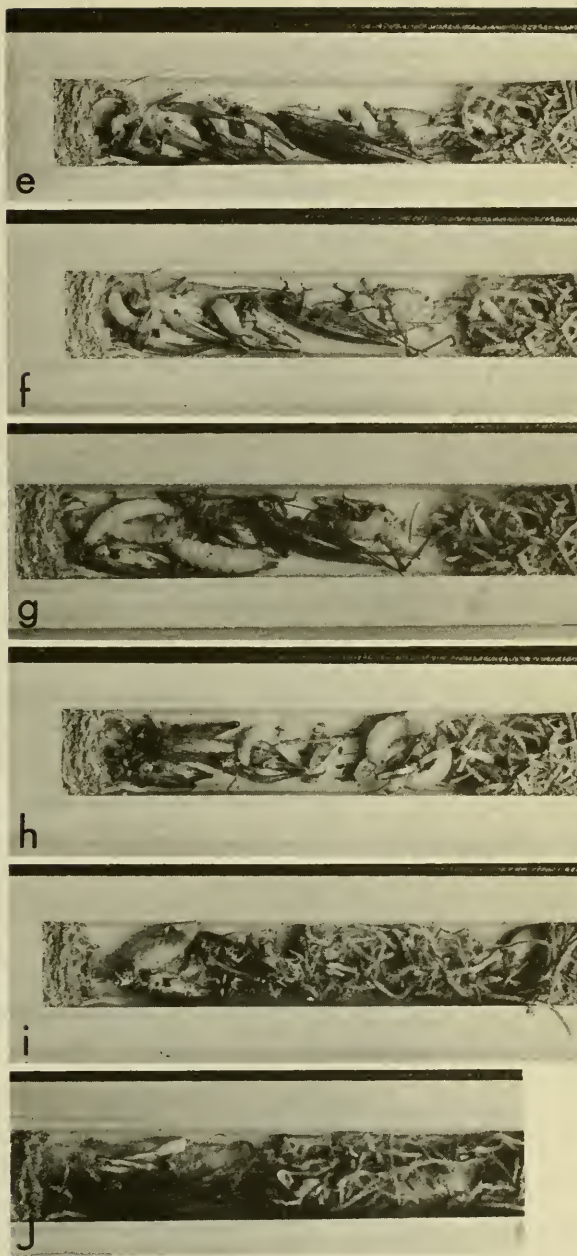
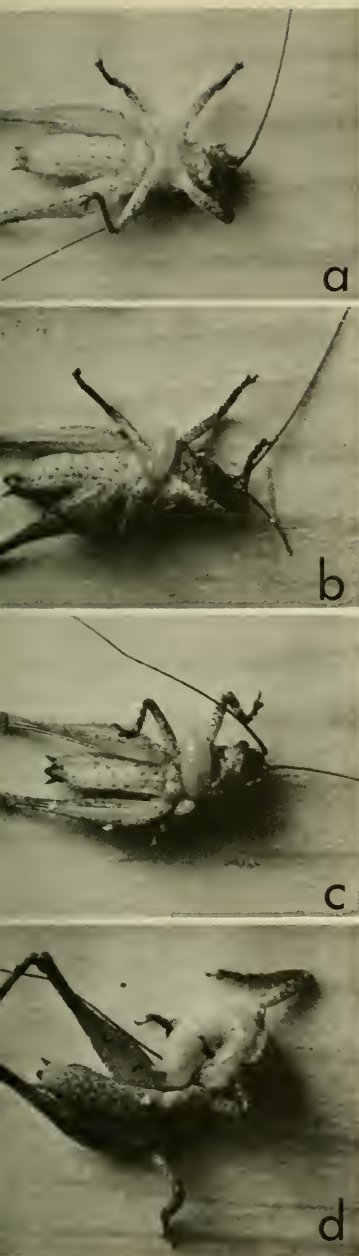


*Trap Components and Habitats.*—(a) On the left, the routed-out channel for the nest with its plastic and wooden strips unattached; in the center, the plastic strip taped into position; on the right, the completed trap with the wooden strip attached by rubber bands to form a light-tight cavity in which nesting can occur. (b) A bundle of traps suspended from a dead limb. (c) Individual traps suspended from the framework supporting a cultivated tropical bush.





*Grass-carrying Wasp with Its Prey, a Bush Cricket.*—(a) At the entrance of the nest, (b) tunneling through the closing plug, (c) dragging the cricket into the brood cell, (d) ovipositing on the prey, (e) closing the plug. Note the earlier prev. a shield-back katydid.



**Larval Development in a Nest.**—(a) The newly hatched larva, 11:30 a.m., 18 April; (b) 8:20 a.m., 19 April; (c) 7:35 p.m., 19 April; (d) 11:55 a.m., 20 April, the larva has eviscerated the prey. (e) Brood chamber at 12:25 a.m., 20 April; (f) 8:00 p.m., 20 April; (g) 11:50 a.m., 21 April; (h) 8:00 p.m., 21 April; (i) 4:05 p.m., 22 April, the larva pulling out strands of Spanish moss; (j) 8:00 a.m., 24 April, spinning cocoons in the moss.



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## INVERTEBRATE ZOOLOGY

The Department has made considerable progress in several important areas of activity. Most notable has been its continuing expansion of the use of computer techniques for accomplishing curatorial tasks, thus freeing valuable time for research and other functions. The year has also seen a further broadening of the systematic investigations that its members carried forward.

As partial results of his two-year visit to Hawaii, New Zealand, and Australia in 1967-68, J. Laurens Barnard has completed and submitted for publication two manuscripts on the shallow-water gammaridean amphipods of Hawaii and New Zealand. In addition to his research and field activities, Barnard has served as secretary for the Americas of the Charles Darwin Foundation for the Galapagos Islands.

In October and November 1968 Thomas E. Bowman visited the Indian Ocean Biological Centre at Ernakulam as a consultant on Crustacea and began a project with H. E. Gruner to prepare a synopsis of the families and genera of hyperiid amphipods.

A survey of the littoral and sublittoral marine and freshwater shrimps of the Caribbean has been considerably advanced by Fenner A. Chace, Jr.; a manuscript on a new genus and five new species of shrimps from the western Atlantic has been completed as part of this study. The extensive report on the freshwater and terrestrial decapods of the West Indies, by Chace and Horton H. Hobbs, Jr., also has been published during the year. Studies on the crayfishes and their entocytherid ostracod associates, particularly those from the southeastern United States, have been continued by Hobbs, who has completed a major study on the distribution and phylogeny of the seventy-two species of *Cambarus*. His Georgia field studies in April 1969 resulted in the collection of several important species.

Investigations on parasitic copepods and their hosts have been carried out by Roger F. Cressey, Jr., who also has served as editor for the *Proceedings of the Biological Society of Washington*. With Bruce R. Collette, of the Ichthyological Laboratory, Bureau of Commercial Fisheries, Cressey has completed a detailed study of the host-parasite relationships between needlefishes and their parasitic copepods. He also has completed a study with Ernest Lachner, Division of Fishes, on the relationship between parasitic copepods and echinoid fishes.

A computerized checklist of genera and higher taxa and a bibliography of marine nematodes has been prepared by W. Duane Hope and research associate D. G. Murphy, in collaboration with the Information Systems Division in a form suitable for publication by photo-offset. In addition, Hope has continued studies with the electron microscope on



the cuticle and somatic musculature of marine nematodes, studies that are expected to help clarify phylogenetic relationships within the group. During the year Hope has been appointed associate of the Graduate Faculty of Rutgers University.

Studies on myodocopid Ostracoda based on collections from the Peru-Chile Trench, the Antarctic Ocean, and the Philippine Islands have been completed by Louis S. Kornicker. During the year Kornicker has participated in a survey of the marine animals from the coastal shelf of Cyprus, sponsored by the Smithsonian and the Hebrew University, Israel. He served as chief scientist for part of the cruise.

The possibility of using differences in enzymal mobilities to elucidate systematic interrelationships of the polychaetous annelids has led Meredith L. Jones to study enzymes of worms from Florida and Woods Hole; part of the summer of 1968 was spent at Woods Hole pursuing this study. Jones also has presented a paper on boring of mollusk shells by the sabellid worm *Caobangia* at the annual meeting of the American Association for the Advancement of Science. Study by Jones of collections from Southeast Asia suggests that at least four species comprise *Caobangia*, which previously was believed to be monotypic.

Systematics of Indo-West Pacific stomatopod crustaceans have been continued by R. B. Manning, who has completed a review of *Protosquilla* and allied genera in the family Gonodactylidae and also a review of *Harpiosquilla*, family Squillidae. With the help of Mrs. Drina Byer, a computer-generated catalog of the type specimens of stomatopods in the National Collections has been prepared.

Relationships of American and Asiatic hydrobiid mollusks, based on gross anatomy, have been investigated by J. P. E. Morrison; the hydrobiids serve as the intermediate hosts of human Asiatic Schistosomiasis. Morrison also has initiated a study of western Atlantic species of *Donax*.

David L. Pawson has completed a review of the holothuroid fauna of New Zealand and has continued work on the systematics of echinoids and holothurians collected during the International Indian Ocean Expedition and the United States Antarctic Research Program investigations. In collaboration with G. Donnay, Carnegie Institution, the structure of calcite crystals in echinoderms has been studied.

A monographic study on the scaled polychaetes of the superfamily Aphroditoidea has been initiated by Marian H. Pettibone, who has completed reviews of several genera, as well as members of the family Eulepethidae. She also has described new, errant polychaetes from the *Siboga* Expedition, based on a draft manuscript prepared by the late H. Augener.

Harald A. Rehder has continued his long-term investigation of the zoogeography of the littoral mollusks of Polynesia, a vast area in the



tropical Pacific Ocean bounded by the Cook Islands, Palmyra Island, and Easter Island. In June 1969 Rehder traveled to the central Pacific to conduct field work necessary for the study.

A comparative study of the development of tropical sipunculid worms of the genera *Lithacrosiphon*, *Aspidosiphon*, *Phascolosoma*, *Sipunculus*, and *Siphonosoma* is being carried out by Mary E. Rice; field investigations have been conducted in Miami, Puerto Rico, and Curaçao. A study on the structure of possible boring organs in sipunculids was presented at the annual meeting of the American Association for the Advancement of Science in December 1968.

Representatives of several families of pelagic cephalopods have been investigated by Clyde F. E. Roper; reports on representatives of the families Cycloteuthidae and Joubiniteuthidae from the North Atlantic have been completed in collaboration with Richard Young. Roper has participated in two cruises off Bermuda as part of the Ocean Acre project, a long-term study (sponsored by the United States Navy) of the systematics and ecology of organisms occurring in a column of water under a one-degree square of ocean surface. A cross-indexed bibliography of cephalopod literature and a catalog of cephalopod names have also been initiated during the year.

Joseph Rosewater has continued studies on the worldwide Periploematidae and the Indo-Pacific Littorinidae and Cerithiidae, based on materials studied in American, European, and Australian museums, and during field work in the Indo-Pacific. The first portion of a monograph on the Littorinidae should reach completion in 1969. He also has served as president of both the Bibliological Society of Washington and the American Malacological Union during the year.

Investigations on the systematics and physiological ecology of sponges from the Caribbean and Mediterranean seas are among the studies conducted by Klaus Ruetzler during the year; in this connection, he has visited Barbados, Colombia, and several places in the Mediterranean Sea as well. Current projects include a review of the genus *Ircinia* in the Caribbean and investigations of symbiotic associations between algae and sponges.

Research associates in residence and visiting research associates also have made significant contributions to departmental research programs: Roman Kenk has completed a review of the genus *Planaria* as part of a long-term study of the freshwater triclad turbellarians of North America; Isabel Canet [Pérez Farfante] has continued investigations on American penaeid shrimps and has completed an important manuscript that should simplify identification of juveniles of certain species of *Penaeus* from the western Atlantic; Dennis M. Devaney has studied the systematics and biology of chilophiurid ophiuroids and, as a partici-

pant in the "1969 Shark" expedition to British Honduras, he has initiated a study of the larvae development of the brittlestar *Ophiocoma pumila*.

Departmental research activities also have been enhanced by the investigations of three graduate students in residence: Jackson E. Lewis (Tulane University), studying calappid crabs under the guidance of Fenner A. Chace, Jr., has completed a manuscript on reversal of symmetry in chelae of crabs of the genus *Calappa*; Nancy Cramer (George Washington University) has completed her doctoral dissertation under the supervision of Meredith L. Jones; and Catherine Kerby (George Washington University) has conducted studies of the life history of a polychaete under the guidance of Mary Rice and Meredith L. Jones.

### *The Collections*

Among the more important activities for which the Department is responsible are the care and development of the National Collections. The extensive collections of invertebrates other than insects, now comprising in excess of twelve million specimens, are the focal point for departmental research activities, as well as a major source of basic data on invertebrates. All too often the collections and activities pertaining to them are ranked below other kinds of endeavors, including research and education in the broadest sense, in spite of the fact that the collections provide the basis for many staff research projects and are the main reason for the large numbers of students and senior visitors who use the facilities each year.

Emphasis on research as the primary activity of the professional staff, broadening of the Institution's educational activities, and severe restrictions on budget and personnel combined during the past year to increase the work load of each curatorial unit in the Department. Government-wide personnel ceilings have precluded filling several technical and clerical positions and, in spite of efforts by the curatorial staff, who have assumed the burden of curatorial activities formerly carried out by the professional staff, the backlog of materials awaiting processing and identification has grown.

During the year a catalog of type specimens of echinoids in the National Museum of Natural History and the Museum of Comparative Zoology at Harvard, prepared by museum specialist Maureen Downey, has been published. A similar catalog on ophiuroid type-specimens by Miss Downey is in press, and catalogs of asteroid and holothurian types are in preparation by Miss Downey and David Pawson, respectively.

Large collections of sponges and echinoderms from the Caribbean and the Indian Ocean have been received from Paul R. Burkholder,

Lamont Geological Observatory; 5,700 specimens of echinoids and holothurians from the Indian Ocean and the Antarctic have been received from the Smithsonian Oceanographic Sorting Center; and over 2,000 specimens of sponges, coelenterates, echinoderms, mollusks, and tunicates have been received from the Mediterranean Marine Sorting Center. During the year the collections of recent bryozoans have been transferred from the Division of Echinoderms to the Division of Invertebrate Paleontology.

The collection of Mollusks has been enriched by the addition of 2,855 specimens of nudibranchs from the northeastern United States, Alaska, and Thailand, from the estate of the late George M. Moore, University of New Hampshire; this gift from the Moore estate also includes a series of transparencies of living nudibranchs. More than 1,600 specimens of mollusks from the Indo-Pacific region have been obtained on exchange from the Museum of Comparative Zoology at Harvard University. Rolf Brandt, SEATO Median Research Laboratory, has donated 2,150 specimens of land and freshwater mollusks from Thailand, greatly enhancing the division holdings of mollusks from Southeast Asia.

Under a contract with the Department of Agriculture, museum specialist Walter J. Byas has continued identification of specimens of mollusks intercepted at United States ports of entry. As a result of this service, a useful reference collection of exotic mollusks potentially hazardous to crops or as vectors of parasites and diseases is being accumulated. A project has been initiated to prepare the cephalopod collection for cataloging and entry of specimen-associated data into the computer in a system similar to that being used for Crustacea.

In the Division of Worms, Frances Paulson and George Ford have combined efforts to streamline the cataloging operation and have succeeded in making substantial progress in cataloging current material, as well as identified lots in the backlog. Technician Vernetta Williams has worked primarily on the slide collection, including preparation of slide mounts of interstitial organisms and sorting of nematodes. The addition of 25,000 nematodes to the collections each year from various sources has added significantly to the Division work load.

The single largest addition to the collection of worms has been a valuable series of oligochaetes from the estate of the late William R. Murchie, comprising over 24,000 specimens and 3,000 slides of sections. Other additions include approximately 7,000 specimens of annelids from Florida, the West Indies, and Central and South America, collected by David W. Kirtley, and 6,000 marine nematodes from the Antarctic, collected by James Lowry, Virginia Institute of Marine Sciences.

During the past year there have been many notable additions to the collection of Crustacea. Major additions have been to the crayfish col-

lections, through the efforts of Horton H. Hobbs, Jr., who has made extensive collections in Kentucky, Tennessee, and Georgia, as well as through the generosity of many colleagues from other institutions. In addition, the crustacean holdings have been enhanced by the addition of a large collection of freshwater ostracods from the estate of the late Edward Ferguson, Lincoln University. Arthur G. Humes, Boston University, has deposited more than 2,900 commensal copepods from Madagascar, most of them representing types.

Specialist H. B. Roberts, who has assumed the major portion of decapod identifications, has initiated an important exchange of types with the Museum National d'Histoire Naturelle, Paris, through Mme Danielle Guinot-Grmek. He also has begun a reorganization of the crustacean reprint collection. Specialist C. Allan Child, whose primary responsibility is the cataloging operation in Crustacea, has assembled data for a catalog of types of the Pycnogonida. Specialist Roland Brown has assumed the role of departmental coordinator for purchasing, for development and maintenance of curatorial supplies and equipment, and for meeting visitors' equipment needs.

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## VERTEBRATE ZOOLOGY

Research in the Department of Vertebrate Zoology represents a combination of museum-based systematic revisionary and monographic studies and field-oriented ecological, behavioral, and life history studies. Because correct identification of animals and knowledge of their relationships is fundamental to further studies, such identification aides as handbooks and manuals are part of the Department's scientific effort.

Systematic revisions and monographs have been prepared in three of the divisions, with the greatest emphasis on fishes, of which perhaps only one half of the world's species are known. Victor G. Springer has completed research for a revision of the blennioid fish genus *Ecsenius* and, with W. F. Smith-Vaniz, a graduate student at the University of Miami, a synopsis of the blennioid tribe Salariini.

W. Ralph Taylor has continued his long-term studies of the marine family Ariidae and a study of hybrids of the freshwater family Ictaluridae.

Stanley H. Weitzman has nearly completed a comprehensive study on the evolutionary relationships of the stomiatoid fish families Gonostomatidae, Maurolicidae, and Sternoplychidae. In addition, he has undertaken further studies on the anatomy and relationships of the fish suborder Characoidei. Han Nijssen of the Zoological Museum of the University of Amsterdam is collaborating with him in a study of the catfish genus *Corydoras*. Visiting research associate Ambat G. K. Menon of the Zoological Survey of India returned to Calcutta in July 1968 after completing a worldwide revision of the flatfish genus *Cynoglossus*.

Robert H. Gibbs, Jr., has continued studies of bathypelagic stomiatoid fishes, completing a worldwide systematic and zoogeographic study of the genus *Stomias* and preliminary systematic work on the genus *Bathophilus*. He has also nearly completed work on the family Astronesthidae.



He has supervised the predoctoral research of Richard H. Goodyear, a graduate student at George Washington University, on studies of the family Malacosteidae. Gibbs' work on flying fishes has resulted in the preparation of a manuscript on the genus *Cypselurus* from the eastern tropical Atlantic, and he is working on flying fishes for the multi-volume *Fishes of the Western North Atlantic*. The Smithsonian has been designated by the United Nations Food and Agricultural Organization (FAO) as world center for deposition of tuna-like fishes. Gibbs serves as chairman of the FAO working group on tuna taxonomy, of which Research Associate Bruce Collette is a member. Their definitive paper on the "Comparative Anatomy and Systematics of the Tunas, Genus *Thunnus*" has been recognized with an award as an outstanding scientific contribution by both the Smithsonian and the Bureau of Commercial Fisheries.

Richard L. Zusi has completed work with Joseph R. Jehl, Jr., of the San Diego Natural History Society, on the relationships of three species of the little-known shorebirds in the monotypic genera, *Phegornis*, *Aechmorhynchus*, and *Prosobonia*, utilizing new evidence from anatomy and downy young. S. Dillon Ripley, assisted by Gorman M. Bond, has begun intensive work on a monograph of the rails of the world. J. Fenwick Lansdowne has completed ten of a series of forty plates to illustrate the monograph. Research associate Richard C. Banks is continuing his systematic studies of the tinamous. Charles J. La Rue has continued his systematic study of skull morphology in the Ciconiiformes for his PhD dissertation at the University of Maryland under Zusi's direction.

Charles O. Handley, Jr., has worked on revisions of bat genera. He has completed the free-tailed bats, *Molossops*, and is continuing revisions of the long-tongued bats, *Leptonycteris*, and, with Kay Ferris, the white-lined bats, *Vampyrops*. Duane A. Schlitter has continued work on his doctoral dissertation at the University of Maryland on a revision of the rodent subgenus *Gerbillus* under Henry W. Setzer. John R. Napier and his wife have almost completed research on color variation in coat color of the squirrel monkeys. During visits to museums in the United States and Europe this year, he has accumulated data for a long-term research project on limb proportions of primates.

Systematic studies of vertebrates often entail gathering information on ecology and behavior in the field that may be used in conjunction with morphological and anatomical characters studied in the laboratory. In addition to observations and photographic or sound recordings, other highly sophisticated technical equipment or instruments have been used in some studies in the department.

Gibbs has collaborated with Clyde Roper of the Department of Invertebrate Zoology and other biologists and oceanographers at the University of Rhode Island, Bureau of Commercial Fisheries, and the United States Navy in "Ocean Acre," an intensive study of life histories, vertical distribution, and migration of midwater fishes and other organisms in a single small area southwest of Bermuda. He has participated in two cruises supported by a grant from the Office of Naval Research. Specimens from the cruises are being sorted and identified prior to intensive systematic study.

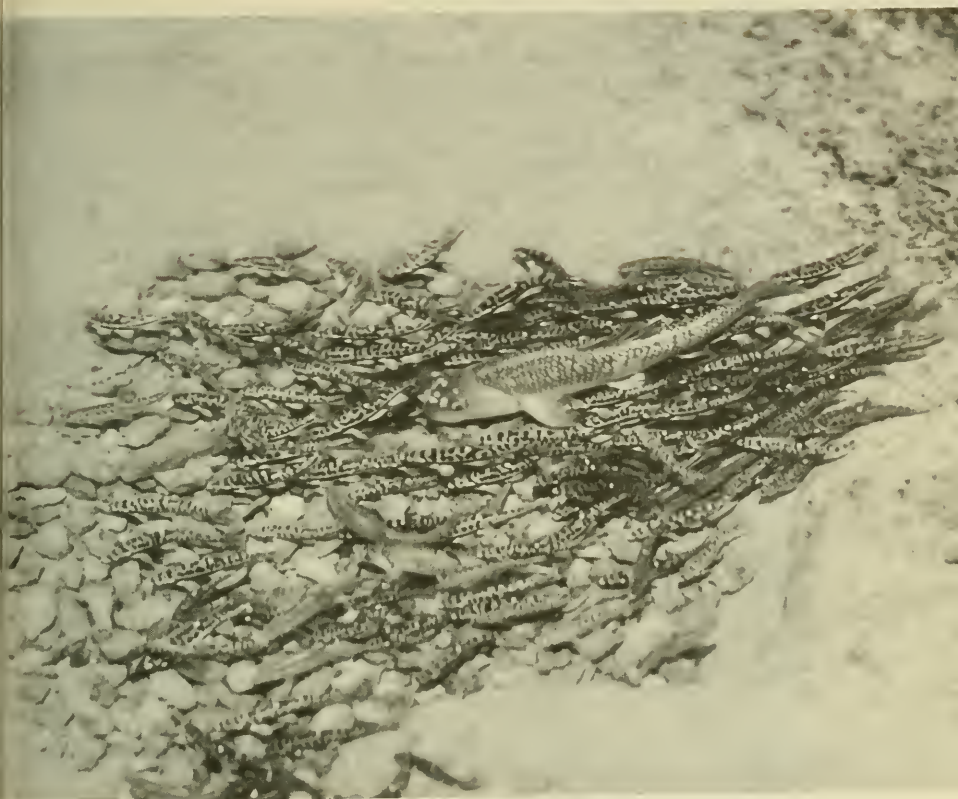
Ernest A. Lachner has spent most of the year on sabbatical leave studying the breeding behavior of chubs of the genus *Nocomis* in several streams in the eastern and midwestern United States. He has demonstrated that numerous intergeneric hybrids involving *Nocomis* as one parent are the result of the chubs' tolerance of other fishes, such as dace, at their nests. Because both species utilize the same rock pile for spawning, chance cross-fertilization may take place. Based on his field work, he has nearly completed several parts of a major monograph on the ecology, behavior, distribution, and systematics of chubs. With Roger Cressey of the Department of Invertebrate Zoology, he has completed a paper on the relation between diskfishes or sharksuckers of the family Echeneiidae and their parasitic copepods, which also serve as their food.

George R. Zug joined the department in January 1969 as assistant curator in the Division of Reptiles and Amphibians. He has revised for publication his dissertation on locomotion and morphology of the pelvic girdle and hind limbs of cryptodiran turtles and is currently analyzing color patterns in snakes in relation to their ecology.

Zusi has finished a paper on the feeding niche and adaptations of the Trembler (*Mimidae*) of the Lesser Antilles, based on his field work in Dominica. He has pointed out that the species represents an ecological counterpart of some ovenbirds and woodhewers of the mainland. Paul Slud has terminated research in the Museum on methods by which to conduct avifaunal surveys in the field. Next year he intends to apply this study to field work in comparing representative avifaunas in Brazil and Costa Rica and to relate them numerically to their respective environments.

Jan Reese, a student at Chesapeake College, has completed a manuscript on his six-year population study of Ospreys in Talbot County, Maryland, in consultation with George E. Watson. This Maryland population is reproducing at a rate well above that of other known populations in the United States, most of which currently have little success in breeding.

Research Associate Crawford Greenewalt's book, *Birdsong: Acoustics and Physiology*, has been published by the Smithsonian Institution Press.



After spawning, a male Bluehead Chub, *Nocomis leptcephalus*, carries stones in his mouth to his gravel nest in a tributary of the James River in western Virginia. Most of the other smaller fishes over this nest represent a spawning school of Mountain Redbelly Dace, *Chrosomus oreas*. Ernest Lachner's field observations have shown that such compatible associations of breeding populations of chubs and other cyprinid fishes is a primary factor for the high incidence of natural intergeneric hybrids.

His laboratory analysis of recorded bird voices has provided new insight into sound production by birds. He has demonstrated conclusively that a single song may be produced by sounds from two vocal sources in the bird.

For many years Charles Handley has been studying the flora and fauna of Assateague Island off the Eastern Shore of Maryland and Virginia. Assisted by his wife, he is attempting to define the biotic communities and assess the impact of a growing tide of human visitors on the biotic communities and their components. Handley also has studied population dynamics and ecology of forest bats at Belém, Brazil. By marking more than 1,500 individual bats, he has accumulated much information on

vertical and horizontal distribution and habitat selection. With a recapture rate of about ten percent, he has been able to demonstrate nocturnal movements of considerable distance.

Using night-vision equipment on loan to the Smithsonian from the Department of Defense, research associate Arthur M. Greenhall has been studying the feeding behavior of vampire bats in Mexico. This FAO-sponsored research may have considerable economic importance throughout Latin America, where vampires feed on the blood of cattle and may transmit rabies to human beings.

James A. Peters has continued development of time-share computers for research use, including a program for biogeographical analysis. He gave a short course in use of the telephone-terminal computer in June 1969 to various other vertebrate zoologists interested in inter-museum data communication. With Richard Van Gelder of the American Museum of Natural History, he has established the first link in an inter-museum computer network. Through their joint effort, the first national meeting of the Museums and Universities Data, Program, and Information Exchange (MUDPIE) group was held in New York.

Major interdisciplinary programs involving ecological studies of mammals and birds and their role in the dispersal of viruses and other diseases through ectoparasites are under way in northern South America, Africa, the Pacific Ocean, and southeast Asia. The programs involve local field collaborators as well as laboratory-based entomologists and virologists in several countries.

Charles Handley's research team has concluded three years of field work on the distribution and ecology of mammals in Venezuela. Systematic studies of the vertebrates have begun, and visiting research associate Ralph Wetzel of the University of Connecticut has developed a statistical technique for the recognition of taxa. Several hundred thousand ectoparasites collected in the field have been distributed to specialists in the United States, Latin America, Japan, and Taiwan.

Three field teams of mammalogists have worked in Ghana, the Ivory Coast, Upper Volta, and South Africa under the direction of Henry Setzer. More than 60,000 mammal specimens have been collected under this African project in the last three years. Approximately twenty-five papers on preliminary studies of ectoparasites and virology have been published. In the future, all data on specimens will be automated in order that host identification lists may be sent out to parasitologists as soon as the mammal specimens are cataloged.

The Pacific Ocean Biological Survey Program, directed by research associate Philip S. Humphrey, has continued surveying bird populations and movements in the Pacific Ocean. Intensive studies at selected islands have been accompanied by shipboard studies in the central Pacific and



off the west coast of North America. A survey of the birds at Eniwetok and other atolls in the Marshall and Gilbert islands has resulted in A. Binion Amerson's comprehensive report on "The Ornithology of the Marshall and Gilbert Islands." Long-term studies of bird populations have continued on Sand Island in Johnston Atoll and on Kure Atoll and French Frigate Shoals in the Hawaiian Leewards, with major emphasis on breeding biology and population dynamics through banding. More than 33,000 birds have been banded this year. Two long-distance recoveries involved an Elegant Tern banded in San Diego and recovered on Sand Island and a Common Tern banded on Long Island, New York, and recovered in the Bay of Panama. Since February 1969 emphasis on field work has been greatly reduced and the major effort is now directed toward preparation of comprehensive island and species reports.

Site-oriented ecological studies have been under way at the Area de Pesquisas Ecologicas do Guamá (APEG) in Belém, Brazil since 1963 in collaboration with the Brazilian Instituto de Pesquisas e Experimentação Agropecuarias do Norte, the Belém Virus Laboratory, and Yale University. Humphrey has served as principal investigator on two of the projects and is a member of the commission for coordination of research activities in APEG. Data from the study area have been computerized in a system of ten-meter grids, and information on vegetation, soil, climatology, and the fauna, based on the same grid, is being collected. Thomas E. Lovejoy, a graduate student at Yale University, is studying the ecology and epidemiology of birds captured in mist nets set at varying heights in the Belém forest.

Bird banding and collection of ectoparasites and blood samples have continued in the Middle East by two field parties of the Palearctic Migratory Bird Survey under the direction of George Watson. Approximately 20,000 birds have been banded and more than a thousand blood samples have been returned to Yale University for virus testing. Antibody formation in response to a new virus has been demonstrated.

Another bird migration study is underway in India in collaboration with the Bombay Natural History Society under Salim Ali and the Migratory Animal Pathological Survey under Elliott McClure. Recoveries in the Soviet Union of waterfowl banded at Bharatpur in Rajajasthan have demonstrated several migration routes over the Himalayas. The Poona Virus Laboratory took blood samples and ectoparasites from 500 birds trapped at Bharatpur in the spring of 1969 to survey the potential for virus transmission by the migrants.

Because of the department's concern for conservation and interest in studies of migratory birds in the Far East and the Pacific basin, Watson and research associate John W. Aldrich have participated in a meeting of ornithologists in Tokyo to explore the possibility of a migratory bird





Author George Watson and artist Bob Hines examine plates and specimens for the *Handbook of Antarctic Birds*.

treaty with Japan similar to those that the United States already has in effect with Canada and Mexico. Another meeting will take place in Washington, D.C.

Handbooks and identification manuals can stimulate interest in a group of animals or a geographic region and identify problems for intensified study. Thus, the production of such compilations is often a foundation for future research. Several projects of this type have been completed or have seen substantial work in the Department this year.

George Watson, assisted by J. Phillip Angle and Peter C. Harper, has completed the species-account section for a research handbook on Antarctic birds. These researchers have worked concurrently on a set of distribution maps of Antarctic birds for the Antarctic Folio Series, assisted by visiting research associate Roberto Schlatter, a graduate student from Chile at the Johns Hopkins University. Watson has been assisted by Betty Jean Gray, a student at Mt. Holyoke College, in work on the warblers, Sylviinae, for Peters' *Check-list of the Birds of the World*.

Volumes one and two of the *Handbook of the Birds of India and Pakistan*, by S. Dillon Ripley and Salim Ali, have been published and at least two more are in press.

Twenty-seven sections of the *Smithsonian Preliminary Identification Manual to African Mammals* have been completed under the editorship of research associate J. A. J. Meester of Pretoria, South Africa. Two other Smithsonian identification manuals, on the mammals and the reptiles of Vietnam, which were written by United States Navy medical personnel stationed at the Museum, will be published by the Smithsonian Institution Press in the near future. James Peters and his collaborators, Roberto Donoso-Barros of Chile and Braulio Orejas-Miranda of Uruguay, have finished the *Catalogue of Neotropical Squamata*, which will be submitted to the Smithsonian Institution Press for publication.

The Primate Biology Program is concerned both with research and education. A significant proportion of director John R. Napier's time this past year has been spent on the educational aspects of the program. During the fall he gave lecture and demonstration courses in primate biology at the following institutions in London: The London School of Economics, the Institute of Archeology, and the Royal Free Hospital of Medicine. In December 1968 the London office, the Unit of Primate Biology (Smithsonian Institution), moved to its new quarters at Queen Elizabeth College at the University of London. After Napier returned to Washington during the winter, he presented a weekly lecture series on "Roots of Mankind" to the Friends of the National Zoo. These lectures will be published as a book by the Smithsonian Institution Press.

### *The Collections*

Work by Olga Rybak and Shirley Artis on entering specimen data on seabirds has progressed through the HEW contract in the Division of Birds under the supervision of George E. Watson and David Bridge. Information on all National Museum specimens of the orders Sphenisciformes, Procellariiformes, and Pelecaniformes has been recorded, punched, and entered into the computer. The marine species of Charadriiformes remain to be entered. All new specimens collected by the Palearctic Migratory Bird Survey and the orders Tinamiformes, Gavii-formes, and Podicipediformes also have been entered. To provide information of future use in computerization of bird specimens, Richard C. Banks is making a survey of collections in the United States for the American Ornithologists' Union.

The Division of Mammals will utilize the bird data format and, for the time being, the same computer program for entering mammal collection records. A numericleature of mammals of the world has been prepared by various specialists under the supervision of Henry W. Setzer, and data entry should begin in the summer of 1969.

Large segments of the National Collection of mammals have been moved this year—some of them twice. Marine mammals and ungulates first were moved to the Smithsonian storage facility at Silver Hill, Maryland, and then transferred to better quarters in Alexandria, Virginia, where hopefully a Marine Mammal Study Center will be established next year. Computerization of data on these specimens stored “off campus” will facilitate their use until the new Center can be adequately staffed. The primate and carnivore collections have been moved to new locations in the Natural History Building to clear space for the return of the Department of Entomology from Lamont Street. The ungulate skeletons and the alcoholic collection have been reorganized. The divisional administrative record-keeping system—especially that dealing with accessions, loans, and other specimen transactions—has been streamlined.

Accessions of note in the Division of Mammals are: 11,150 specimens received through the Venezuelan Project; 14,500 mammals from western and southern Africa received through the African Mammal Project; 50 porpoises from the west and south coasts of South Africa from K. S. Norris, Oceanic Institute, Honolulu; 75 porpoises of the genus *Stenella* from W. F. Perrin, Bureau of Commercial Fisheries, La Jolla, California; 1,656 mammals from Brazil through the Belém Virus Laboratory, Rockefeller Foundation; 6,000 bats from Colombia from C. J. Marinkelle, Universidad de Los Andes, Bogotá; over 200 East African monkeys from Cynthia Booth, Tigoní Primate Research Center, Limuru, Kenya; several hundred fluid-preserved specimens from the anatomical research collection of W. C. Osman Hill, Yerkes Regional Primate Center, Atlanta, Georgia; and a type of the bat *Antrogous pallidus obscurus* from R. H. Baker, Michigan State University, East Lansing.

Among the accessions to the National Collection of birds are representatives of two newly described species: a peculiar swallow *Pseudochelidon sirintarae*, from Thailand, whose only close relative is an African species, donated by Frank G. Nicholls and Kitti Thonglongya; and an antpitta, *Grallaria eludens*, from Peru received on exchange from George Lowery. Also received are eggs of the Gray Gull, *Larus modestus*, from Chile donated by George M. Moffett, Jr., and casts of California Condor bones from Stanton Cave, Arizona, given by Paul Parmalee.

Large collections of bird skins have been received from the eastern Mediterranean through the Palearctic Migratory Bird Survey; from North America through the Fish and Wildlife Service, including collections donated by Bert Roberts and Elizabeth P. Bartsch; and from the Pacific Ocean through the Pacific Ocean Biological Survey Program. Important additions to the skeleton and spirit collections, besides speci-

mens obtained by the Palearctic Migratory Bird Survey, include birds from Antarctica, collected by George E. Watson and J. P. Angle, and from Churchill, Manitoba, collected by Richard L. Zusi.

The Division of Reptiles and Amphibians has received two collections from Thailand totaling 492 specimens, donated by Sergeant Kenneth T. Nemuras, USAF, and Major John E. Scanlon, USA. The Smithsonian Oceanographic Sorting Center has transferred 130 specimens from the Indian Ocean to the Division. A sizable collection of South American reptiles has been given by Roberto Donoso-Barros. A collection of 32 *Haideotriton wallacei*, a rare subterranean salamander, and 26 paratypes of the salamander *Typhlotriton braggi* have been given by David Lee and Jeffrey Black, respectively. The North Carolina State Museum has transferred five types of emydine turtles. Specimens cataloged this year total 1,962.

Important accessions in the Division of Fishes have been a 5½-foot specimen of a coelacanth, *Latimeria chalumnae*, donated by H. N. Schnitzlein, Department of Anatomy, University of Alabama Medical Center; more than 10,000 fishes from the Tropical Atlantic Biological Laboratory, United States Department of the Interior, Fish and Wildlife Service, Miami, Florida, through Fred Berry; marine fishes from Kenya received through Wolfgang Klausewitz, Senckenberg Museum, Germany; and freshwater fishes from western Africa through Tyson Roberts, Stanford University.

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## MINERAL SCIENCES

Research emphasis within the Department has undergone reevaluation during the year, and significant redirection of parts of our program has been accomplished. The expanded interests and activities of the Division of Petrology have been recognized by the addition of "and Volcanology" to its title. Staff members have investigated five important eruptions during the year, and the program in submarine geology has been expanded. Research on meteorites and tektites has continued at a high level, stimulated in part by contracts from the National Aeronautics and Space Administration for preparation for the examination of lunar samples. The fall of the Allende, Mexico, meteorite in February 1969—a meteorite of rare type recovered in large amount—was promptly investigated in the field and laboratory by staff members. Additional research centering around the study of the Foote Lithium Mine in North Carolina has been undertaken and important new observations are being made. Some progress has been made in the area of electronic data storage and retrieval.

Investigation of the complex mineral suite that occurs at the Foote Mineral Company spodumene mine, Kings Mountain, North Carolina, has been continued during the year by John S. White, Jr., in collabora-



Devastation caused by the violent explosions of Arenal Volcano on 29 and 30 July 1968. This eruption has been studied extensively by W. G. Melson, who has made three expeditions to the volcano in the past year.

tion with Peter B. Leavens of the University of Delaware and Richard W. Thomssen, visiting research associate, Smithsonian Research Foundation. A continually growing number (now about ten) of new mineral species are being described for publication as separate papers. A monograph that will contain descriptions of some eighty to ninety minerals found at the mine, and giving their paragenesis, is under preparation. A description of one of these, switzerite, a new manganese, iron phosphate, has already been published. The description of a new tin silicate is nearly completed and an abstract of the paper has been submitted to the International Mineralogical Association New Mineral Names Commission for prepublication approval. Work on the rare mineral lithiophosphate has also been completed by White. Included among the new species under study are two other tin minerals and several manganese, iron phosphates. An April 1969 collecting trip to the Foote mine has resulted in the addition of many specimens to the collections that will be of value in the continuing studies.

R. W. Thomssen has undertaken research in connection with a predoctoral internship on a project concerning the systematic variations in the compositions of femic minerals in some porphyry copper deposits.



Primary and secondary biotite micas from different porphyry copper deposits have been examined with the electron microprobe. Significant variations of Fe, Mg, and Ti have been found in step-scan analytical traverses across the biotite flakes. Preliminary considerations of the compositional data indicate that, as time passes, the solutions from which the biotite crystals are precipitating are enriched in Fe and Ti with respect to Mg. Near the end of crystallization of biotites a pronounced reversal in the relative amounts of these elements took place. Research is continuing in an effort to evaluate this phenomena and to relate the biotite composition variations to the whole rock and mineralization histories.

George Switzer has continued his studies of eclogite and other ultramafic nodules from South African kimberlite pipes. He has completed studies of the glass phase observed in kyanite eclogites from the Roberts Victor mine, and these studies are being extended to include a similar glass phase observed in other eclogite specimens from the same locality. As part of this study, a large number of electron microprobe analyses are being made of the major constituents of these nodules: garnet, omphacite, olivine, diopside, enstatite, and chrome diopside. This analytical data is being supplemented when necessary by partial wet chemical analyses by Eugene Jarosewich.

Also under investigation by Switzer are specimens of andradite garnet on serpentinite matrix dredged from the mid-Atlantic Ridge by William G. Melson, the first observed occurrence of this mineral assemblage from this area.

Chemical and metallographic studies by Roy S. Clarke, Jr., continue on the Campo del Cielo, Argentina, meteorites and related meteorites in the hexahedrite-octahedrite composition range. Particular emphasis is being placed on the role of phosphorus in the development of these temperature-dependent structures and the interrelationships between the minerals schreibersite and cohenite. A better understanding of the low-temperature cooling history of iron meteorites should result. Studies on several pallasite meteorites and the new Allende, Mexico, meteorite are also in progress. The oxidation state in synthetic glass systems of tektite composition is being studied too in the expectation of obtaining information on metallic spherules in tektites.

Kurt Fredriksson has spent five months at the Manned Spacecraft Center, NASA, Houston, Texas, assisting in preparation for the anticipated lunar samples. He also worked with the staff from the Geology Branch at Houston on southwest Texas ashflow rocks and on glass particles resembling micro-tektites from recent volcanic ashes from Hawaii and Surtsey.





Cerro Negro Volcano, Nicaragua, in eruption November 1968. Lavas and ash from this eruption are under study by W. G. Melson, who was at the volcano in November.

New instrumentation and techniques for nondispersive x-ray analysis have been studied by Fredriksson and a system has been adapted to the electron probe. The technique allows very rapid phase identification or qualitative or semi-quantitative analysis of small multicomponent systems. Of special interest seems to be the possibility to analyze small compositional differences ( $\pm 0.2$  weight percent) in various minerals, e.g., proton bombardment-induced oxygen deficiency in mineral phases from the surface of the moon.

Fredriksson also visited India in January 1969 in order to coordinate an extensive investigation of the Lonar Lake, a crater-like depression in central India, suspected to be an astrobleme. En route to India he studied the Mt. Mayon and Taal volcanoes in the Philippines and also visited the Merapi Volcano in central Java immediately after its January eruption. These studies have been carried out in cooperation with

the Smithsonian Center for Short-Lived Phenomena and the results have been communicated to interested scientists through the Center.

Fredriksson's work on detailed phase composition in meteorites has continued and a system for automatic data processing for all kinds of meteorite research data has been worked out. Once implemented, this system will not only facilitate "bookkeeping" in regard to the collection but also will provide a powerful research tool.

Robert F. Fudali has continued experimental work bearing on crystallization sequences of natural basalts and andesites and chemical trends of the residual liquids. He also has continued study of the relations between divalent iron, trivalent iron, oxygen fugacity, and total chemical composition of a given rock. This work involves subjecting powdered samples of different rocks to extreme temperatures (800–1300° C.) and very low oxygen partial pressures ( $10^{-6}$  to  $10^{-10}$  atmospheres) to observe how variations in these two parameters change the character of the resulting mineral assemblage.

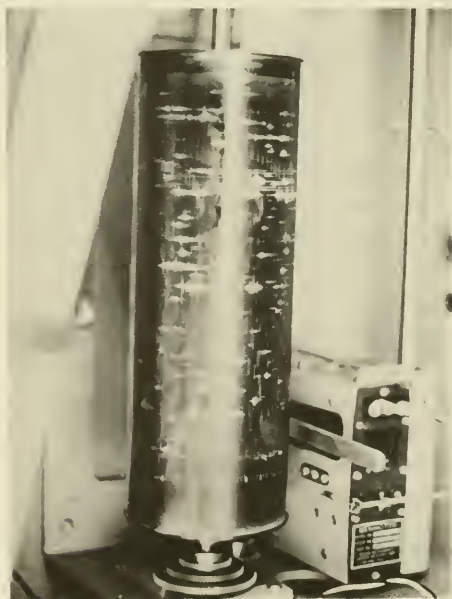
Fudali has spent three weeks in Mauritania, primarily examining two large circular features—Richat and Semsiyat domes. In the past these have been suspected of being the root structures of ancient meteorite craters. Extensive petrographic work has been performed on the returned rocks in an effort to determine the nature of these domes. Based on the complete lack of any effect in the rocks that can be attributed to the shock waves that are generated by a meteorite impact, it has been concluded that these features are not meteoritic in origin but must instead result from unusual endogenic processes.

Curator emeritus Edward P. Henderson has conducted detailed studies of four iron meteorites of the rare ataxite group. In cooperation with Ananda Dube of the Geological Survey of India, he has studied the meteorite that fell at Muzaffarpur, India, on 11 April 1964. The other meteorites, Del Rio, Nordheim, and Monahans, are all from Texas and have been studied in cooperation with Virgil Barnes of the University of Texas and Elbert King of the Manned Spacecraft Center, NASA, Houston, Texas.

Eugene Jarosewich and Joseph Nelen have provided a number of high-quality quantitative chemical and electron-microprobe analyses essential to the research programs not only of the Division of Meteorites but also of the Department of Mineral Sciences as a whole. Jarosewich has performed complete analyses of seven stony meteorites and several inclusions from meteorites (in cooperation with Anana Dube of the Geological Survey of India), two stony meteorites (in cooperation with K. Keil of the University of New Mexico), and one silicate inclusion sample from the Weekaroo Station iron meteorite (in cooperation with Edward Olsen of the Field Museum of Natural History, Chicago).

Extensive work on the Allende, Mexico, meteorite has been completed in cooperation with the staff of the Division of Meteorites. Four rocks from the Arenal Volcano, Philippine Islands, have been analyzed, as well as several minerals, and a number of partial analyses on various materials. Nelen has done extensive electron microprobe work on several meteorites in cooperation with Kurt Fredriksson; F. Kraut of the Museum d'Histoire Naturelle, Paris, and G. Kurat of the Naturhistorisches Museum, Vienna, Austria. Detailed microprobe work has been performed on the Allende, Mexico, meteorite in cooperation with the staff of the Division of Meteorites. Joseph Nelen also has studied ignimbritic rocks, the distribution of carbon in meteorites, and has done developmental work on an automatic data-processing procedure for the meteorite collection. Much of Nelen's effort also has gone into cooperative work with Fredriksson and the Manned Spacecraft Center, NASA, Houston, Texas, in preparatory work for the study of the returned lunar samples.

Brian Mason has continued to work on the phase composition of stony meteorites and has complemented this work with a study of ultrabasic xenoliths from an extinct volcanic pipe near Kakanui, New Zealand. These xenoliths probably crystallized within the earth's mantle, the material of which may resemble meteorite compositions. Similarities and differences between analogous compositions of terrestrial and extraterrestrial derivation are significant for the elucidation of tempera-



Records of microearthquakes created by the advancing lava flow at Arenal Volcano, Costa Rica. Record obtained by W. G. Melson during an expedition cosponsored with the National Geographic Society in March 1969.



Lava flow (background) and memorial to eighty people who perished in the 1968-69 eruption of Arenal Volcano, Costa Rica. This eruption, an unusually explosive one, is still under study by W. G. Melson.

tures and pressures of crystallization. In collaboration with E. P. Henderson, Mason has investigated the Australian tektites collected during their expeditions in 1963-1965 and 1967. He reported on this work to the Third International Tektite Symposium in New York in April 1969.

Vagn F. Buchwald, on leave from the Department of Metallurgy, Technical University of Denmark, has been a research associate in the Division of Meteorites for this past year and will be with the Division for another year. He is working with the Smithsonian collection of iron meteorites in order to compile a modern handbook of the metallography and chemistry of iron meteorites. Photomicrographs, critical historical data, and a list of references will be included. This work will be a major contribution to the study of these meteorites and will greatly increase the information on the collection available in published form to scientific colleagues.

Research in the Division of Petrology and Volcanology has focused on studies of rocks from the deep sea floor and their implications on sea-floor spreading and continental drift. Considerable study also has been directed toward certain recent volcanic eruptions. The latter





Caldera of Isla Fernandina Volcano, Galapagos, before (upper) and after (lower) its great collapse in 1968. This event has been investigated by a number of scientists, including Thomas Simkin, research associate, Division of Petrology and Volcanology.

research has continued to receive much assistance from the Smithsonian Center for Short-Lived Phenomena.

The Division has planned and carried out a geophysical investigation of the remarkable Juan de Fuca Ridge, a highly active zone of sea-floor spreading that is but several hundred miles west of Oregon and Washington. The study has been conducted on one of the finest oceanographic vessels in the United States, the United States Coast and Geodetic Survey ship *Oceanographer*. This ship, equipped with some of the most modern geophysical gear, including a narrow-beam echo sounder, and staffed with excellent officers and men, has led to a number of important discoveries: (1) recognition of new evidence for the hypothesis of sea-floor spreading and continental drift, (2) the nature and probable delineation of the seaward extension of the San Andreas fault, and (3) collection of a wide variety of volcanic rocks, some of which reflect the very young age of the median part of the Juan de Fuca



Ridge. The dredging has been unusually successful. Thirteen of fifteen dredges have yielded rock samples. This extensive collection is a valuable source of materials for detailed petrographic and geochemical information of the makeup of oceanic crust and thus is one of the division's major accessions. This study, carried out in conjunction with Jason Morgan and John Duncan of Princeton University, has included William G. Melson and Harold Banks of the Division's staff and Thomas Simkin of the Smithsonian Oceanographic Sorting Center and a research associate in the Division of Petrology and Volcanology. Interagency cooperation has been a key part of the success of this study, with the Environmental Science Services Administration providing both technical advice and ship support.

Melson has continued his studies of rocks from the mid-Atlantic Ridge, which are cooperative studies with the Woods Hole Oceanographic Institution and Oregon State University.

One of the outstanding achievements of the year has been the National Science Foundation-funded deep-sea drilling program, a joint effort of a number of oceanographic institutions. Numerous holes have been drilled to relatively shallow depths in the Atlantic Ocean and Caribbean and core recovery has been remarkably successful. Although

An Allende, Mexico, meteorite individual found in the field 13 February 1969, five days after it fell. The specimen was found by a schoolboy, one of a group organized by Brian Mason and Roy S. Clarke to search for the meteorite. (Knife handle shows scale.)



intended for recovery primarily of sedimentary materials, the drill has penetrated a short distance into underlying basaltic lavas at a number of stations. These lava samples, whose preliminary study is being performed under the advisory panel on petrology on which Melson serves, provide important information on the older lavas of the midocean ridge system. The results of the sedimentary drilling support the theory of sea-floor spreading and provide unusually complete stratigraphic sections for paleontologic and other studies.

Two eruptions have been the focus of much field and laboratory investigation. The devastating explosive eruption of Arenal Volcano, Costa Rica, in 1968 and 1969 has been investigated by Melson and Simkin. The 1968 eruption and collapse of the caldera of the great shield volcano of Isla Fernandina, Galapagos, has been studied by Simkin.

Arenal Volcano emitted a series of both laterally and vertically directed explosions that devastated about eight square miles and killed some eighty people in less than three days. Subsequent investigations have shown that the eruption can be classified as *nueés ardentes* of the explosion type and that Arenal Volcano, deemed to be extinct prior to the eruption, had erupted last around A.D. 1500. Arenal and presumably many other assumed extinct explosive volcanoes have very long periods of repose between eruptions, periods that may range upward from 500 years.

There have been two expeditions to Arenal—in July and August of 1968 under Smithsonian sponsorship, and in March 1969 under cosponsorship of the National Geographic Society. The field data and samples are still under study, but preliminary results were preprinted and distributed by the Smithsonian Center for Short-Lived Phenomena shortly after the first expedition. Howard Waldron of the United States Geological Survey participated in the first expedition and acted as team leader of the three scientists (Waldron, Melson, and Simkin) dispatched by the United States at the request of the President of Costa Rica. The scientific aspects of the two expeditions will soon be described in a manuscript in preparation by Melson.

Dating of the prehistoric eruptions has been a key part in the study of Arenal Volcano. Clifford Evans and George Metcalf of the Department of Anthropology have provided dates on artifacts buried by prior eruptions and the Smithsonian Institution Radiocarbon Laboratory has provided dates on trees buried by a prehistoric eruption.

In early June 1968 remote sensing devices throughout the hemisphere indicated unusually explosive volcanic activity in the Galapagos Islands. A small expedition was organized by the Smithsonian, including biologists R. I. Bowman and P. A. Colinvaux, and geologists Keith A. How-

ard of the United States Geological Survey and Tom Simkin, a research associate in the Division of Petrology and Volcanology. With the excellent help of the United States Air Force, the group reached the island of Fernandina three weeks after the start of activity. They found that the central caldera, an area approximately two miles in diameter near the summit of Volcano Fernandina, had subsided roughly 100 feet upon the withdrawal of lava from a large chamber within the volcano. Such subsidence is not uncommon in the geologic record, but this event is the largest known since the Katmai (Alaska) activity of 1912. Rock avalanches down the oversteepened sides prevented descent to the floor of the caldera, but observations from the rim showed that the floor was little disturbed and fracturing was restricted to within one-fourth mile of the elliptical boundary fault. The volume of volcanic ash was small and no lava was extruded within the caldera although lava flows on the outer flanks preceded the collapse. Laboratory work is continuing on materials collected during field work in the summer 1968 and follow-up studies of the collapse are planned.

In addition to the major programs of research, a small amount of laboratory study has been devoted by Melson to experimental reduction of basaltic magma by graphite, a study aimed at clarification of the conditions and products of such reductions.

Philippa Black, a visiting post-doctoral associate from the University of Auckland, New Zealand, has been studying the chemistry, mineralogy, and phase relations of the blueschist facies. The so-called eclogites commonly recorded in glaucophane schist terrains have been proven to be part of the normal blueschist facies. Relations between calcic and sodic amphiboles have been studied, and the partitioning of elements between the two amphibole phases has been shown to be a potential geothermometer. Papers are in preparation on the occurrence of a new omphacitic pyroxene and a previously unrecorded member of the sodic amphibole series.

### *The Collections*

The meteorite and tektite collections have continued to grow during the year at an encouraging rate. A large slice of the Mount Padbury, Western Australia, mesosiderite has been obtained by exchange with the Kalgoorlie School of Mines, Kalgoorlie, Western Australia. Specimens of the Boaz, Alabama, iron meteorite have been obtained by gift and exchange from Oscar Monnig of Fort Worth, Texas. Impactite specimens from Köfels crater, Austria, have been obtained by exchange with the Naturhistorisches Museum, Vienna. Impact glass from Aoullouel



Large individual Allende, Mexico, meteorite specimens with Hidalgo del Parral, Chihuahua, Mexico, in the background. These specimens were brought to Washington by Roy S. Clarke and Brian Mason within eleven days of the fall. Material from this collection has been distributed internationally for study to all investigators requesting samples.

crater, Mauritania, and a suite of rock specimens from Richat Dome, Mauritania, have been obtained for the collection by R. F. Fudali. An important collection of australites from Motpena Station, Parachilna, South Australia, has been added to the collection as a gift of Richard Craigie. A major exchange has been completed during the year with the Field Museum of Natural History, Chicago. Particularly important specimens obtained in this transaction are specimens of the Indarch and Mighei meteorites from the Soviet Union, the Barratta meteorite from New South Wales, and the Agen and Vouillé meteorites from France.

Small specimens from two new falls have been obtained. The Juromanha, Portugal, meteorite is a new and unusual iron that fell on 14 November 1968. A small study specimen has been obtained through the cooperation of the Center for Short-Lived Phenomena and the Smithsonian Astrophysical Observatory. A fragment from the Schenectady, New York, meteorite, a fall of 12 April 1968, has been obtained as a gift from Robert L. Fleischer, General Electric Company, Schenectady.





Brian Mason (center) in San Juan, Chihuahua, Mexico, on 17 February 1969, nine days after the Allende, Mexico, meteorite fall. He is holding a large Allende individual just found nearby in a plowed field. Gunther Schwartz (left) and Charles Tugas (right) of the Smithsonian Astrophysical Observatory's Prairie Network Meteorite Recovery Project look on.

The Allende, Mexico, meteorite fall of 8 February 1969 undoubtedly is one of the great meteoritic events of our time. Brian Mason and Roy S. Clarke, Jr., visited the fall area east of Parral, Mexico, in February 1969. They have been successful in obtaining several hundred kilograms of this new, rare-type meteorite. More of this valuable material is being obtained through various channels. The collection not only is large but also it is representative of the strewnfield which is at least 45 km in length, and perhaps amounts to 200 square kilometers. The event was brought to the Division of Meteorite's attention by the Center for Short-Lived Phenomena. Cooperation with the Center has greatly aided the investigation. The Division also has worked cooperatively with the Smithsonian Astrophysical Observatory Prairie Network Project on distribution of material in the field and phenomena of the fall.

A review of the specimen inventory of the Division of Petrology and Volcanology has been completed and it has been decided that a number of improvements are in order. The automatic-data processing (ADP) of specimen information, a pilot program that began two years ago, is still under way. The retrieval system is now operational, but much more information must be processed and added to the data bank before it is fully useful. Much progress has been made and use of the ADP system will soon be routine. This will solve one of the most difficult curation



problems in rapid location of critical specimens for particular research projects.

The research potential of the collections has been further increased by choosing certain areas for intensive development. These are the reference collections of deep-sea rocks and the volcanologic collections. In addition, much time has been devoted to requests for important specimens in other areas of basic research in petrography. The United States Geological Survey recently has instituted new mechanisms for routine transfer of its important mineral and rock specimens. This is significant because most of the petrology research collections have come, and must continue to come, from the United States Geological Survey.

There have been a number of noteworthy additions to the collections during the past year:

73 chemically analyzed igneous rocks, Silver Peaks, Colorado	United States Geological Survey Ross Johnson
Extensive collection of ultrabasic and associated rocks, Southern Appalachians	United States Geological Survey David Larrabee
1968-69 eruptives and prehistoric eruptives; hypersthene-augite lavas and ash and numerous basic plutonic xenoliths, Arenal Volcano, Costa Rica	Collected for the Museum by W. G. Melson
Basaltic lava and ash and acid xenoliths, Cerro Negro Volcano, Nicaragua, 1968 eruption	Collected for the Museum by W. G. Melson
Andesitic lava and ash specimens, Merapi Volcano, Indonesia, 1969 eruption	Collected for the Museum by K. Fredriksson
Samples of a complex basalt-mugearite sill, Piton des Neiges Volcano, Reunion Island, Indian Ocean	University of Edinburgh, Scotland B. G. J. Upton
50 chemically analyzed rock and ore samples, Ore Knob Sulfide Deposits, Tennessee	University of North Carolina Paul D. Fullagar
Basaltic and other lava and ash samples, Deception Island, Antarctica, 1968 eruption	Instituto Antartico, Argentina R. N. M. Panzarine
Volcanic rocks from the floor of the Northeast Pacific	Collected for the Museum by United States Coast and Geodetic Survey and Staff, Division of Pathology and Volcanology Staff

A new area has been added to the reference collection: the Volcanologic Study collection. This includes films, specimens, and geophysical records pertaining to volcanic eruptions. Material for this collection comes from Smithsonian expeditions, donations, and from the Smithsonian Center for Short-Lived Phenomena. Much interest has been gen-

erated in this collection, particularly in the films, which include a number of unique sequences of rare types of volcanic eruptions.

The mineral and gem collections have continued to grow at a satisfactory and predictable rate. Growth and improvement during the year has maintained the mineral collection in its leading position for research and exhibition among world collections. A very active program of exchanges has been continued with other institutions and with individuals. This has made it possible to keep up with newly discovered research specimens as well as with extraordinary display pieces not available through any other channels. Several species new to science and new to the collection have been added, including weloganite, rodagularite, raguinite, lithiophosphate, manganoan goldmanite, yamatoite, and braitschite. Some of the additions have been new type specimens, including magadiite, kenyaite, goldmanite, iowaite, hexastannite, humberstonite, and karelianite. Roebling endowment funds as usual have been used primarily for acquiring new specimen materials for the research collection. One notable exception is the finest specimen known of the rare mineral legrandite. Canfield endowment funds have been used to obtain several fine display specimens, including an extremely large Japanese twin crystal of quartz from Brazil and a fine crystal of a new discovery of tanzanite, a gem variety of zoisite, from Tanzania.

The gem collection has been enriched by several excellent gems, including a 122.7-carat tanzanite, the largest known. Chamberlain endowment funds have greatly improved representation in the collection of the new gemstone tanzanite by the purchase of an 18.16-carat cat's-eye stone. Mrs. Kathryn Everhart has donated a beautiful white opal cabachon weighing 345 carats. Harry Winston, Inc., has given a magnificent 858-carat emerald crystal from the Gachalá mine in Columbia. It is the finest emerald crystal on public exhibit anywhere.

## *Exhibits*

R. F. Fudali has completed scripts for three exhibits in the Hall of Meteorites, and production should be finished during this year. One exhibit is composed of pictures of the lunar surface taken by the unmanned Lunar Orbiter Spacecraft; one is an exhibit describing the Smithsonian Astrophysical Observatory's Prairie Network; and one is an exhibit on ancient meteorite impact craters. When these are opened, they will complete the Hall of Meteorites, which was formally opened two years ago.

Paul E. Desautels has continued his work on the preparation of scripts and exhibit materials for the new Physical Geology Hall. He also has arranged for some changes in the gem displays. New cases for tanzanite, the Bismark sapphire, and the Gachalá emerald have been installed and improvements have been made in other exhibit cases.

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## PALEOBIOLOGY

Activity in the Department has continued to be marked by a primary emphasis in research and an increased participation in educational activities. The Departmental staff of seventeen scientists, joined by more than twenty research associates affiliated with university faculties or the United States Geological Survey, are closely integrated in investigation that includes almost all aspects of paleobiology and related geological sciences.

Walter H. Adey has concluded extended field investigations of the crustose coralline algae of the North Atlantic. He has spent three years studying the systematics and ecology of the corallines. Distributional patterns of species have been traced on the shelf areas from the mid-Atlantic states north through the Maritimes to Greenland, Iceland, and south to Spain. His recent activities have been centered in the Baltic area where scuba diving has been used along the coast of Norway and the northern coast of Europe. These data will serve for compilation of a monograph on the North Atlantic genera.

Automatic data processing has been utilized by Nicholas Hotton III to determine statistical parameters of osteological variation in the skulls of living lizards. The study is now sufficiently far advanced to suggest modification of taxonomic procedures with respect to South African dicynodont reptiles. It appears that some of the characters studied in lizards serve to distinguish genera but not species within a genus. The osteological differences, however, in both lizards and dicynodonts by which genera are recognized are so marked and so readily interpreted as adaptive that use of quantitative procedures is not necessary for generic description. Another group of characters does serve to distinguish between species of the same genus but, when pooled with extrageneric data, fails to distinguish between certain species of closely related genera. Theoretically, this suggests that either there is a great deal of adaptive parallelism among species of different genera of lizards or that such minor osteological features are not under strong selective pressures and vary more or less at random from population to population.

Whatever the interpretations, the taxonomic result is the same. With the characters in question, the investigator cannot use more standard procedures of obtaining clusters that he can call species and clusters of clusters that he can call genera. In order to use osteological characters to distinguish species in these animals, the genera must be determined first. The strongly adaptive basis upon which reptilian genera are established suggests that this procedure will be effective in dealing with the dicynodonts.





A twice-weekly seminar was organized by bryozoan workers in the Department of Paleobiology in the spring of 1968 and is continuing on a year-round basis. Regular members during the past year include permanent staff A. H. Cheetham and R. S. Boardman, predoctoral fellows O. B. Nye and Raman Singh of the University of Cincinnati, T. G. Gautier of the University of Kansas, R. W. Hinds of Columbia University, R. J. Scolaro of Tulane University, and United States Geological Survey geologists O. L. Karklins and Helen Duncan. During the year the seminar has been addressed by twelve visiting bryozoologists, including Patricia L. Cook of the British Museum (Natural History), who is shown above lecturing to the group during her three-month visit to the Department. Seminar subjects have been wide ranging, from the details of bryozoan morphology to the philosophy of evolutionary systematics. The seminar functions most successfully as a testing ground for new ideas resulting from continuing research of its participants. Ideas are presented, discussed, and modified by the seminar and made available to all participants to use if acceptable and as appropriate to individual projects. The seminar is, in effect, a research procedure that multiplies the individual efforts of its members.



Foraminiferal species recovered from the estuarine Choptank River of Maryland's Eastern Shore have been maintained successfully in a culture laboratory for more than two years. The program is directed by Dr. Martin A. Buzas, who is currently involved in studies of distributional pattern and other ecological factors concerned with low-salinity foraminifera. Laboratory technician Miss Brenda Williams is shown transferring specimens.

Erle G. Kauffman has continued research in four major areas of paleontology and stratigraphy: (1) evolution, functional morphology, biostratigraphy, and paleoecology of select Mesozoic-Cenozoic bivalve lineages; (2) systematic, evolutionary, and ecologic study of the dominant Mesozoic bivalve family Inoceramidae; (3) lithostratigraphic and biostratigraphic studies of Mesozoic rocks in the western interior United States; and (4) paleontology and stratigraphy of the Caribbean Cretaceous. Completed studies on the Mesozoic and Cenozoic Thyasiridae, Cretaceous Inoceramidae, and Paleogene Astartidae and Crassatellidae demonstrate the evidence of detailed evolutionary patterns and processes in fossils and equate biological aspects of living and fossil populations. Studies dealing with inoceramids have resulted in the first biostratigraphic zonation of North American and Caribbean forms, with zonal durations approaching a quarter of a million years. The ultra-structure of inoceramid and related shells has demonstrated the presence of daily and tidal growth increments discernible as far back as the Jurassic. Prismatic calcite and biologic response are shown to be tools in defining earth-moon relationship during post-Paleozoic time.

Kauffman's western interior studies have aided in a redefinition of the biostratigraphic system for the Cretaceous and is now centered on analyzing lithologic and biologic facies for faunal zones. More than one hundred zones are now recognized, and integration with radiometric data gives durations of 120,000 to 500,000 years per zone.

Studies of functional morphology, mode of growth, and evolutionary systematics of cheilostome Bryozoa have been continued by Alan H. Cheetham. By applying multivariate statistics and cluster analysis to a lineage of specialized cheilostomes, the poricellariids, Cheetham has been able to recognize the evolution of dimorphic characters from "random" intracolony variation in phenotypes. He is attempting to determine the extent to which this kind of variation is the precursor of polymorphism by extending the analysis to related lineages. In another study he is establishing the dependence of colony form on morphologic structure of individuals in cheilostomes from moundlike accumulations of earliest Tertiary age in southern Scandinavia.

Cheetham has completed, with Richard S. Boardman, a review of skeletal growth, intracolony variation, and evolution in Bryozoa, in which major differences in the method of colony growth in different bryozoan groups have been suggested to have phylogenetic and taxonomic significance. Several students working toward graduate degrees under the direction of Boardman and Cheetham have participated in biweekly seminars that have been well attended by visiting researchers. Educational activities have included four full-time predoctoral fellows

and a number of visiting students in bryozoology. This concentration is indicative of the expanded staff participation in education.

Martin A. Buzas is currently completing a study on the homogeneity of species distribution in Rehoboth Bay, Delaware. Sixteen stations, each ten meters apart, have been sampled with five replicates each. These data are being statistically analyzed by using the facilities of the Smithsonian Information Systems Division at Cambridge, Massachusetts. In another study, the distribution and abundance of Foraminifera in the Pleistocene of Maryland are being examined quantitatively. Comparison of spatial distribution, density, relative abundance, and diversity with other Pleistocene and Holocene faunas is under way through utilization of the information function and multivariate statistical techniques. A study is being made with T. G. Gibson of foraminiferal diversity based on several hundred samples from the Arctic to the Gulf of Mexico in water depths up to 5000 meters, using the Shannon-Weiner information function and a measure of species equitability.

Thomas Waller has completed a study of the evolution of the most common groups of scallops—living and fossil—found along both coasts of North America. By means of a detailed, automated morphological study of the living bay and calico scallops and their fossil ancestors, it has been possible to demonstrate that during the past eighteen million years the group displayed examples of convergence, extinction, and adaptation in response to changing geologic and hydrographic conditions. It also has been shown that the group has evolved more rapidly on the eastern side of North America than on the western side. The computer programs written for the scallop study have been modified in order to make them adaptable to the analysis of shape and growth in a wide variety of organisms.

Dominant patterns of sedimentation in deep Mediterranean basins are being examined by Daniel J. Stanley. Sedimentary deposits observed in these modern basins are being compared with those of similar ancient marine rocks, known as flysch, exposed in the Alps, Carpathians, and other mountain belts of the world. As part of this study Stanley has participated on a seismic and core-collecting cruise sponsored by NATO in the Alboran Sea between Morocco and Spain. He is also completing a preliminary regional reconnaissance of the recent marine geological history of the Mediterranean Sea and is making detailed studies of the Wilmington submarine canyon off the east coast of the United States. Projects in the canyon and adjacent slope, partly supported by the United States Coast Guard, include an evaluation of sediment texture and structures as influenced by such factors as bottom currents and the influence of bottom-living organisms.



## *The Collections*

The departmental collections have been strengthened by the greatest increase in many years of specimens from important foreign localities. Staff field excursions have added to previously weak parts of both the invertebrate and vertebrate collections, while exchanges and purchases through contacts made at foreign universities and museums surpass any such activities in the Department's recent history.

Porter M. Kier has visited many type-localities in England and southern France while completing a tour at Cambridge University as a Guggenheim Fellow. He was accompanied and guided by research associate Anthony Coates through parts of France, accumulating large collections of Mesozoic and younger invertebrates. The coelenterates and echinoderms among these materials are particularly important as they represent many species new to the Museum collections. In southern France, Alan Cheetham has made extensive collections of Tertiary and Upper Cretaceous Bryozoa from the Aquitaine Basin. Cheetham also has visited localities in Italy, Denmark, England, and—of particular importance—the area between the Holy Cross and Carpathian Mountains in Poland. Samples prepared from these collections have yielded many topotype suites of species.

In company with colleagues from the Carnegie Museum and the University of Utrecht, Clayton Ray has collected Pleistocene mammals in Sardinia, Sicily, Malta, and Mallorca. The most significant acquisition has been a series of specimens of the extinct artiodactyl *Myotragus balearicus* from Mallorca, received from William Waldren.

Other valuable collections include general invertebrates from the Cretaceous of the Virgin Islands and Puerto Rico by Erle G. Kauffman; fossil deep-sea ostracoda from localities in India, Israel, Czechoslovakia, Yugoslavia, Turkey, Cyprus, and Sicily by Richard Benson; Brachiopods from England and Poland by G. A. Cooper; mollusks from the Caribbean by Thomas Waller; and a major collection of fusulinid foraminifera from the upper Paleozoic of Yugoslavia, Tunisia, Cyprus, and Turkey collected for the Museum by Raymond C. Douglass and Merlynd Nestell. In total, these field collections will produce thousands of specimens new to the Museum.

The most outstanding single foreign collection has been added by purchase as a gift of the Walcott Fund. It is composed of more than 6,000 specimens, most of them carefully prepared, which represent one of the finest collections ever made from the classic Jurassic sequence of the Swiss Jura. The collection represents more than forty years of work by the collector, Zuber Oberlé, and is meticulously labeled and documented. The brachiopods and sponges are of exceptional importance





Museum specialists assemble a composite skeleton of the woolly mammoth from remains found in the frozen muck deposits in the vicinity of Fairbanks, Alaska.

while the cephalopod species represented are used as a standard throughout the world. This magnificent addition to the invertebrate collection will aid in better fulfilling the responsibility of the Museum as a repository of material used for cosmopolitan studies by staff and professional visitors from throughout the world. Most of the species are new to the collections and previously have been represented only sparsely in any American collections.

Exchanges with the British Museum resulting from trips funded by the Walcott bequest have been arranged by Frederick Collier, Porter



Museum technician Sigmund Sweda exposes the skeleton on an extinct peccary, one of four individuals—probably a family—found together in a wind-blown dust deposit near Hickman, Kentucky. The animals are thought to have died by suffocation during an Ice Age dust storm. A mounted skeleton of the same species, from Pennsylvania, is in the right background.

Kier, and G. A. Cooper. Several thousand specimens have been transferred in this program. Many new species of mollusca, brachiopods, and echinoderms from Great Britain have been added to the collections and the possibility of further exchanges is being arranged.

Notable additions to the collections from domestic sources include tens of thousands of specimens comprehending thousands of type specimens transferred from the United States Geological Survey or received from researchers throughout the country. The Walcott bequest has provided for a number of outstanding purchases or collecting trips. These include the purchase of more than 12,000 deep-sea ostracodes recovered from cores provided by Lamont Laboratories. The cores have been taken from stations all over the world and represent an unprecedented sampling of these microfossils from depths as great as 4,000 meters and an age of more than 20 million years. Ostracodes are the only group of higher invertebrates found in deep-sea sediments that have a good fossil record with the resulting potential for geologic correlation of time and environmental boundaries. Other significant addi-

tions include 24,000 Silurian and Devonian brachiopods from Nevada and Southern California donated by research associate A. J. Boucot, and more than 5,000 invertebrates from the Paleozoic of Oklahoma, Mississippi, and Ohio made by G. A. Cooper and Thomas Phelan. The paleobotanical collections have received many type specimens, including palynomorphs from the Middle Cretaceous of Peru, the holotype of *Williamsonia nizhonia* Ash with thirteen cuticle preparations, specimens of Cretaceous algae from the Black Escarpment and Israel, and others of importance.

Intensified collecting of fossil marine mammals and less-abundant vertebrates from the classical Miocene localities of southern Maryland has produced numerous additions to the fossil vertebrate collections. Close cooperation by residents and amateur collectors has enabled early recovery of many pieces before weathering damage can occur. Albert Myrick has represented the Department in organizing a volunteer collecting team and clearinghouse for information regarding new exposures. Rare specimens added through these efforts include fragmentary mandibles of *Hadrodelfhis calvertense*, about two dozen porpoise skulls, several turtle and fish specimens, posterior rami of both mandibles of the rare Miocene peccary *Desmathyus*, and an unerupted gomphothere molar. Other notable additions include snake vertebrae from a Eocene-Bashi formation and a cast of the skeleton of *Paleoparadoxia* from the Museum of Paleontology, University of California, Berkeley.

The Division of Sedimentology has acquired bottom-grab and dredge samples and deep-sea cores from the continental slope and rise in the vicinity of the Wilmington Canyon collected on joint Smithsonian-United States Coast Guard cruises. Sediment samples added to the collection include those obtained in coastal environments of North Carolina (collected in conjunction with the University of South Carolina) and in the Hatteras abyssal plain (collected on joint Smithsonian-United States Coast Guard and NAVOCEANO cruises). Also received are bottom samples collected on the continental shelf of Argentina as part of a cooperative project with the National Oceanographic Committee of Argentina, the Hydrographic Service of Argentina, the United States Coast Guard, and George Washington University.

Curation of the collections continues to center on the processing of type specimens. In all divisions there has been movement toward eventual automatic data processing, but type specimens must be fully curated and verified against published descriptions and illustrations before information can be put into any automatic system. The paleobotanical type-collections and fossil vertebrate types are not seriously backlogged in initial processing, but fossil invertebrate type specimens

continue to be received at an increasing rate. More than forty papers, including some six to seven thousand specimens, have been processed this year by cataloger (Mrs.) Beverly Tate. The procedures in recording invertebrate specimens have been altered by changing to loose-leaf catalogs with typewritten entries. The information in this form will be more accessible for entry into an automated system and is more rapidly recorded.

Several collections have been rearranged to facilitate storage or to improve use and accessibility. The Paleozoic bivalve mollusks have been moved into a biologically arranged system comprising several thousand species, and the first biologically arranged Mesozoic ammonite and bivalve collections have been formed. A start has been made on a complete revision of the fossil mammal collection to be based on a faunal-stratigraphic plan.

The greatest demand on collections and laboratory facilities of the Department have involved the increased use of predoctoral and postdoctoral fellows and visiting scientists and students. Ten study kiosks and increased desk space in the range areas, as well as increased laboratory space and equipment, have been almost constantly in use.

## *Exhibits*

Major emphasis in the Vertebrate Paleontology laboratories has continued to be placed on preparation of specimens for exhibition. Work has continued on several individual glyptodonts, on a composite skeleton of woolly mammoth, and on a family group of peccaries. A second mounted individual of the giant ground sloth *Eremotherium* has been completed.

Special attention in field work has been given to the acquisition of specimens for exhibition. Large collections of the extinct lagomorph *Prolagus sardus* have been made in Sardinia. Several skeletons have been mounted by Daniel Opplinger at the Carnegie Museum under the direction of Mary R. Dawson. One of these will be provided for exhibit at the Smithsonian. Materials of extinct dormice and of *Myotragus balearicus* also have been obtained in the Mediterranean for future exhibit.

The Division of Paleobotany is cooperating with the Department of Mineral Sciences in the construction of a Carboniferous swamp diorama in the Hall of Physical Geology. Consultation with artists of the exhibits staff also has involved the illustration of Mesozoic plants to be presented in mural form in the dinosaur hall.



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# Smithsonian Astrophysical Observatory

FRED L. WHIPPLE, *Director*



FOR THE FIRST TIME, THIS REPORT of the work conducted by the Astrophysical Observatory is limited to a close view of only a few of the numerous areas in which great progress has been made during the current year. This new policy permits examination in subsequent years of other areas selected so as to give a full view of Observatory activities in a sequence of four or five annual reports. The titles of staff papers presented or published, as listed at the end of this report, give a thumbnail sketch of the research completed.

No significant policy changes in the Observatory research program have been initiated this year except that unusual effort has been expended toward the most efficient utilization of brainpower, funds, and facilities with the goal of uncovering as much knowledge and understanding as possible about the universe in which we live and about man's interrelationships with this universe.

## GEODESY AND EARTH PHYSICS FROM SPACE

For a multitude of his enterprises, man must know the coordinates of points on, above, or below the earth's surface. Points on the earth are not, of course, fixed in space and time. The earth-moon system moves in its orbit about the sun while the earth and moon follow orbits about their center of mass and while the earth rotates about a slowly changing axis. Also, locations on the surface change because of processes within the solid, liquid, and gaseous domains of the earth. To this complex dynamical system, man has added spacecraft that sense the details of the system without themselves influencing its workings.

Fundamental physics asserts that the only way to mark a point is by reference to objects possessing mass. But all objects with mass are



attracted mutually in accordance with the laws of gravitation, and these laws dominate in governing the complex motions in which the earth and its satellites participate. Hence, the mass distribution and the gravitational field of the earth are fundamentally linked to the problem of locating points.

Traditionally, relative positions and gravity on the surface of the earth, the motions of the earth, and the associated physical processes are recognized as principal objectives of branches of the geosciences and astronomy.

These disciplines have the common characteristic that they are based upon measurements of distance and direction and their time dependence. The Smithsonian Astrophysical Observatory has pioneered in the application of space technology to a broad span of related metric problems.

### *Evolution of Instrumentation and Techniques*<sup>1</sup>

Preparations to observe artificial satellites and to calculate their positions were important aspects of the first satellite programs. By the time satellites became a reality, special cameras developed under the direction of Fred L. Whipple were ready to photograph an illuminated satellite against the star background. These Baker-Nunn cameras designed for SAO produce camera-to-satellite directions accurate to a few seconds of arc. For a typical orbit, this angular uncertainty corresponds to a positional uncertainty of a few tens of meters. Radio doppler tracking also began with the first United States satellite; this technique as perfected by the Applied Physics Laboratory of the Johns Hopkins University has demonstrated accuracy comparable to that of camera tracking.

During most of the first decade of the space age, the 10-meter accuracy characterizing the various photographic and doppler systems surpassed the precision with which their data could be fitted by theory.

By about 1966, agreement between theory and data came into sight, and interest in improved tracking systems grew.

Ranging to satellites with light pulses from a ruby laser was perhaps the first new technique promising 1-meter resolution or better.<sup>2</sup> For this system, the satellites need carry only retroreflectors in the form of cube-cornered mirrors. At this writing, six satellites with retroreflectors are in orbit, and several laser systems, including three at SAO sites, are operating, typically at the 1-meter accuracy level. No major obstacles seem to stand in the way of 10-centimeter accuracy in a few years.

A second instrumentation breakthrough is long-baseline radio interferometry over thousands of miles, with independent atomic clocks.<sup>3</sup>



A Baker-Nunn photograph of S4-B fuel venting 30,000 miles above earth.

The SAO-Harvard radio telescope is being equipped for these measurements. As with any interferometer system, the fundamental measurement is a range difference that can be translated into an angle relative to the baseline.

The use of an altimeter on a satellite is an old idea that now seems timely for implementation. As currently conceived by the National Aeronautics and Space Administration, this third instrumentation advance would use radar techniques over the ocean to attain meter-or-

better accuracies. Other systems being readied include devices to compensate for surface forces on a satellite and instruments for satellite-to-satellite tracking. SAO is preparing techniques to analyze data from such systems.

### *Evolution of Geodetic Applications*<sup>1</sup>

In 1964, with the establishment of the National Geodetic Satellite Program, a set of national objectives was adopted, embracing goals reasonably attainable with the systems then available. As currently formulated, the two major objectives are (1) the establishment of a unified world datum referenced to the center of mass of the earth, in which about ninety station locations are to be positioned with an accuracy of ten meters, and (2) the determination of values of the coefficients of the spherical-harmonic representation of the gravitational field of the earth to the 15th degree and order.

The objectives of the national program now seem within sight of fulfillment. Results at SAO reported during 1969 by Kurt Lambeck establish a world datum as required by the first objective and give positions of some forty stations. Geopotential coefficients determined during this year by Edward M. Gaposchkin of SAO and Yoshihide Kozai of SAO and Tokyo University nearly satisfy the second objective. These results are being compiled in the new Smithsonian Institution Standard Earth.

Thought and action toward other applications and objectives have begun, stimulated in part by the progress toward the announced national objectives. An equally significant stimulus has been the instrumentation progress sketched above.

### *Geopotential and Mass Distribution*<sup>1</sup>

The gravitational potential of the earth is a manifestation of the mass distribution within the earth. As determinations of the potential improve and as they come to represent smaller features of the field, their implications for geology rise sharply. Over the oceans, very fine geoid detail from a satellite altimeter can have great geological significance for large regions of the earth that have had little study.

### *Earth Tides*<sup>4</sup>

Earth tides due to the sun and moon are prime examples of phenomena whose investigation by satellite techniques became possible

only when orbit determination attained accuracies of a few seconds of arc. In principle, at least two aspects of earth tides can be studied.

The most obvious effect is the motion of a tracking instrument as its foundation rides with the tides in the solid earth. The radial deformation of the earth under conditions of maximum change has a range of some thirty centimeters. Motions of this amplitude should be detectable by the most precise tracking instruments, but a suitable observing campaign has yet to be mounted. Robert Newton of the Applied Physics Laboratory and Kozai have detected the satellite orbital perturbations corresponding to the mass displacement. Analyses by both authors have obtained a measure of the gross elastic properties of the earth.

The elastic coefficients derived from satellite orbits agree reasonably with the value derived from astronomical observations and the theory of the Chandler wobble of the earth's pole.

### *Polar Motion*<sup>4</sup>

The earth rotates about an axis that continually changes. First, the direction of the angular momentum vector in space has a 26,000-year cycle caused mainly by torques from lunar and solar gravitational interactions with the oblateness of the earth. This is called astronomical precession and nutation.

Second, the axis about which the earth rotates at any instant, expressed relative to body-fixed coordinates, performs a precession. This can have an amplitude of roughly 0.5 arcsec. The motion involves two periods, one of twelve months and the other of about fourteen.

Third, the position of the principal axis of inertia for the earth, i.e., its current rotation axis, is not necessarily fixed relative to some set of axes attached to the earth. Besides the obvious possibilities of mass displacement in the fluid domains of the earth, there recently has been a suggestion that mass displacements associated with earthquakes may contribute observable changes.

Satellites offer several new but untried avenues for further investigations of polar motion. If the conventional corrections for polar motion are not introduced into the analysis of satellite observations, station positions should show an apparent variation corresponding to the wobble of the earth beneath the satellite. Polar-motion measurements of superior accuracy may result from long-baseline interferometry with independent atomic clocks at two or more radio telescopes.

An exciting possibility from satellite observations concerns the determination of the location of the principal axis with maximum

moment of inertia, using analysis techniques developed for geopotential determinations.

### *Rotation of the Earth*<sup>4</sup>

The rate of rotation of the earth about its instantaneous axis is not a constant when measured against atomic clocks; that is, the sidereal length of the day is not constant. There is some possibility that those variations may be determined from the satellite analyses themselves. It is more likely that improved techniques, such as long-baseline radio interferometry, will eventually provide refined tabulations.

Satellite techniques may also contribute to an understanding of the origin of these variations. There may be mass displacements that change the moment of inertia of the earth, and these changes should be accompanied by changes in the geopotential coefficients.

### *Crustal Motions*<sup>3</sup>

An attempt to measure the relative motion of crustal blocks, i.e., continental drift, is by far the most difficult task seriously contemplated for techniques of satellite geodesy. Yet this phenomenon is one of the most actively discussed today in earth science. Two recent global models can be applied to predict the relative horizontal velocities that might be expected for any two points on the earth's surface. These have been applied to SAO sites by Paul A. Mohr. The maximum rate is about ten centimeters per year. Because laser and interferometer techniques are approaching this accuracy and because an observing campaign could cover several years, measurement of crustal block motion is a reasonable goal for the second decade of the space age.

### *Ocean Profile*<sup>4</sup>

In the open ocean, the sea level averaged over wave structure should be an equipotential surface within an uncertainty of a few meters. Dynamical variations due to tides, currents, cyclones, and similar phenomena of great interest in oceanography seem to have amplitudes of less than a few meters. Hence, the use of satellite-borne altimeters to sense sea level might progress through two phases. In the first, the equipotential surface corresponding to mean sea level would be determined to an accuracy of one meter or better. In the second phase, refined altimeters would probe dynamical changes in the ocean surface.



## *Coordinated Observation Campaigns*<sup>1</sup>

Clearly, the problems discussed above are intimately interrelated in complex ways, and certainly there are other related topics not discussed here that will emerge later with major importance. Many investigations of a broad range of questions can be based on the same observational material if the design of the observing campaign anticipates this need. Also, some of the investigations may require coordinated observations from quite different instruments—e.g., laser networks and radio interferometers. Still further, most of the topics are global in scope and therefore require that observing sites be well distributed geographically. The organization of a coordinated observation and analysis effort of the scale required is a formidable problem in itself, to which SAO is now expanding its attention.

## MAJOR METEORITE RECOVERIES OF 1968-69

The scientific value of information gathered from a meteorite is greatly enhanced if the object can be analyzed within a few weeks or even a few days after its fall. Such material fresh from interplanetary space contains traces of radioactivity that afford unique information about the solar system's history.

This past year has been an unusually productive one for scientists interested in the quick recovery of meteorites. Four large meteorites have been recovered, each within a few days of its fall.

On Friday, 12 April 1968, at 8:30 P.M., a meteorite struck the roof of the home of Joseph W. Kowalski in Schenectady, New York, splintering a portion of the eaves and rebounding onto the ground. Mr. Kowalski, who was watching television at the time, heard what he later described as a sound "like a firecracker going off in the attic." Two days later, on returning home from church, he observed the broken eaves, noted the nature of the damage, searched the grounds adjacent to his home, and recovered from alongside his house a single chondritic meteorite of mass 283.3 grams. Its exterior consists primarily of a dull black fusion crust plus a fracture surface that was apparently produced by breakup in the atmosphere.

During its existence in space (in this case, as a small body of one-meter radius or less), a meteoroid is exposed to cosmic rays, which cause nuclear reactions and produce radioactive and stable atomic species. After it has fallen, however, the meteorite is protected from cosmic rays by the earth's atmosphere and there is little subsequent isotope production. From laboratory measurements of a stable product

and a radioactive one, it is possible to determine the duration of cosmic-ray exposure, which is called the exposure age.

Edward L. Fireman<sup>5</sup> has measured the cosmic-ray exposure age of this meteorite and has placed it at 31.4 million years. This age plus measurements of the densities of cosmic-ray tracks in olivine and pyroxene crystals at four positions in the meteorite give evidence that the specimen came from a depth between 5 and 10 centimeters in a preatmospheric body of greater than 15-centimeter radius. The uranium/helium-4 and krypton/argon-40 ages, which are 4.1 billion years and 4.35 billion years, respectively, indicate that the meteorite underwent very little heating in space since it became solid.

On 14 November 1968, at about 6 P.M., a 25-kilogram iron meteorite fell only thirty meters from where a farmer was standing in a field near Alandroal, Portugal. Robert A. Citron, director of the Smithsonian Center for Short-Lived Phenomena, learned about this fall on 2 December and arranged for a specimen to be sent to SAO for analysis.<sup>6</sup> It arrived on 14 December, only thirty days after the fall. The meteorite is called both Alandroal and Juromenha.

Matthias F. Comerford has investigated its metallography<sup>7</sup> and has found that if the object had ever had the octahedral pattern normally expected of iron meteorites, the pattern had been destroyed by at least a single-stage melting event and more probably by a two-stage melting freezing plus deformation-and-annealing history. His investigation has further indicated that the structure of the meteorite is similar to that of the Washington County iron, which is an unusual meteorite because it has 8.7 percent nickel but no Widmanstätten pattern, a distinctive crystallization feature usually found in irons.

Because study of Alandroal began only one month after fall, certain of the short-lived radioactivities could be measured with considerable accuracy, giving new information about cosmic rays in interplanetary space. Fireman has measured the argon-37, argon-39, and tritium radioactivities and the rare-gas content.<sup>8</sup> He has found that the argon-37, argon-39 ratio in Alandroal is the lowest ever measured in any meteorite.

From this ratio, Fireman has found that the exposure age of Alandroal is 33 million years. This means that Alandroal was covered with protective material until 33 million years ago, when it collided with another body or otherwise had its protective covering ripped away and the present meteoritic material exposed to space. Another conclusion is that the cosmic-ray flux per unit time bombarding Alandroal during the fifty days before the meteorite struck the earth was only half as great as the average flux during the last 400 years. This ratio means that the

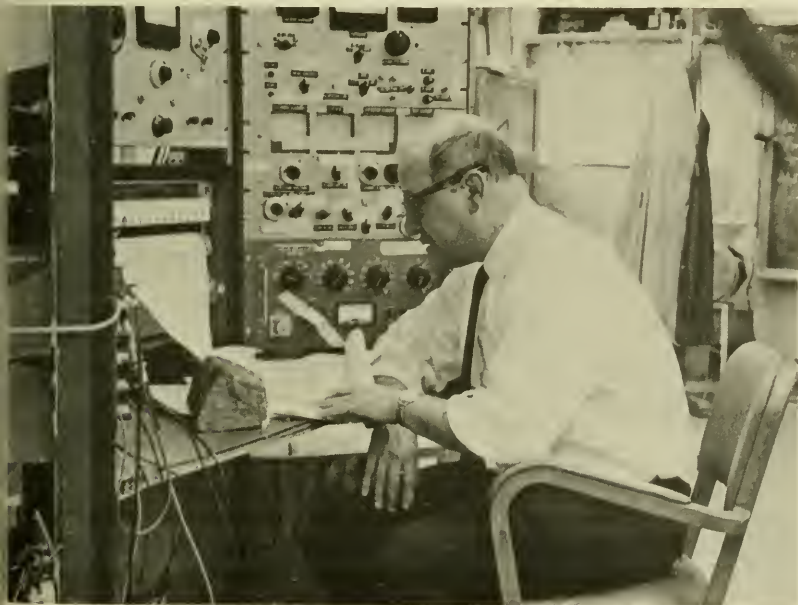
cosmic-ray flux at  $3 \pm 1$  astronomical units from the sun is twice as high as at 1 astronomical unit.

Less than three months later, on 8 February 1969, at 1:05 A.M., a spectacular fireball lit up the sky over Arizona, New Mexico, and northern Mexico. A shower of stones fell over an area of approximately 100 square miles around Pueblito de Allende in Southern Chihuahua, Mexico, approximately twenty miles east of the city of Hidalgo del Parral.

When news of this event reached saO, the Center for Short-Lived Phenomena immediately alerted the Air Force. A B-57 aircraft followed the winds over the Gulf of Mexico for seven hours to collect airborne dust ablated from the meteoroid. Citron quickly located people who had recovered specimens and he notified scientists of the fall. Charles A. Tougas and Gunther Schwartz traveled to the site to obtain trajectory data; from these data and from the distribution of material on the ground, Richard E. McCrosky has been able to deduce that the preatmospheric mass of the meteorite exceeded twenty tons.<sup>5</sup>

An intensive study of a piece of this meteorite has been carried out by Ursula B. Marvin, John A. Wood, and John S. Dickey, Jr.<sup>9</sup> It has proved to be a rare type III carbonaceous chondrite containing chondrules and irregular masses that depart radically in mineralogy and chemistry from the matrix and from the bulk composition of other stony

Dr. Fireman examines the meteorite Pueblito de Allende in his laboratory.



meteorites. Patches of material abnormally rich in aluminum have been discovered, along with one mineral (hercynite,  $\text{FeAl}_2\text{O}_4$ ) new to meteorites. Also a melilitic glass has been found that is new to meteorites.

Fireman has determined from the neon in Allende that the cosmic-ray exposure age of this meteorite is five million years. Evidently this is the interval since it broke out of a larger object during a possible collision in space. The exposure ages of other carbonaceous chondrites range from 0.2 to 50 million years.

The most unusual feature of the rare gases contained in Allende is the isotopic composition of the xenon in the chondrules. Chondrules are spherical globules, a few millimeters in diameter, of what looks like rock that once was melted but is now embedded in a fine-grained dust-like matrix. Fireman has found that the xenon in the chondrules is practically pure xenon-129, with only 1/100 as much xenon-132. This is in sharp contrast to the xenon in the earth's atmosphere, where these two isotopes are nearly equally represented. Excesses of xenon-129 have been found in other chondrules, but never so pronounced as in the present case. The xenon-129 is believed to have arisen from the long-extinct radioactive isotope of iodine-129, which was created when the elements were formed. If this is true, then to have contained such a high amount of xenon-129, the chondrules of Allende must have been formed very soon after the creation of the elements.

To judge from the amount of material recovered, Pueblito de Allende has the distinction of being the largest carbonaceous chondrite known. The first known meteorite of this type fell near Alais, France, on 15 March 1806, only a few years after scientists accepted the reality of "stones from the sky." Allende is the 27th carbonaceous chondrite found. Since the total weight of material in collections from the 26 previous cases is only slightly greater than 100 kilograms, the world supply of carbonaceous chondrite matter has been more than quadrupled by the addition of over 350 kilograms recovered from this meteorite.

On 25 April 1969, a farmer saw a large fireball streak across the sky near Belfast, Ireland. It was seen to fall in a bog in Sprucefield, and several pieces of the meteorite were recovered. A sample has been analyzed by Fireman for radioactive and stable rare-gas isotopes. The radioactivities of argon-37 and argon-39 have been measured in the magnetic and nonmagnetic phases. The argon-37/argon-39 ratio gives a value of  $0.90 \pm 0.009$  for the iron phase, which is considerably higher than the ratio measured in Alandroal. Since Sprucefield and Alandroal both fell during the same period of the same solar cycle, Sprucefield's orbit must have been different from that of Alandroal. In order to have a higher argon-37/argon-39 ratio, Sprucefield's orbit must have had a smaller semimajor axis. The stable rare-gas isotopes of helium, neon, and argon



are very low, indicating that the meteoroid was recently heated. The exposure age of 1.6 million years obtained from helium-3 and neon-21 is less than one tenth the age obtained from xenon-126, which is 20 million years. This recent heating is in accord with an orbit with a small semimajor axis.

Several of the analyses of these meteorites have been made in part with special equipment designed and built by SAO for the study of lunar samples, beginning in the fall of 1969.<sup>8 9</sup>

## ATOMIC AND MOLECULAR PROCESSES

In a very general sense, the study of atomic and molecular processes refers to the collisions of an atom, molecule, electron, or proton with another such particle. Because of the quantal nature of these particles, a variety of interesting effects can be observed.

The knowledge both of the different types of atomic and molecular processes and of the rates at which these reactions proceed is essential to the basic understanding of many aspects of modern science and technology. There are numerous applications in astrophysics, geophysics, aeronomy, meteors, controlled fusion, magnetohydrodynamic power conversion generators, plasma motors, and gas lasers that impose stringent requirements on both identifying and determining accurate probabilities of various atomic and molecular processes. For example, the impact of atoms evaporated from a meteor with the atmospheric atomic and molecular constituents causes the optical and ionization phenomena produced when a meteor enters the upper atmosphere. In addition, the ionosphere of the earth is produced mainly by the ionization of the neutral-particle constituents of the atmosphere by solar ultraviolet radiation. This ionization process leads to the production of free electrons and positive ions, which cause excitation of the neutral particles, with the subsequent emission of light (dayglow). Knowledge of atomic and molecular processes further enhances our understanding of such fields as health physics and biochemistry.

Alex Dalgarno and his group have carried out theoretical studies of a wide range of collision processes involving the interaction of radiation with electrons, atoms, and molecules found in the atmospheres of the planets, in the solar corona, and in the interstellar medium.<sup>10</sup> Space science has opened up a new, wide field of observation in the far ultraviolet where these processes produce direction radiation.

One of the areas of atomic and molecular physics to which they have given special attention is the absorption of ultraviolet radiation by helium and hydrogen molecules. In addition to their importance to



molecular spectroscopy, the absorption processes in hydrogen provide an efficient mechanism for the dissociation of a hydrogen molecule into two hydrogen atoms. The calculation by Arthur C. Allison of accurate transition probabilities for the Lyman and Werner systems is the necessary first step in the calculation of the dissociation of molecular hydrogen by radiation with ultraviolet wavelengths around 1000 angstroms. The cross sections he has computed have been used in a discussion of the abundance of hydrogen in the atmosphere of Venus. Kenneth M. Sando has completed a detailed analysis of both the absorption and the emission of radiation in specific helium transitions that have been studied in the laboratory. Dalgarno and his group have also begun a study of the quadrupole emission spectrum that results from the primary ultraviolet absorption.

Further, this group has continued studies of the processes controlling the decay of excited states of the helium-like ions in the solar corona and has completed the first purely theoretical predictions of the probabilities of intercombination of spectral transitions. Gordon W. F. Drake has carried out variational calculations to determine accurately the rates of these radiative processes as a function of nuclear charge. He also has calculated spin-orbit mixing parameters and relativistic corrections to the energy levels. In addition, he has developed a theory of induced radiative deactivation of metastable ions by collision with charged particles. This theory has been used to obtain results for the metastable helium-like ions.

The group also has explored the effects of collision-induced fine-structure transitions that give rise to infrared emission. Robert H. G. Reid has devoted particular attention to this work and has been involved in the development of a new theoretical formulation that predicts the occurrence of oscillations in the collision probabilities arising from a resonance-like phenomenon.

Methods for calculating the effects of collisions between electrons and heteronuclear molecules such as  $\text{CN}$  and  $\text{OH}$  have been developed this year. Calculations on  $\text{CN}$  have been completed.

Several members of this group have continued fundamental studies of the quantum mechanics of atomic and molecular structure. By means of extension of the  $z$ -expansion technique to high order, Drake has provided accurate wavefunctions for the entire isoelectric sequence in a single calculation. Paul Blanchard has carried out a theoretical investigation of quantum defects in 2- and 3-electron atomic systems with the aid of the  $z$ -expansion perturbation theory, as developed by Dalgarno and David Layzer (of Harvard College Observatory). Michael Jamieson has completed his PhD dissertation, entitled *Time-Dependent Hartree-Fock Theory*, on this subject. Dalgarno believes

that this construction of a general form of perturbation theory shows much promise as a procedure for studying correlation effects.

Investigations of collision broadening effects in the wings of spectral lines have continued. Sando has begun a study of the contribution to the absorption in the Lyman-alpha wing. Dalgarno and his coworkers have completed a study of the luminosity appearing in the upper atmosphere of the planet earth as a consequence of collisions of the fast photoelectrons released by the action of solar ultraviolet radiation.

M. Raymond Flannery and Hiram Levy II have continued their studies of atomic and molecular processes as they relate to meteor trails.<sup>11</sup> They have developed an analytic form for the interaction matrix elements in the hydrogen-hydrogen collision system and have prepared impact-parameter calculations of cross sections for the excitation of both atoms.

Flannery has continued investigations of various recombination mechanisms that contribute to the electron loss from a meteor trail. The rate of decay of the radar echo from the meteor trail gives a measure of the decrease of electron concentration in the trail.

Levy is currently working on two calculations of particular importance. The first is a method for determining first Born-wave excitation and ionization cross sections for the collision of two atoms. The second calculation involves multistate impact-parameter cross sections.

Theoretical studies of atomic and molecular processes are supported not only by laboratory work but also by means of astronomical instruments and space experiments.

Anthony R. Lee and Nathaniel P. Carleton have completed a series of laboratory measurements on the excitation by electron impact on the ions of calcium, barium, and strontium. Thus far, there have been no laboratory measurements of this collision process, which is vitally important in the formation of the spectral lines of these ions.

Ashok Sharma, Wesley A. Traub, and Carleton also have been constructing a three-etalon Fabry-Perot interferometer system for high-resolution spectrometric work at Agassiz Station and at Mount Hopkins.<sup>12</sup> This instrument is designed to be very flexible in terms of wavelength coverage and resolving power, having specially designed reflecting coatings on the etalons. It will be used to continue the program of high-resolution planetary spectroscopy that is currently under way, with investigations of methane rotational temperature on Jupiter and of photochemical processes involving oxygen on Venus and Mars. A search is also planned for deuterium in the spectrum of Jupiter and in certain planetary nebulae.

## STUDYING THE SUN

The sun, a star among unimaginably many others, is uniquely close. We can observe what it is and how it behaves much more thoroughly than we can any other star. Yet the data we have already accumulated raise at least as many questions as they answer, for they reveal the enormous complexity of the solar atmosphere. Theoretical studies have now progressed to the point where they account for many separate solar phenomena, but many of the most fundamental aspects of the sun remain unexplained. Familiar examples include sunspots and the solar corona, the origins of which are still not understood. SAO is contributing heavily to our understanding of these and related phenomena.

Exciting new observations of the infrared region of the spectrum of sunspots are now available. This material is being obtained by Robert W. Noyes and Donald N. Hall (the latter of the Harvard Astronomy Department), who have jointly initiated a major program of high-resolution infrared spectroscopy of sunspots, using the vacuum spectrograph at the McMath Solar Telescope of Kitt Peak National Observatory.

These infrared observations have enabled Noyes and Hall to make the first identification of solar fluorine in the form of hydrofluoric acid molecules in sunspots. They also have mapped the first-overtone spectrum of carbon monoxide to very high quantum numbers and have obtained high-resolution observations of highly excited levels of overtone bands of OH. They are in the process of extending their observations farther into the infrared with a new infrared spectrograph under construction at Kitt Peak National Observatory.

In order to interpret the new sunspot data, Noyes has begun to calculate theoretical sunspot models, using a computer program developed by Owen Gingerich and Duane F. Carbon at SAO. There has resulted a rather precise value for the abundance of fluorine in the sun as well as information on sunspot structure.

Solar physicists have long worked to establish satisfactorily how the temperature varies with height in the sun's atmosphere. The procedure is as follows: The details of many observed features of the radiation from a star, such as the continuous spectrum or individual absorption lines, are determined in part by the star's temperature structure. Using theories that specify how the spectrum and the temperature structure are related, we build computer programs to calculate (hypothetical) model solar atmospheres and synthetic solar spectra. With such programs we attempt, largely by trial and error, to construct a temperature structure that causes the model to give rise to synthetic spectra that agree in all essential details with the observed ones. The more complete our



The solar corona photographed during an eclipse.

observational material, the better fixed are the details of the temperature structure.

New observations have been obtained by the Harvard College Observatory spectroheliometer on board the fourth Orbiting Solar Observatory (OSO).<sup>13</sup> These data have enabled Harvard and Smithsonian scientists to make new studies toward understanding the structure of the upper solar atmosphere. Gingerich, in part jointly with Noyes and

Yvette Cuny, has used new data to derive a new empirical model of the temperature structure of the solar atmosphere.

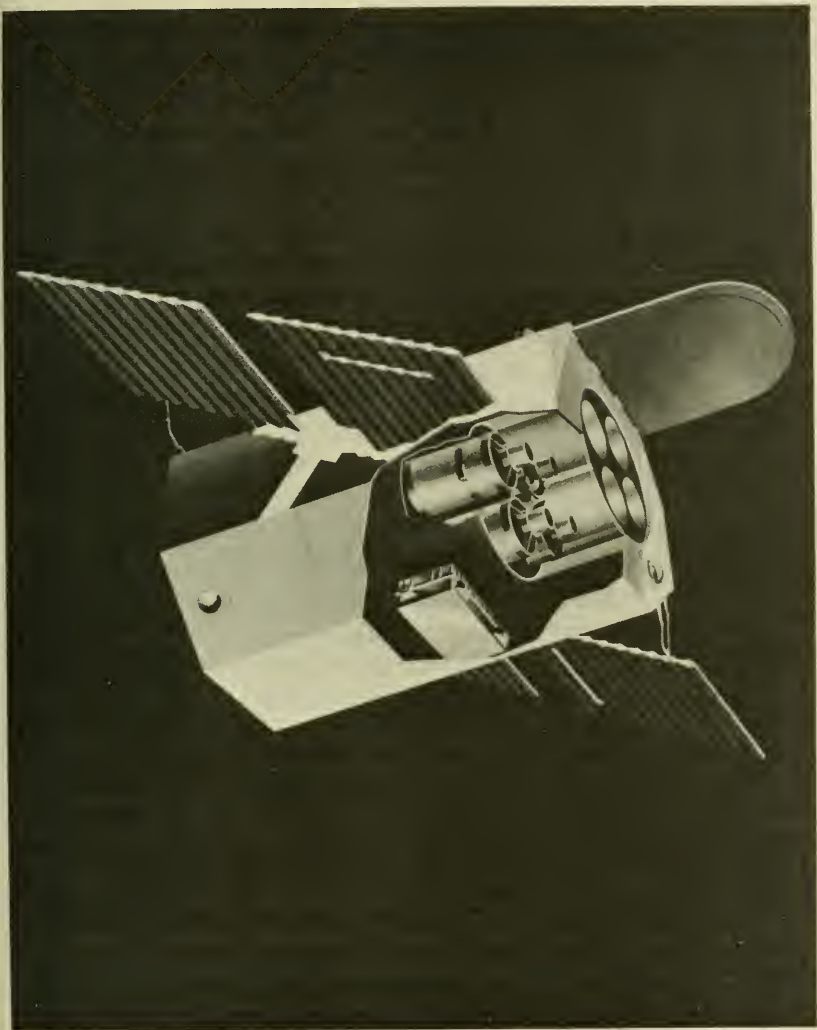
Because of its position outside the atmosphere, *OSO 4* has provided new observations in the far ultraviolet spectrum of the sun's hydrogen. Any model of the solar atmosphere should not only reproduce this spectrum at any point of the sun's disk but also give its variation from center to limb. Noyes and Wolfgang Kalkofen, using the latter's model atmosphere program, have obtained for the low solar chromosphere a temperature and density structure that produces correctly the general features of this radiation: emission of the continuum radiation from a region where the kinetic temperature is about  $8500^{\circ}\text{K}$ , with a decrease in the intensity for wavelengths near the head of the continuum as we look from the center to the limb (limb darkening), and a corresponding increase (limb brightening) at shorter wavelengths. Eugene H. Avrett, using a program he and Rudolf Loeser have been developing over several years, also has tried to obtain a temperature structure conforming to the observed Lyman radiation; his results differ from those of Noyes and Kalkofen. Reasons for the discrepancy may become clear as Avrett's work continues.

Casual observation discloses that neither the sun's atmosphere nor those of other stars resemble what we must assume in our calculations: a series of flat layers of unlimited extent, the same everywhere, and never changing. Even this apparent simplicity has necessitated several decades of development of mathematical procedures, much of it here at SAO, to allow us to compute effectively. But we need to treat more complex geometries: in the large, atmospheres are shells, not planes; in the small, the shapes of relevant segments are more complex still. And we need to take inhomogeneities and dynamics into account: We can observe atmospheric motions, such as convection currents and flares in the sun, and motions of entire atmospheres, in pulsating stars. Sunspots remind us that the solar atmosphere is not the same everywhere.

## THE CELESCOPE EXPERIMENT<sup>14</sup>

Until very recently, astronomers have been forced to conduct their observations from the bottom of the earth's atmosphere, which significantly limits the accuracy, sensitivity, and scope of their observations. Important classes of objects, such as the x-ray stars, lay undiscovered pending man's ability to place the necessary instruments above the absorbing layers of the atmosphere. In order to confirm and refine the relevant theoretical concepts, important physical processes, such as those occurring in the atmospheres of the hotter stars, require observa-





Model of OAO 2 showing Telescope experiment.

tions in that part of the ultraviolet spectrum that is totally absorbed by the atmosphere. Studies of remote galaxies, needed for refining our theories of the universe, have been hampered by the blurring effects of the atmosphere. Studies of faint objects have been hindered by the brightness of the surrounding sky. Understanding of the sun requires that it be studied in the ultraviolet and x-ray regions of the spectrum and that it be studied with higher resolution than any available from the ground. Seen from the highest mountains, not even the sun is bright

enough to provide detectable radiation below a wavelength of 2850 angstroms.

Some of these observational handicaps are being overcome by Project Celelescope. That experiment, initiated by Whipple and carried out under the direction of Robert J. Davis, is addressed primarily to the study of the atmospheres of the hotter stars by means of photometric measurements in those regions of the ultraviolet that are accessible only from above the earth's atmosphere. Named for its pioneering as a truly celestial telescope, the Celelescope concept originated from a series of meetings in February 1958 involving the scientific staffs of Harvard College Observatory and Smithsonian Astrophysical Observatory. Project Celelescope has been supported by the National Aeronautics and Space Administration as part of their Orbiting Astronomical Observatory (OAO) program. Other experimenters in the program are the University of Wisconsin, Goddard Space Flight Center (GSFC), Princeton University, and University College in London. The program reached a climax on 7 December 1968, when NASA launched the second OAO, containing the SAO Celelescope experiment as well as that of Wisconsin.

The manner chosen for accomplishing the primary mission of the Celelescope project is to conduct a sky survey, with reasonable photometric accuracy, in four ultraviolet bands. One of the most important aspects of this survey is the generation of a catalog containing ultraviolet photometric data for the 25,000 or more stars expected to be observed.

### *Description and Operation of Celelescope*

The Celelescope instrument consists of four 12.5-inch  $f/2$  Schwarzschild telescopes that focus starlight on ultraviolet-sensitive television cameras. Each telescope covers one of four separate bands of wavelengths centered at 2600, 2300, 1600, and 1500 angstroms. The 440-pound optical assembly is housed in a cylinder 57 inches long and 40 inches in diameter. From this, a ten-foot cable leads to 87 pounds of electronic gear inside a 9 x 16 x 26-inch box.

The four telescopes are identical, with the central 6.25 inches of each 12.5-inch primary mirror obscured by its secondary. The image is focused on the ultraviolet-sensitive surface of a special television camera tube called a Uvicon. Although the field of view on the photocathode is 2.8 degrees, not all of it is covered by the television raster, so the usable field is about 2 degrees on a side. Each telescope assembly has an additional optical system to focus light from a calibration lamp upon the photocathode.

For the Celelescope experiment, two kinds of Uvicons were specially designed with sensitivity from 1050 to 3200 angstroms and from 1050 to

2150. By means of appropriate filters, the four wavelength ranges are achieved. Also, each field of view is divided into two halves of different wavelength sensitivity by means of a semicircular arrangement of the filters in front of the cathodes, thus enabling each wavelength to be recorded on two cameras.

Although the experiment requires 54 commands to operate the electronics, no mechanical adjustments are needed in flight. The telescopes have been designed to remain in satisfactory focus under all anticipated conditions. The Uvicon tubes produce single-frame pictures, rather than a continuous "motion picture" such as is customary in commercial television. To produce one such frame, 17 different commands must be transmitted to the satellite at carefully controlled time intervals. Each frame, relayed to earth by digital code, is equivalent to a scanning raster of 256 lines with 256 elements in each. The reliability testing of this system was under the direction of Yasushi Nozawa.

The Telescope experiment is operated primarily in real time, since the command and data-storage systems on board OAO 2 do not have a large memory. Telling the spacecraft what to do is not an easy task. Several different kinds of commands can be sent to the experiment itself and many to the spacecraft. There are signals to control the storage of engineering telemetry data; commands to turn on backup subsystems should primary systems fail; commands to select analog, digital, or stored digital modes of operation; operating instructions for the camera whose video signal is being fed into the system; operating controls for the voltages on each camera; and calibration commands. The spacecraft itself can be told to connect or disconnect Telescope power and can be given commands to store or transmit Telescope and other data.

To convert the signals received on the ground into meaningful measurements of ultraviolet flux, all optical parts have had to be carefully calibrated—an extensive and critical undertaking.

The Telescope equipment can observe about 0.8 percent of the entire sky per week. Since only half of the OAO's time will be used by the Smithsonian Astrophysical Observatory, a complete survey would take more than four years. This is considerably longer than the expected lifetime of either the spacecraft or the experiment. Hence, Smithsonian scientists plan to concentrate on a set of fifty sky regions that should provide a reasonable statistical sampling of stars.

The OAO 2 satellite carries an orientation and stabilization system that guides on stars. Its six 2-axis trackers can be set on appropriate stars as the spacecraft is turned to observe a desired area. The experiments on board OAO 2 may never be allowed to point directly at the sun, nor may the paddles carrying the solar-power cells turn away from the

sun. These constraints mean that the observing program must be carefully planned well in advance. This task is being performed under the direction of William A. Deutschman.

### *Determination of Stellar Atmospheres*

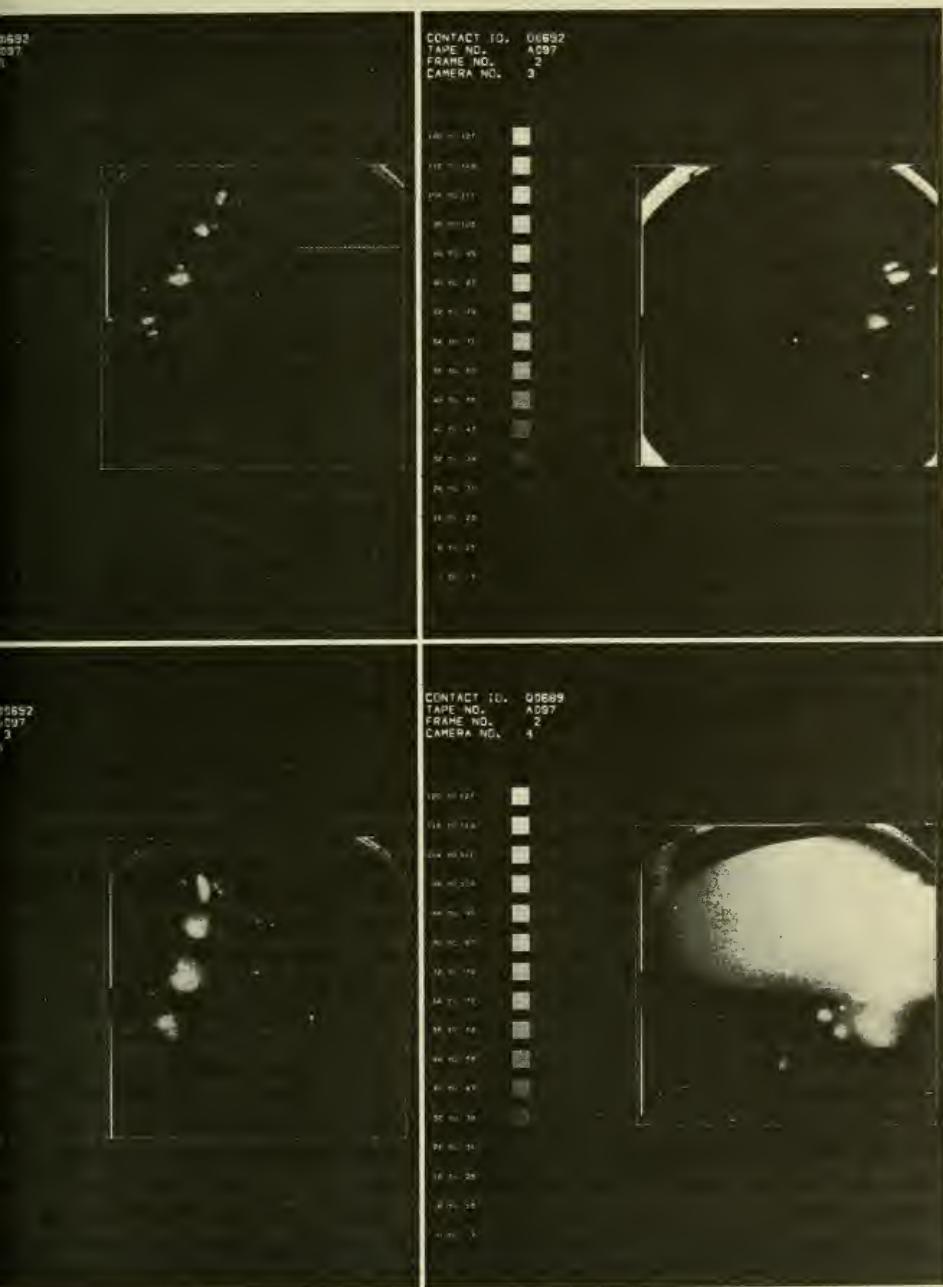
One of Telescope's goals is the measurement of the brightnesses of at least 25,000 main-sequence early-type stars in four spectral bands. The datum of interest is the shape of the spectral-energy distribution curves of the different types of stars. Only for the atmospheres of main-sequence early-type stars do we now have a reasonably clear picture of what to expect. As was the case with the great sky surveys of the past—for example, the *Henry Draper Catalogue* and the *Palomar Sky Atlas*—we plan to acquire our data by sampling the entire available portion of the celestial sphere and thus increase our chances of making important unexpected discoveries. We have planned our instrumentation and observational program in order to balance the payload limitations of Telescope with these scientific objectives.

Experiments from rockets and satellites have already given astronomers a considerable amount of observational information concerning ultraviolet stellar spectra. These observations indicate ultraviolet fluxes that for most stars are consistent with the most recent theories of stellar atmospheres and interstellar absorption, but interesting exceptions are numerous.

Observation of the ultraviolet fluxes from the hot stars is of great importance to theoretical astrophysics. One goal of Telescope is to strengthen the observational foundation and to chart the path for observing programs and instrumentation for future, more specialized satellites now being planned.

### *Observations*

As of 30 June 1969, we had scheduled 3,000 pictures in 1,000 different positions and had obtained 2,500 pictures in 900 different positions. The reliability and performance of the Telescope experiment in orbit have followed almost exactly the prelaunch predictions. Our first pictures, obtained during checkout, indicated that all cameras met or exceeded performance specifications. Three of the cameras continue to obtain valuable scientific data, with all four wavelength bands still in use; one camera failed after 77 days in orbit. The three cameras still in use are exhibiting loss of sensitivity, owing partly to the effects of



Telescope pictures of the Sword of Orion.



space radiation on our optics and partly to the effects of prolonged operation on the performance of the camera tubes. The present performance of the equipment is such that we expect to continue receiving useful scientific information from the Celescope experiment for several more months.

The accompanying figure is a sample of the pictures now being received from Celescope. The 5-second exposures show the stars in the Sword of Orion, with the Orion Nebula surrounding Theta Orionis, the third bright star from the top of the picture. Since these are extremely hot young stars, of spectral types B and O, they appear brighter in the shorter wavelengths (Camera 4) than in the longer wavelengths (Cameras 1 and 3).

The Orion Nebula is one of the brightest objects we have observed to date. On the 60-second exposure (frame d), it is strongly overexposed. The bright background in the upper portion of the 60-second exposure is hydrogen Lyman-alpha light, sunlight scattered by the earth's atmosphere into the otherwise dark night sky.

An early evaluation of the results indicates that very few of the stars measured by Celescope are appreciably brighter than expected. Although many stars lie below the normal spectrum-color relationships predicted for the Celescope ultraviolet color system, those measurements that we have reviewed in detail have been for the most part consistent with a straightforward interpretation such as interstellar reddening or known spectral peculiarities. About twenty percent of the objects found by Celescope near the plane of the Galaxy do not appear in our identification atlas, whereas nearly every object more than 10 degrees from the plane does. Presumably, the extra stars are mostly faint O and B stars, but additional analysis of ground-based photographs and additional measurements using ground-based telescopes will be needed before we can be certain.

The reduced data will be distributed, beginning early next year, as a series of Celescope Observational Data Reports. Full interpretation of these data must, of course, await completion of analysis for the bulk of the observational material, since most of the scientific value of broadband photometric measurements such as those provided by Celescope depends on the intercomparison of the results from measuring large numbers of stars, rather than on the separate measurements of individual stars.

#### NOTES

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<sup>2</sup> Supported by NASA contract NSR 09-015-039.

<sup>3</sup> Supported by NASA contract NSR 09-015-079.

<sup>4</sup> Supported by NASA contract NSR 09-015-054.

<sup>5</sup> Supported by NASA grant NGR 09-015-004.

<sup>6</sup> Supported by grant 1105 from the Smithsonian Research Foundation.

<sup>7</sup> Supported by contract DA-31-124-ARO-D-473 with the United States Army.

<sup>8</sup> Supported by NASA contract NAS 9-8105.

<sup>9</sup> Supported by NASA contract NAS 9-8106.

<sup>10</sup> Supported by contract F 19628-68-C-0234 from the United States Air Force.

<sup>11</sup> Supported by NASA contract NSR 09-015-033.

<sup>12</sup> Supported by NASA grant NGR 09-015-047.

<sup>13</sup> Supported by NASA grant NASw-184 to Harvard College Observatory.

<sup>14</sup> Supported by NASA contract NAS 5-1535.

## STAFF CHANGES

During the year, the staff of the Observatory have welcomed physicists Michael R. Pearlman, Irwin Shapiro, and Richard B. Wattson; astronomers Frederick Chaffee and Lawrence W. Mertz; and geologists John S. Dickey, Jr., and Benjamin Powell.

The Observatory also has continued its program of postdoctoral fellowships in cooperation with the National Academy of Sciences-National Research Council. Robert H. G. Reid, Gordon W. F. Drake, and M. V. Krishna Apparao have had their fellowships renewed. David Hearn is the new appointee. Wattson has completed his fellowship and has accepted an appointment to our staff. Michel Henon has returned to France, and Zdenek Ceplecha to Czechoslovakia.

Resignations have been received from Yvette Cuny, Bishun Khare, Walter Köhnlein, Barbara Kolaczek, Anthony R. Lee, Robert H. McCorkell, James Pollack, Carl Sagan, and Ashok Sharma. Sagan, Khare, and Pollack have taken positions at Cornell University; Cuny has returned to France; Köhnlein is studying in Germany; and Kolaczek has gone back to Poland.

Appointed as research associates are Zdenek Ceplecha and Carl Sagan.

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## CARLTON W. TILLINGHAST

Carlton W. Tillinghast, Jr., author of the following paper and assistant director of the Smithsonian Astrophysical Observatory, died of cancer on 27 July 1969. He was 36 years old.

In the spring of 1969, Carl was participating in a graduate seminar on science and public policy at the John F. Kennedy School of Government, Harvard University. This essay, prepared for that seminar, is a product and expression of a federal-university relationship that deeply interested him. The paper offers his evaluation of this type of relationship, which may promise much for the future of scientific and scholarly research. We present it here as the last document of a man dedicated to ministering to the needs of the scientific community.

Carl joined the Astrophysical Observatory in 1959 as administrative chief of the Computations Division. His earlier training and experience proved to be of substantial value. After graduation in 1955 from a special five-year program conducted jointly by Cornell University and the Massachusetts Institute of Technology, he became an analytical nuclear engineer for Pratt and Whitney Aircraft. Two years later, he served for six months as a second lieutenant with the United States Army Signal Corps. From 1957 to 1959 he was a research engineer at Mitre Corporation.

At SAO he first directed the complex activities of a staff of thirty in operating the Observatory's computer. His outstanding success led a year later to his appointment—at the age of 27—as assistant director for Management.

He early determined that his first responsibility was to relieve the scientists of administrative burdens. To that end, he developed a series of service units, such as business, contracts, personnel, and editorial and publications, and staffed them with men and women of exceptional qualifications. Together, they developed a policy of strong group responsibility and individual freedom and initiative.

Carl participated in the planning of new scientific programs so that he might better anticipate and meet their new administrative needs. Although his technical background enabled him to appreciate many of the complexities of these programs, Carl strenuously refrained from entering the area of science development.

His greatest strength was in his relations with others. He was concerned with people as people, not as boxes in an organization chart. Through this concern he communicated his own strength and self-assurance, his creative and imaginative thinking, his understanding—and he inspired those qualities in others.



In nominating him for a special Smithsonian award that he received in 1963, Dr. Fred L. Whipple wrote that "because of his effectiveness and wise counsel on administrative matters, scientists have been enabled to devote the fullest possible attention to scientific research. By his example, Tillinghast has instilled in all levels of his staff a challenge to initiative and achievement. He has developed an effective staff, made significant administrative and budgetary improvements, and given maximum support to the Observatory's scientific achievement."

Carl is survived by his wife Suzanne and four children. Their loss and the Observatory's are inestimable.

## JOINT GOVERNMENT-UNIVERSITY LABORATORIES IN THE UNITED STATES\*

CARLTON W. TILLINGHAST

### *Introduction*

Joint government-university laboratories have existed in this country since about 1955 and have emerged as a distinct class of research establishment. Now they are coming in for considerable attention from the government. This paper is addressed to the questions: What are joint laboratories? Why do they succeed? Where do they fit into the overall government research picture? And what will they mean, in the long run, to the government and to universities?

### *What Are Joint Laboratories?*

As defined here, a joint laboratory is a federal laboratory located on a university campus and staffed and operated by federal personnel working together with university faculty and graduate students. Two good examples are the Joint Institute for Laboratory Astrophysics (JILA), operated by the National Bureau of Standards and the University of Colorado, and the Smithsonian Astrophysical Observatory (SAO) at Harvard University. I would guess there are only a very few tens of such laboratories in the United States today. However, the number is growing.

The purposes of a joint laboratory are research and teaching. The government is interested mainly in research, and the university, presum-

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\*Prepared for Seminar in Science and Public Policy, John Fitzgerald Kennedy School of Government, Harvard University, May 1969.

ably, in both teaching and research. The goals of the government and of the university and to various extents their organizations can remain separate, yet by working together both parties can achieve more than they ever could separately. Their roles as government and university are not incompatible. In fact, they are complementary. Staff and facilities are shared on both sides. Government scientists typically hold joint academic appointments and teach and supervise graduate students to the extent of the university's needs and their own desires.

It should be understood that a joint laboratory is not a method of funding university research. There need be no financial transaction at all between the government and the host university. It is simply a working partnership between two scientific organizations.

The government's original motive in creating joint laboratories was probably to go where the scientific action was and to improve its recruiting position and the professional contacts open to its staff. The universities probably saw it as a chance to increase their faculty, laboratory, and fellowship resources.

The initiatives to establish joint laboratories were taken independently by the federal agencies and the universities concerned. Nobody noticed what was happening on a government-wide basis. Even laboratories like the two mentioned above, which early had scientific contacts with one another, were largely unaware of their organizational similarities. Now this situation is beginning to change. The Federal Council for Science and Technology (FCST) has studied and reported on the benefits of close affiliation between federal laboratories and universities, and several agencies have consciously begun to copy the prototypes in establishing new joint laboratories.

### *Why Do They Succeed?*

The Federal Council's attention and the fact that government agencies that already have them are creating new ones imply that joint laboratories have been successful. Many people feel that they have been exceptionally so. A task force of the FCST found that among 76 federal laboratories of all types, those with close university relationships had a "purpose, an alertness, an enthusiasm, a striving for excellence, a dedication, a feeling of accomplishment coupled with unlimited potential contribution, a vibrant participation at the advancing frontiers of science, an excitement, a sense of life and involvement" that were seldom found elsewhere. Although apparently this is a statement on morale rather than on performance, nevertheless it constitutes a strong endorsement.

There are some obvious reasons why joint laboratories should succeed. Shared staff and facilities, as well as recruiting advantages, fall into this category. But they fail to explain the *extent* to which joint laboratories seem to have succeeded. Nothing mentioned so far would necessarily explain why a direct link with a university should make a government laboratory notably more effective than it would have been otherwise. Are scientists and administrators overreacting to a novel situation, or are there *basic* reasons why joint laboratories should stand out from other forms of research organization? Indeed, there seem to be two such reasons.

First, consider the framework in which the conventional government laboratory operates. Scientific research is an intellectual business, while related activities, such as granting research funds to investigators, are administrative. Science succeeds only through its intellectual performance. Heretofore, the government laboratory has operated as part of the executive branch of the government or, if not as part of it, at least entirely within it. The government is organized to govern, not to foster free inquiry and intellectual creativity. In fact, the approaches needed for the two kinds of activity are somewhat incompatible.

The university, on the other hand, is specifically designed to impart knowledge and to stimulate scholarship. Success varies, but the basic goal of the whole system is scholarship.

This is not to say that government research cannot succeed. Its history in this country is longer than that of academic research. Given the right leadership and what the FCST has called adequate "buffering" from the bureaucratic structure, it has produced some outstanding results. But other things being equal, a university today may offer a more congenial research atmosphere than the government can. Thus, the location of a federal laboratory is important. Its superficial structure and operations depend very little on where it is, but to enjoy certain indirect environmental benefits, it must be implanted in the university culture.

Fortunately, the government can achieve its scientific goals in such an environment without compromising itself in the process. There is no basic incompatibility between government research and the university. Rather, the government's scientific goals fall outside the original goals for which government as we know it was designed.

The second basic reason for the success of joint laboratories is less obvious. It is the presence of graduate students. Some government scientists do not want to teach and are in the government for just that reason. But the whole scientific organization gains in vitality by having students. The scientists who teach find it valuable to have to go back over essentials. For the rest of the staff, there is the benefit of even the

informal contacts with vigorous, inventive young minds. The physicist Leopold Infeld once said that the ideal scientific meeting would include three groups of scientists: the older ones, for their breadth of view; the heavily productive middle-aged group; and students, for their unfettered creativity. The same is true of the university community.

In short, universities provide an excellent environment for scientific research; and students, who are commonly viewed as beneficiaries of government-university research, in fact catalyze it.

### *Joint Laboratories in the Federal Research Picture*

In a sense, joint laboratories are a logical extension of the government's long dependence on academic relationships. Visiting appointments, for instance, while representing transaction at arm's length as far as interorganizational relationships go, have nevertheless been a source of strength to federal groups such as the Geological Survey. Among other benefits, joint laboratories increase the opportunities for these varied contacts outside the government. A laboratory affiliated with one university may well have more contacts with staff members of other universities than it would have otherwise.

As part of the federal government's in-house research effort, joint laboratories do not compete directly with sponsored research at universities and university consortia, nonprofit corporations, and the so-called federal-contract research centers. However, the joint-laboratory concept might sometimes provide the government with a viable in-house alternative where it would otherwise have to turn to outside contracting.

Whether a given research program should be done by the government or contracted out depends on long-range scientific and social goals as well as on immediate research objectives. It also depends on the availability of qualified federal personnel. Joint laboratories help to nurture the government's limited human resources. At a time when contractors and industry are attracting scientific talent away from the government, it is important to note that certain features of a joint laboratory can go a long way to make a federal scientific career as attractive as any other.

The Bureau of the Budget and the General Accounting Office have recommended that the government consider the establishment of special institutes for research. In effect, these institutes would be government corporations designed to provide administrative flexibility and a degree of independence while retaining public accountability and control. Each one would have its own board of directors, but would be under the ultimate control of a cabinet officer or agency head.



Although mainly intended as alternatives to existing arrangements for contract research, institutes could do the work of in-house federal laboratories, too. Either way, they could be affiliated with universities. A research institute could in fact embody the joint-laboratory concept, whatever it was called. Of course, from the legislative point of view, it would be easier simply to set up a joint laboratory without resorting to the institute mechanism.

Although the institutes were first suggested in 1962, nothing has come of them yet. One reason is that some of the ills they were intended to cure have been handled in other ways. The idea behind the institute was flexibility. But flexibility, properly employed, may be more a state of mind than a system of rules.

We tend to admire flexibility in other organizations at those points where we find our own organization inflexible. There are usually two sides to the matter. Government scientists at a university are sometimes surprised to find that their own rules are more flexible than those of the university. Here, as elsewhere, complementarity is one of the strengths of the joint laboratory. Together, the government and university groups can capitalize on their respective flexibilities.

When should the joint-laboratory approach be used by a government agency? Three principal considerations are the following:

1. A joint laboratory should be used where intellectual creativity is important to the government's operation. This could be true for either basic or applied research.
2. It may be feasible only when the principal experimental facilities and the objects of experimentation can be taken to the university.
3. It will probably work well only when the government's activities are compatible with the nature of a university. For instance, a development activity with heavy subcontracting or a classified research project might not be suitable.

The first point is the most important for the government to consider. An agency may fear that its laboratory will become the captive of the university and be diverted from its own mission or from the control of the agency. Or there may be a question as to whether applied research will do as well at a university as would basic research. The real question, though, is whether an element of creative thinking is required that the university connection will foster.

The best arrangements are those in which the government and the university have complementary strengths as well as aspirations, not simply as to subject matter but also as to the way they approach it. For instance, a university department's approach may be intensive, whereas the government's interest in the same subject may be extensive, as in the contrast between specific topics in biology and the same topics from the



broader viewpoint of ecology. Or it may be the other way around. In short, the dimensions of their two interests should combine so as to expand their joint effect.

Instead of the government going to the university, could the university come to the government? That is, could teaching and research at a government laboratory away from the campus result in the same benefits that the government would enjoy on campus? Probably not, although there would surely still be some advantages. The university might benefit more than the government would, since the federal scientists would not be an integral part of the university community. However, the location of a large fixed government experimental facility may preclude campus location or may at least dictate a more gradual move into the university community.

Many universities operate federal-contract research centers. The question may arise whether one of these could serve as the contact point between an in-house government laboratory and the university. It would seem unlikely. A contract laboratory, while legally part of the university, is usually somewhat removed from its intellectual life. It is the direct, intimate contact with teaching and academic research that imparts the special vitality typical of the best joint endeavors.

### *Problems for the Government*

Once the decision has been made to join forces with a university, the government laboratory and parent agency will face the problem of adapting to a new situation. However, problem and opportunity may go hand in hand, for it was the very hope of change and improvement that led the government into the merger.

The most important problems usually concern the government's personnel policies. Whether it had moved to the campus or not, the government would sooner or later have had to face most of them. University affiliation merely hastens the confrontation. For instance, there is the problem of whether to permit teaching as a part of a government scientist's official duties. It can be done, but it need not be. An alternative is to give him leave without pay, and let the university make up the difference. Such monetary and other incentives should be adequate but not so high as to create the feeling that every government scientist must teach in order to advance his career; if that happens, the government loses a recruiting advantage, for some scientists dislike teaching.

Questions of conflict of interest and dual compensation will arise, involving, for example, outside consulting and publication, two areas where federal and academic traditions differ widely. But these problems

are coming up even within long-established government research centers and have to do mostly with general changes in accepted standards of practice.

### *Long-Range Benefits to the Government*

An effective relationship with a university will in the end not only improve the performance of the laboratory concerned but also have a favorable effect on the sponsoring government agency. The latter will be felt in at least three ways:

First, like any in-house laboratory, the joint laboratory will provide a useful source of technical-management personnel for the parent agency. This can be important in this day of contract research programs, which require extensive government overseeing but at the same time compete with the government for the services of the very managers who could provide it.

Second, mission-oriented agencies commonly give little thought to the educational side of the science policy problems between government and academia. Direct cooperation through the government-university laboratories will make a growing number of people in the agencies more aware of the academic viewpoint and generally more aware of the whole outside world. Both government and university horizons are broadened through collaboration.

Third, the university environment may reveal certain truths about research administration that the agency can put to use elsewhere. The government's growing appreciation of the importance of students to research is a case in point.

### *Effect on the University*

The principal benefits to the university are in the increased staff and facilities available for its teaching, plus the heightened intellectual stimulus that comes from having a larger group of scientists working together. Moreover, the government laboratory brings with it new contacts with the outside scientific world, for students and faculty alike. And in almost every joint program, the government provides added opportunities for scholarships and fellowships for the students. These are immediate and apparent benefits.

The problems are more subtle and will take longer to reveal themselves. They have to do with balance within the university and eventually with the nature of the university itself.

The university's internal equilibrium may be affected not simply by joint laboratories but also by its whole range of contacts with the government. A Harvard study identified the following areas where imbalance could occur owing to government influence: It could occur among various fields of learning, between teaching and research, and between tenure and nontenure faculty at the university.

The danger is real. This year, half the astronomy courses offered at Harvard are taught by Smithsonian people, who also teach courses in other fields such as physics and the history of science. From the educational point of view, this is a desirable use of resources. More scientists are teaching more students. But from Harvard's point of view, the present astronomy program depends not only on government funds (which it may have through other sources), but also on the presence of a government scientific staff.

The joint laboratory may have another, qualitative effect on the university. Owing to its different ancestry, it will probably be more operationally inclined than its university counterpart. It is not unusual for a federal laboratory to have a supporting-to-professional staff ratio of five to one, which is higher than that of most academic departments or laboratories. The university does have a maintenance and administrative staff, but it is more or less separated from the academic department. The government organization, on the other hand, is relatively homogeneous. It is aware of itself as a group and accustomed to working as a group. While it is presumably only the federal scientific staff that is integrated with the academic community, the obvious presence of the federal supporting staff may make the university feel its academic environment is being weakened.

The source of the disparity is historical. The university was originally a group of scholars, to which administrators were added as they became necessary. The government, on the contrary, was first an administration, to which scholars were added as they became necessary. Whereas many a university department is built around a few key faculty members, the government laboratory, even where it is locally a very scholarly effort, has to be operationally self-sufficient in many ways that the academic department does not. It has been said that the government must pay attention not only to the top of the pyramid of scientific activity, but to the entire base required to support the pinnacle of scientific excellence.

Now it may be argued that tomorrow's science will be achieved through large organizations and not by individuals alone and that therefore exposure to a supporting bureaucracy is consistent with the full education that the universities ought to be giving in science. One wonders, though, whether *that* part of a modern scientific education

belongs in the faculty of science, or in the business school, or in the government department, or in the university at all. Today, most things are done through organizations, and the same logic applied to other faculties in the university might lead to an odd institution indeed. Is education for the "real" world most efficiently achieved by isolating the university in the traditional way or by bringing some of the real world into the university? Note that bringing the outside world into the university is a different matter from sending students outside the university to gain practical experience as an adjunct to their education. The problem of science as science, versus science as a corporate effort, is an interesting one that remains to be resolved.

It leads to the even more interesting question of whether the joint laboratory is in fact the forerunner of a whole new class of cooperative undertakings that may change the very nature of the university. The joint laboratory results from the government and the university sharing an interest in a particular field, in this case scientific. Since scholarship of all kinds is becoming increasingly important to the government's own operations, there is no reason to think that the joint-laboratory concept will not be extended to other fields as well. In fact, universities already have various institutes, advanced-study centers, and the like that resemble joint laboratories or their immediate precursors. Conceptually, there is very little difference between the reasons for the existence of a joint laboratory and the reasons why, let us say, the Department of State might be interested in working together with a foreign-studies program at a university. The principle would hold for any field of knowledge.

If government research and study groups become common on the university campus, then the university will change. For the first time, it will have a third active constituency in its midst, in addition to the faculty and students who were there before. Government researchers—physicists, economists, sociologists, and others—will serve on university committees, will vote with the faculty, and in general will become full-fledged members of the university community. This is already happening through the joint laboratories.

Again, this is not necessarily bad. But it is different. Some may view it as a natural corollary to the pervasive influence the academics now have on the government. Like it or not, the seeming anomaly of government on campus can be no surprise to anyone who thinks about it. For the first time in history, the government is becoming a user, not merely a patron, of scholarship, which in modern times has until now been the preserve of the universities. Clearly, either the government or the universities as we know them must change. In fact, both are changing.



## *Conclusion*

Joint laboratories seem to be here to stay. They will affect the future both of government research and of universities.

If anything, we may wonder why they did not come sooner. Their advent now may be due to the science explosion in the government and the universities, or to the improved transportation and communications that encourage decentralization of the government, or to the big-science trend that makes collaboration the price of progress, or to all three. Or it may reflect a growing realization of the shortcomings of bureaucracy, which science needs but from which it also suffers; university relationships may be part of the cure.

As strictly functional management is now obsolete in almost every modern organization, so may be strictly governmental laboratories. Even for hard-core mission-oriented research, new arrangements may serve better than the old ones.

For whatever reason joint laboratories have come, the time is propitious. United States science policy is in a period of consolidation and reassessment. Joint laboratories may yield some useful answers to questions of science organization.

There is a tendency, in press releases and in public statements, to treat government-university collaboration and shared government facilities as cases of the government helping the universities, albeit in the national interest. There is more to it than that. At the working level, in terms of scientific output, the government benefits tremendously. In fact, the opportunities and the problems on both sides go far deeper than the sharing of equipment and personnel.

The question may be raised whether similar cooperation between government and industry would work as well as it does between the government and universities. Perhaps so. University-industry laboratories exist in this country, and they are common abroad. However, there is one important difference between government and the universities, on the one hand, and industry on the other. Money is important to all of them. Good research management always means getting the most research for the dollar. But industry uses its research to maximize its dollars, whereas the government and the universities must use their dollars to maximize their research. This is an important distinction. It is not clear what differences it might create between a government-industry laboratory and a government-university laboratory, but it may prove significant that the government and the universities are on the same side of the fence in this case.

The separations and distinctions between government, higher education, and private enterprise are lessening all the time. In planning for



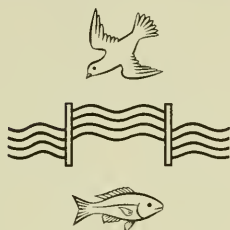
science, we must ask not only whether it is government or private, but who does the best in a particular field. Where are the standards high? Who, private or public, has what the nation needs? Flexibility and enlightened administration and policy making are difficult to attain, but they are what we need. Success in a complex world will depend not simply on our brains, or education, or expensive equipment, but also on our ability to combine them effectively through what might be called our organizational skills.

Joint laboratories are a form of research integration between the government and the university sectors. We can think of the scientific community as having those two sectors, plus the foundations and non-profit groups, industrial research, and the amateurs (who still dominate certain narrow fields). To make the best use of our national scientific resources, we must encourage their free interaction. Probably only the government is in a position, through policy, to integrate the research activities of all five sectors. Joint laboratories may be an important step in that direction.



# Smithsonian Tropical Research Institute

MARTIN H. MOYNIHAN, *Director*



THE SMITHSONIAN TROPICAL RESEARCH INSTITUTE performs field studies and experimentation in order to better understand the biological processes and evolutionary outcome of competitions for scarce space and resources. With the main thrust of research by the Institute addressing the evolution of ecological adaptations and patterns of behavior, its efforts are being enhanced greatly by extended comparative research on these responses in differing New and Old World tropical habitats. By research at carefully selected locations in Central and South America, Africa, southern Asia, and the Pacific Ocean, the Institute's biologists and students are adding important dimensions of understanding to the wealth of data assembled in Panama.

Progress has been made by the Institute in strengthening the management of its field stations and resources in order to be better prepared for future growth and to take advantage of opportunities for collaborative research and advanced education.

The library, the area's finest on tropical biology, along with administrative headquarters, conference rooms, and laboratories for permanent staff and several interns, has been housed in a newly acquired building on Ancon Hill, overlooking Panama City.

In Cali, Colombia, only one hour by air from Panama, a small sub-station has been established in cooperation with the Museo Departamental de Historia Natural, directed by Dr. Carlos Lehmann. Space is available for several scientists and students to use the structure as a base camp from which to study habitats ranging from the low, wet forests of Buenaventura to the nearby Andean heights.

Increased cooperation with universities has taken several forms. A cooperative arrangement with the University of Pennsylvania will be

initiated in the fall of 1969 by one of the Institute's biologists, Dr. Michael H. Robinson, who will lecture at the university. Plans have been completed for a joint Princeton University-Smithsonian Tropical Research Institute appointment for Dr. Egbert G. Leigh, who specializes in mathematical theories of evolution and community ecology. Other cooperative arrangements are being developed.

Having, thus, consolidated its gains in a number of areas, the Institute is now prepared to extend its research into new directions in the months ahead.

### *Research*

The research activities of the bureau include both the studies of staff scientists, interns, and fellows, and those of visiting investigators from other institutions. The following tabulation shows the number of visiting researchers, roughly divided into academic categories, for whom the bureau has provided appreciable support during the past fiscal year.

Senior scientists	63
Graduate students	89
Undergraduate students	27
Secondary school students	12
Postdoctoral fellows	2
OAS fellow	1
Others	76
Seminar participants	400
Total	<hr/> 670

The number of senior scientists is somewhat smaller than in previous years because it reflects a longer average period of stay for an individual researcher.

The scope of the research by visiting scientists has been quite broad. Some examples are cited below.

How species of butterflies belonging to a Mullerian mimic association—hence all distasteful and very similar in appearance—discriminate visually between each other has been a subject investigated by Thomas Eisner, Jeffrey Camhi, and Herbert Rosenberg of Cornell University. Using a portable television camera that records ultraviolet radiation, Eisner has showed that the various species within a particular mimetic association have very different and diverse patterns under ultraviolet, a portion of the energy spectrum to which their vertebrate predators are blind. Thus, these distasteful insects present a single pattern that presumably their predators can easily learn to avoid, but a diversity of patterns to themselves in a code unbreakable by their predators.

Robert MacArthur, Henry Horn, and Steven Fretwell of Princeton



**The STRI laboratory-office building in Ancon, Canal Zone.**

University have sought to test the predictive efficiency of several theoretical models of animal population biology. They have compared several groups of animals living in certain habitats on islands in the Bay of Panama with those in similar habitats on the mainland forty miles away. Comparisons such as these are particularly revealing. By their very number and diversity in size, shape, and ecology, islands provide ideal natural experimental situations in which evolutionary hypotheses may be tested rapidly.

With much interest now focused on the possible biological effects that may result from the construction of a sea-level canal in Central America, a number of investigators have come to the marine laboratories to make Atlantic-Pacific comparisons of their special groups. Among these are Neal Powell and Arthur Clarke of the National Museums of Canada, who have compared the species composition and ecology of several groups of marine animals living at both ends of the present canal. Powell, a bryozoan specialist, has completed a similar study at the Suez Canal,





In the basket of the United States Air Force's strato tower sixty feet above the ground, Neal Smith is examining the contents of nests in an oropendola colony.

through which Red Sea and Mediterranean organisms only recently have begun to move.

An oil spill that occurred near the Galeta Island marine laboratory has provided Jeremy Jackson of Yale University with a before-and-after comparison in his study of species diversity in the fauna associated with *Thalassia* beds in the Caribbean. The effects of this oil spill—today an all-too-frequent disaster—are under analysis.

The familiar white-faced monkey (*Cebus capucinus*) has been the research subject of three investigators. John Oppenheimer of Johns Hopkins University has continued his two-year study in the wild of the complex social behavior of this species. On the other hand, intern Mark Bernstein has analyzed the abnormal behavior patterns (quirks) of caged *Cebus* emphasizing the possible signal function of these quirks. Juan Delius, University of Durham, has made a detailed analysis of the vocalizations associated with one particular social situation in this species with the aim of continuing this analysis of causal mechanisms through neurophysiological techniques.

The staff has continued to concentrate on aspects of evolution, ecology, and behavior, combining experimental analysis in the laboratory with observations in the field under natural conditions both in the Old and New World tropics.

Marine invertebrate laboratory added to growing complex on Panama Bay.





**The newly opened STRI residence-laboratory in Cali, Colombia.**

Moynihan has furthered his studies of the evolution of social behavior among primates and birds in the Andes and the upper Amazonian region.

Robert L. Dressler has continued his studies of orchid pollination, largely through sampling euglossine bees, and the orchid pollinaria that they carry, with terpenoid and aromatic "baits." Extensive collections have been made in Costa Rica and Brazil that will permit better understanding of evolution within these bees and among the orchids that they pollinate.

Although the upwelling of cold water in the Bay of Panama has been quite restricted this year and phytoplankton production correspondingly reduced, Peter Glynn has found that barnacle and oyster growth is surprisingly high, suggesting that water temperature may be more important in influencing growth than fluctuations in food supply. Glynn's studies of fouling, particularly from algae, in marine animals has suggested that



this fouling may be a severe problem for many organisms. He indicated that many of the behavioral and morphological features of animals like isopods, previously thought to be antipredator devices, may indeed be primarily antifouling adaptations. His analysis of plankton samples from coral communities in Puerto Rico showed that reefs do accrue a substantial net gain of diatoms and zooplankton, a point not demonstrated previously. Glynn also attended a symposium on coral reefs at Mandapam Camp, India, and made a preliminary analysis of the extensive reefs near Nossi Bé, Malagasy Republic.

A. Stanley Rand has continued his studies of animal communication in the West Indies, Colombia, and Panama. His analysis of the visual communication system in anoline lizards and the vocal communication in frog choruses has shown that the two systems have a surprisingly high level of redundancy. This is perhaps a result of the high degree of "noisiness" of their particular communication channels. In June 1969 Rand visited the symposium on evolution in the tropics held by the Association for Tropical Biology in Puerto Rico.

Paramo vegetation at 11,000 feet in the central Andes near Cali, Colombia, showing the characteristic composite *Espeletia*.



As part of his long-term investigations of predator-prey interactions, Michael H. Robinson, in collaboration with Heath Mirick, a summer intern, and Barbara Robinson, has extended his studies of predatory behavior in orb-web spiders to include four additional genera. In collaboration with Laurence Abele of Florida State University, he has begun a study of Panamanian crabs. They have found one particularly fascinating form of defense that occurs in at least two genera of land crabs. The crab attacks a predator with its claws, causes the claw to break off its own body, and retreats to safety while the predator deals with the detached but still attacking appendage. In November 1968 Robinson attended the Fourth Latin American Congress of Zoology in Caracas, Venezuela.

Ira and Roberta Rubinoff have completed their analyses of isolating mechanisms in the marine fish *Bathygobius*. They have demonstrated that species from both coasts of the Isthmus will interbreed even though the species have been isolated for between two and five million years and are morphologically quite different. Mrs. Rubinoff has extended the investigation of isolating mechanisms to include invertebrate groups and has begun a study of social behavior in the sea urchin *Diodema*. The two scientists journeyed to Israel, where they visited many laboratories and met with a number of other scientists. A focus of common interest has been the migration of animals through the Suez and Panama canals.

Neal Smith has completed a five-year experimental study of the evolution of adaptations for and against brood parasitism by four species of oropendolas and the avian parasites.

Does the appearance (structure) of a mature forest reflect mainly the conditions of its physical environment or the characteristics of the plants that happened first to colonize it? What aspects of a forest's appearance can be predicted from ecological considerations and what aspects reflect accidents of history? (For example, what is the explanation for the dominance of Dipterocarps in Malaya?) Attempting to answer such questions, Egbert Leigh has studied selected forests in the Ivory Coast, Madagascar, India, Malaya, and New Guinea. Leigh, who will continue this research in those areas as a member of the STRI staff, has found that lowland forests around the world are quite similar structurally, but that montane forests differ radically in this respect. Oddly, of several major structural features of these forests such as tree height and amount of ground cover, leaf size is the feature that best correlates with altitude.

Postdoctoral fellows Christopher Smith and Robert Ricklefs have

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Montane forest at 7000 feet in the western Andes near Cali, Colombia.





been in residence at STRI during part of last year. Smith has completed his investigations of energy budgeting by howler monkeys (*Alouatta*) and Ricklefs has finished his analysis of breeding strategies in tropical birds.

Yoshiki Oniki of Brazil has worked on Barro Colorado Island under the auspices of the joint Smithsonian-Organization of American States cooperative program. She is studying the reproductive biology of one of the forest antbirds.

Visiting fellow Thomas Croat, of the Missouri Botanical Garden, has reached the last phases of field work for compiling a new flora of Barro Colorado Island. The new version should be particularly useful to nonbotanical scientists for it will include keys to fruits and other vegetative structures not normally included in such guides.

Predoctoral interns and associates also have conducted a variety of research projects.

Jeffrey B. Graham of Scripps Institution of Oceanography has studied the effects of temperature on the physiology of marine fishes from both sides of the Isthmus. He found that Pacific populations of *Rypticus*, *Apogon*, and *Bathygobius* show greater temperature tolerance and maintain higher rates of oxygen consumption than Atlantic populations.

### Barro Colorado Island, Canal Zone

#### Annual Rainfall 1925-1968

<i>Year</i>	<i>Total inches</i>	<i>Station average</i>	<i>Year</i>	<i>Total inches</i>	<i>Station average</i>
1925	104. 37		1947	77. 92	107. 49
1926	118. 22	113. 56	1948	83. 16	106. 43
1927	116. 36	114. 68	1949	114. 86	106. 76
1928	101. 52	111. 35	1950	114. 51	107. 07
1929	87. 84	106. 56	1951	112. 72	107. 28
1930	76. 57	101. 51	1952	97. 68	106. 94
1931	123. 30	104. 69	1953	104. 97	106. 87
1932	113. 52	105. 76	1954	105. 68	106. 82
1933	101. 73	105. 32	1955	114. 42	107. 09
1934	122. 42	107. 04	1956	114. 05	107. 30
1935	143. 42	110. 35	1957	97. 97	106. 98
1936	93. 88	108. 98	1958	100. 20	106. 70
1937	124. 13	110. 12	1959	94. 88	106. 48
1938	117. 09	110. 62	1960	140. 07	107. 41
1939	115. 47	110. 94	1961	100. 21	106. 95
1940	86. 51	109. 43	1962	100. 52	107. 07
1941	91. 82	108. 41	1963	108. 94	107. 10
1942	111. 10	108. 55	1964	113. 25	107. 28
1943	120. 29	109. 20	1965	92. 80	106. 91
1944	111. 96	109. 30	1966	111. 47	106. 80
1945	120. 42	109. 84	1967	85. 88	106. 40
1946	87. 38	108. 81	1968	88. 12	105. 99

This seems reasonable since the range of environmental vicissitudes is greater in the Pacific.

A year-long study of avian diversity by James Karr, University of Illinois, has shown more species and, surprisingly, more individuals per unit area in tropical forest-edge and forest habitats than in structurally similar temperate habitats. But in grasslands, the avifaunas of tropical and temperate areas do not differ as significantly as those in structurally more complex habitats.

Norris H. Williams, University of Miami, has analyzed the nature of the pollination relationship between wasps and orchids of the genus *Brassia*. He also has continued biochemical and morphological studies of *Brassavola* that will result in a redefinition of this genus.

The effects of fish predation on zooplankton populations in a lacustrine ecosystem has been the subject of Thomas Zaret's study. Zaret, from Yale University, has found that the planktivorous fish *Thyrinops chagresi* maintains a balanced polymorphic situation in the cladoceran *Ceriodaphnia cornuta*.

Comparison of 1967 and 1968 Rainfall  
(in inches)

Month	Total		1968 excess or deficiency	Years of record	Station average	Accumulated excess or deficiency
	1967	1968				
January	0.49	0.09	-0.40	43	2.17	-0.40
February	0.51	1.79	+1.28	43	1.27	+0.88
March	0.52	3.59	+3.07	43	1.19	+3.95
April	4.38	0.61	-3.77	44	3.43	+0.18
May	6.28	11.54	+5.26	44	10.79	+5.44
June	13.54	10.21	-3.33	44	10.94	+2.11
July	8.74	6.54	-2.21	44	11.38	-0.09
August	10.94	15.87	+4.93	44	12.51	+4.84
September	6.98	7.08	+0.10	44	10.18	+4.94
October	11.87	18.66	+6.79	44	13.74	+11.73
November	15.15	10.32	-4.83	44	17.91	+6.90
December	6.48	1.82	-4.66	44	10.30	+2.24
Year	85.88	88.12	+2.24		105.99	-17.87
Dry Season	5.90	6.08	+0.18		8.06	-1.98
Wet Season	79.98	82.04	+2.06		97.93	-15.89

Education

The educational activities of the Institute are not confined to helping and guiding university visitors, resident interns, assistants, and research fellows. Extensive seminar programs are offered by the Institute. These are usually attended by staff and students from other institutions in



the Republic of Panama and the Canal Zone, including the Middle America Research Unit, the Gorgas Memorial Laboratory, the University of Panama, the Canal Zone Junior College, the Canal Zone hospitals, the United States Army Tropic Test Center, and the Inter-Oceanic Canal Study Commission. During this past year, ten seminars have formed a symposium concerned with the phenomenon of seasonality in the tropics. The following tabulation is a partial listing of the subjects covered in the past year.

Christopher Smith, STRI (postdoctoral fellow)	Primary Productivity and Plant Cycles: Some Theoretical Considerations
Robert Ricklefs, STRI (postdoctoral fellow)	Significance of Fluctuations in Terrestrial Invertebrate Cycles
Michael H. Robinson, STRI	Possible Factors Influencing the Long-Term Strategies of Terrestrial Invertebrates
A. Stanley Rand, STRI	Evolution of Terrestrial Vertebrate Cycles and Breeding Strategies
Peter Glynn, STRI	Marine Seasonality: Cycles in the Marine Environment
Christopher Smith, STRI (postdoctoral fellow)	Seasonality and Species Diversity: Future Prospects and Related Problems
James R. Karr, STRI (University of Illinois)	Avian Species Diversity in Various Habitats in Panama
Robert Ricklefs, STRI (postdoctoral fellow)	Adaptive Significance of Reproductive Strategies of Birds
Charles Elton, Oxford University	Comparisons between Tropical Forests and Temperate Forests
Michael H. Robinson, STRI	The Strategy and Tactics of Predation by Orb-Web Spiders
Jeffrey Graham, STRI (Scripps Institute)	A Comparative Study of the Effects of Temperature on the Metabolism of Tropical Marine Fishes
Thomas Eisner, Cornell University	Studies in Insect Communication
Juan D. Delius, University of Durham	Stochastic Analysis of Behavior
Charles Leck, Cornell University	Strategies Employed by Fruit-Eating Birds
Mark Bernstein, STRI (University of Pennsylvania)	Abnormal Social Responses or "Quirks" in <i>Cebus</i> Monkeys
Peter Marler, Rockefeller University	Bird Song: A Problem in Development
Thomas Zaret, STRI (Yale University)	The Hydrobiology of Gatun Lake
Don Wilson, University of New Mexico	Reproduction in the Neotropical Bat <i>Myotis nigricans</i>
Elwynn Taylor, Washington University	Delimitation of Energy Strata in Tropical Forests
Owen Sexton, Washington University	Habitat Structure and Diversity in Anuran Breeding Habits
Douglas Futuyma, University of Michigan	Genetic Response to Inter-Specific Competition

- Norris Williams, STRI (University of Miami)      Pollination of *Brassia* Orchids by Wasps
- Peter Glynn, STRI      Fouling and Survival in Marine Organisms – A Hypothesis
- James R. Karr, STRI (University of Illinois)      Comparisons of Avian Aggregations in Temperate and Tropical Habitats.

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# Radiation Biology Laboratory

W. H. KLEIN, *Director*



THE LIFE CYCLES OF ORGANISMS are intricately associated with the environmental signals that influence their morphological and physiological development mechanisms. Growth and development of higher plants are regulated and controlled by solar radiant energy, a major factor of the environment, in two general ways: by the conversion, through photosynthesis, of large amounts of radiant energy to chemical energy; and by the activation of reproduction, differentiation, and morphological development by means of radiation-sensitive regulatory systems. These systems may further be subdivided on the basis of spectral characteristics into one group responsive mainly to the blue and ultraviolet portions of the electromagnetic spectrum and into another group responsive mainly to the red and far-red portion of the spectrum.

The research of the Radiation Biology Laboratory is directed toward understanding the cellular and subcellular mechanisms and processes by which organisms utilize this radiant energy from the sun for their growth and development. This research has been directed into three main areas in regulatory biology: (1) the physiology, (2) the biochemical processes of developmental responses to light, and (3) the measurement of solar radiation. In addition, this laboratory also maintains a carbon-dating facility for archeological and anthropological research and also for research in and development of carbon-dating techniques.

## *Regulatory Biology – Physiology*

The excised apex of the corn coleoptile has been used for studies of a phytochrome-mediated growth response. A five-second 660 nm irradiation causes a 50 percent enhancement of the growth rate in subse-

quent darkness. This increased rate of growth is established within 30 seconds and persists for several hours in the dark, but it is largely nullified by an exposure to several minutes of 730 nm irradiation. Continuous measurements of growth have been made with a transducer-type auxanometer. No concurrent change in respiration can be detected with the Warburg respirometer or oxygen electrode. Several chemicals have been tested in an effort to prevent specifically the irradiation-enhanced growth without affecting the basal growth. The most promising substance discovered so far is 4-fluorophenylalanine.

RNA synthesis in *Tradescantia* pollen tubes has been measured by tritiated uridine incorporation and subsequent autoradiography. Pollen tubes from pollen that had been pretreated with 730 nm radiation have incorporated 60 percent more uridine than dark controls.

Experiments upon the genetic control of photoperiodism in corn have been initiated. Two corn varieties, short-day (id mutant) and long-day (Gaspé Flint) are being used. It appears that a single gene controls the short-day response, but further characterization of the two varieties with respect to their true photoperiodic response is necessary.

### *Regulatory Biology – Biochemical*

Studies on plastid protein synthesis *in vitro* have been continued. Study of etioplasts in a crude preparation has shown that the etioplast is the likely site of amino acid incorporation. Illumination of leaves stimulates the ability of plastids isolated from them to incorporate amino acid into protein. Fourfold stimulation occurs within six hours of illumination. The maximum increase is reached between six and eighteen hours and remains constant to thirty-six hours. At this time the ability of plastids to incorporate amino acid into protein decreases sharply, as does the rate of chlorophyll accumulation by leaves. The observed difference in rates of incorporation carried out by etioplasts and chloroplasts is not owing to a difference in ability of etioplasts and chloroplasts to generate ATP (adenosine triphosphate) in the light, or to the presence of factors in homogenates of etiolated leaves that destroy incorporation ability, or to large differences in pool size of amino acid between etioplasts and chloroplasts. The results suggest that plastid amino acid incorporation (protein synthesis) increases sharply during light-dependent plastid growth and differentiation and again decreases after growth and differentiation are complete.

The photosynthetic enzyme ribulose diphosphate carboxylase appears to be one of the chloroplast stroma proteins that can be synthesized by chloroplasts. Crude chloroplast preparations incorporate radioactive



leucine into the enzyme; however, only a small fraction (about 2 per cent of radioactivity incorporated into protein is incorporated into this enzyme. Whole leaf cells and cytoplasmic ribosomes do not contribute to incorporation into the enzyme. Chloramphenicol inhibits incorporation into this enzyme *in vitro*. This result confirms and amplifies previously published results that have shown that chloramphenicol inhibits ribulose diphosphate carboxylase formation *in vivo*. In view of what is now known about the selectivity of chloramphenicol for inhibiting protein synthesis occurring on 70 S (chloroplast, mitochondrial, bacterial) ribosomes, and the demonstration that chloroplasts incorporate amino acid into ribulose diphosphate carboxylase, it is likely that this enzyme is synthesized by the chloroplast.

Studies on the *in vivo* localization and *in vitro* characterization of phycobiliproteins in red and blue-green algae have been continued. The phases pursued are: (1) to determine the effect of particular phycobiliproteins on *in vivo* phycobilisome structure, and (2) the structural characterization of phycoerythrin in order to study this relationship with phycocyanin within the phycobilisomes.

Our previous work on fixed chloroplasts has shown that the structure of the phycobilisomes (phycobiliprotein aggregates) differs in cells that have different phycobilins. These data suggest that the type of phycobiliprotein present determines the shape of the phycobilisomes. To study the variation in shape, *Tolypothrix tenuis* has been used because the phycocyanin to phycoerythrin ratio can be easily varied. The first phase of the work, showing that phycobilisomes are present, has been completed.

Electron microscope studies of three blue-green algae—fresh water *T. tenuis* and *Fremyella diplosiphon*, and an oscillatoria-like marine algae—have revealed structures on the lamellae that correspond to the phycobilisomes of red algae. As in the red algae the phycobilisomes are attached on the outer side of each lamellae, i.e., the side facing away from its own membrane pair.

The photosynthetic accessory pigments, phycoerythrin and/or phycocyanin, are major components of the phycobilisomes. The spatial relationship of these phycobiliproteins is of interest because phycocyanin appears to be a necessary intermediate in the energy transfer from phycoerythrin to chlorophyll *a* located in the underlying photosynthetic lamellae. In order to differentiate between the phycobiliproteins, phycoerythrin has been isolated from the red alga *Porphyridium cruentum* and its structure has been compared with that of phycocyanin, which has been studied previously by other investigators. Phycoerythrin has been found to be a compact particle essentially cylindrical in shape with no obvious regular substructure. Individual particles have an average

*en face* diameter of 101Å and height of 54Å when stained with phosphotungstic acid. An approximate molecular weight of 270,000 has been obtained, which agrees with published molecular weight values obtained by other methods.

Phycocyanin in its most stable form has been reported to be composed of six distinct subunits in the shape of a ring with an outer diameter of about 130Å. Because phycoerythrin has a smaller diameter and lacks a central hole and distinct subunits, the pigments can be differentiated. Since phycocyanin and phycoerythrin are structurally distinguishable, it should now be possible to determine the arrangement of these pigments within the phycobilisomes.

Studies of the molecular properties of purified phytochrome have been extended with special emphasis upon quaternary structure and chromophore structure. Phytochrome extracted from etiolated oat or rye shoots exists as a mixture of two aggregates. About two thirds of the phytochrome exists as a 13 S hexamer (large aggregate), which is almost totally excluded by Sephadex G-200 and is below the middle of the fractionation range of Sepharose 4B. The remaining one third of the phytochrome exists as a 9 S tetramer (small aggregate), which is in the middle of the fractionation range of Sephadex G-200. These two aggregates have similar properties with respect to dark reversion kinetics and light reaction (quantum efficiency) kinetics. From chromophore degradation studies, the bile-type chromophore appears identical in the  $P_R$  form with that of phycocyanin. The structure of the I ring is modified in the  $P_{FR}$  form of phytochrome. A covalent linkage to the protein is proposed for both forms of phytochrome bile pigment.

A new improved method for the isolation of intact rhabidosomes has been developed. Rhabidosomes are subcellular particles produced by the marine blue-green alga *Saprospira grandis*. They are primarily protein in composition and are sometimes associated with nucleic acids. Reasonably pure preparations have been obtained. They have a buoyant density of 1.32 in cesium chloride and an isoelectric point at pH 3.8. Electron microscopy has revealed many details of the fine structure, previously unreported. This structure consists of repeated patterns of protein subunit arrangement in the particle.

### *Measurement of Solar Radiation*

Equipment for detecting and recording continuously "total sky" radiation in various wavelength regions of the spectrum has been in operation. The data have not been completely analyzed, but the occurrence of considerable oscillation in various parameters over both short and

long time periods has been detected. For example, on clear days the ratio of red to far-red energy (600–700 nm/700–800 nm) remains above 1.5, while on cloudy days, with as much as 90 percent reduction in total energy, the ratio shifts and oscillates between 0.5 and 1.5. This type of change may contribute significantly in accounting for variations in biological responses that have been observed in controlled environments.

A number of photomorphological responses in plants are being examined. Stem elongation of Black Valentine bean and Wintex barley is greater after six weeks (irrespective of day length) when grown under a red/far-red ratio of 1:1 than under a ratio of 30:1 or under greenhouse conditions. In Black Valentine bean, this response appears due solely to the elongation of internodes, since the total number of nodes per plant is the same in the different conditions. The comparative flowering responses of soybean (short-day) and barley (long-day) indicate that soybean is less dependent on far-red light than barley.

Germination responses of *Arabidopsis thaliana* L. Heynh. (race BL-1) is predetermined by the spectral quality of light received by the parent plant. This preconditioning effect occurs in the floral stalk region. The effect of spectral quality on the dark-germination response is expressed directly and only during seed maturation in the parent plant.

## Carbon Dating

The function of the Carbon Dating Laboratory is twofold: "service dating" for departments of the Institution, including analyses of samples submitted and advice on interpretation of those results; research toward improvement of the techniques of radiocarbon dating and in original studies of particular interest to the research staff of the laboratory.

Dating time is reckoned in "counting days," defined as those available counting periods of not less than 1000 minutes nor more than 2000 minutes each. Of necessity, the installation, repair, servicing, and maintenance of laboratory equipment limits the number of counting days available. This year approximately 600 counting days have been available with three detectors in use.

Service dating of materials for members of the Institution have resulted in the dating of 116 samples, each of them requiring a minimum of two counting days to insure statistical validity. In addition, 110 counting days have been spent on modern calibration standards, and 154 counting days on background measurements. The unusual number of these latter measurements has been required to maintain accuracy and reliability of measurements in the face of unexpected dust and

vibration conditions during the renovation of the Smithsonian Institution Building. These conditions became so extreme during the third quarter that all dating was discontinued for the rest of the year.

In order to eliminate the increasing difficulty of obtaining commercial hydrogen free of radioactive contaminants, a hydrogen generation system has been installed in the laboratory. "Dead" water from a Pleistocene-age source on the DelMarVa peninsula is used in this electrolysis system to produce radioactive-free hydrogen for use in the conversion of carbon dioxide sample gas to methane counting gas. Initial tests of the hydrogen have indicated a very low background with this method, and the system is now in routine operation.

To produce samples of greater purity in less time, the combustion and purification system has been redesigned and construction of the new unit is now nearly complete. The system utilizes stainless steel tubing with demountable fittings for ease of cleaning, includes two radon-extraction units, and functions as a totally self-contained unit.

### *Staff Activities*

A series of seminars on Environmental Biology has been held in cooperation with the consortium of Washington area universities. The series has been presented for graduate credit and average attendance per lecture has been 150 persons. The speakers and their topics:

"Pattern and Process in Competition." Richard S. Miller, School of Forestry, Yale University, New Haven, Connecticut. 6 February 1969.

"Some Aspects of Estuarine Ecology." Rezneat M. Darnell, Department of Oceanography, College of Geosciences, Texas A&M University, College Station, Texas. 13 February 1969.

"Fresh Water Productivity." David G. Frey, Department of Zoology, Indiana University, Bloomington, Indiana. 20 February 1969.

"Arid Lands." Charles H. Lowe, Department of Biological Sciences, College of Liberal Arts, The University of Arizona, Tucson, Arizona. 27 February 1969.

"Radioisotopes and the Dynamics of Forest Ecosystems." Stanley I. Auerbach, Radiation Ecology Section, Health Physics Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee. 6 March 1969.

"A Species Population in a Temperate Ecosystem." John E. Cantlon, Department of Botany and Plant Pathology, Michigan State University, East Lansing, Michigan. 13 March 1969.

"Evolutionary Significance of Abundance." Lawrence B. Slobodkin. Department of Biological Sciences, State University of New York at Stony Brook, Stony Brook, New York. 20 March 1969.



"Distributional History and Ecology of Some Parasites and Their Hosts in the Arctic." Robert L. Rausch, Chief, Zoonotic Disease Section, Arctic Health Research Center, U.S. Public Health Service, College, Alaska. 27 March 1969.

"Patterns and Processes of Some High Mountain Ecosystems." William S. Osburn, Jr., Environmental Sciences Branch, Division of Biology and Medicine, U.S. Atomic Energy Commission, Washington, D.C. 10 April 1969.

"Life and Energy." David M. Gates, Missouri Botanical Garden and Department of Botany, Washington University, St. Louis, Missouri. 17 April 1969.

"Comparative Systems Analysis of Food Chain Dynamics." Bernard C. Pattern, Department of Zoology, The University of Georgia, Athens, Georgia. 24 April 1969.

"Some Aspects of Controlled Environments for Space Biology." Orr E. Reynolds, Director, Bioscience Programs, National Aeronautics and Space Administration, Washington, D.C. 1 May 1969.

"Future of a Changing World." Lamont C. Cole, Department of Zoology, Cornell University, Ithaca, New York. 8 May 1969.

During the year, plant physiologist H. Drumm from the University of Freiburg, Germany, has been working with M. M. Margulies on protein synthesis in etioplasts. J. J. Zwolenik, associate director of the Chemical Dynamics Program, National Science Foundation, has been working on the physical chemistry and photochemistry of phytochrome with D. Correll as a collaborator for the past year. Assistant director W. Shropshire has been on sabbatical leave at the University of Freiburg, Germany.

Members of the staff have attended symposia, meetings of national scientific societies and international conferences, have journeyed to universities to present seminars and to carry on joint research projects, have participated in various panels and committees of scientific agencies and organizations, and have attended science courses. Some of the special activities are as follows:

In August 1968, W. Shropshire, W. H. Klein, J. Brown, M. Margulies, R. L. Weintraub, and H. Drumm attended the annual meeting of the American Society of Plant Physiologists in Amherst, Massachusetts. Dr. Margulies presented a paper entitled "Synthesis of Ribulose Diphosphate Carboxylase by Chloroplasts *in Vitro*." Also in August, W. Shropshire, E. Gantt, J. L. Edwards, M. Margulies, W. H. Klein, H. Drumm, R. L. Weintraub, and D. L. Correll attended the Fifth International Congress on Photobiology at Dartmouth College in Hanover, New Hampshire, presenting a number of short papers. W. Shropshire chaired a symposium on phototropism. During that time, W. H. Klein



and W. Shropshire attended executive committee meetings of the American Society of Plant Physiologists.

In September 1968, E. Gantt attended the American Institute of Biological Sciences meetings at Columbus, Ohio, and presented a paper entitled "Isolation of Phycobiliproteins."

In November 1968, H. Drumm, R. L. Weintraub, and E. Gantt attended the meeting of the American Society for Cell Biology, and E. Gantt presented a paper entitled "Electron Microscopy of Phycoerythrin" at Boston, Massachusetts. R. Weintraub also attended NIH Panel Committee Meetings at Woods Hole, Massachusetts. T. Ma attended the Annual Meeting of the Genetics Society of America and presented a paper entitled "Far-red Light Induced RNA Synthesis in the Mitotic Generative Cell of the Pollen Tube of *Tradescantia*" in Boston, Massachusetts.

In December 1968, R. Stuckenrath went to the University of Pennsylvania at Philadelphia to attend a symposium on prehistoric settlement patterns in the New World. He also attended a Columbia University seminar on archeology of Europe and the Near East, a special session on computers in archeology. M. M. Margulies conducted a seminar "Protein Synthesis by Plastids *in Vitro*" to the Biochemistry Department, Cornell University, Ithaca, New York.

In January 1969, R. Stuckenrath went to Philadelphia, Pennsylvania, to attend a meeting of Trustees of Philadelphia Anthropological Society at the University Museum. Also in January, W. H. Klein and B. Goldberg went to Eppley Laboratories, Newport, Rhode Island, for discussions regarding the construction of solar radiation instruments, a seminar series, and also to discuss the next meeting of the Solar Radiation Society to be held in Washington, D.C., in 1971. W. H. Klein has been elected a director of the Society and appointed to the Editorial Board. Also in January, D. L. Correll attended a short course on gas chromatography offered by the Washington Gas Chromatography Society.

In February 1969, Dr. Klein went to Oak Ridge National Laboratory, Oak Ridge, Tennessee, to attend a study group briefing on the agricultural aspects of the proposed nuclear powered agro-industrial complex project designed to establish food production centers in warm arid areas adjacent to the sea and utilizing nuclear energy for providing desalinated water.

In March 1969, E. Gantt gave a seminar entitled "Phycobiliprotein Localization in Red and Blue-Green Algae" and consulted with Dr. Thomas Brown at the Charles F. Kettering Research Laboratory in Yellow Springs, Ohio.

In April 1969, R. Stuckenrath visited the Ohio Wesleyan University Carbon Dating Laboratory for discussions involving pretreatment prob-

lems and vegetation sequences in the northeastern portion of the United States. B. Goldberg went to the National Physical Laboratory, Jerusalem, Israel, to calibrate solar-radiation detectors and to initiate beginning of acquisition of spectral radiation data.

In May 1969, J. Mielke and A. Long went to Resolute Bay, Canada, to conduct paleoclimatic studies on Ellesmere Island, Northwest Territories. W. H. Klein gave a seminar to staff and graduate students of the Biology Department of Brandeis University, Waltham, Massachusetts, and attended the Annual Meeting of the Northeastern Section of the American Society of Plant Physiologists in Amherst. He served as chairman for the Cellular Radiobiology Session at the Radiation Research Society meeting in Cincinnati, Ohio. M. Margulies presented a lecture on "Chloroplast Protein Synthesis *in Vitro*" at the Biological Laboratory, Harvard University, Cambridge, Massachusetts.

In June 1969, R. Stuckenrath made an archeological survey trip in the area around Claysville, Pennsylvania, to investigate a logical site for a natural migration route through the Western Appalachians and to search for sites suitable for environmental-archeological correlations. E. Gantt and M. Margulies attended the Gordon Conference on Photosynthetic Organelles held at Holderness School, Plymouth, New Hampshire.

### *Staff Publications*

- CORRELL, D. L. "Rhabidosomes: 2'-O-methylated Ribonucleoproteins." *Science* (1968), volume 161, pages 372-373.
- CORRELL, D. L., J. L. EDWARDS, W. H. KLEIN, and W. SHROPSHIRE, JR. "Phytochrome in Etiolated Annual Rye, III: Isolation of Photoreversible Phytochrome." *Biochimica et Biophysica Acta* (1968), volume 168, pages 36-45.
- CORRELL, D. L., J. L. EDWARDS, and W. SHROPSHIRE, JR. "Multiple Chromophore Species in Phytochrome." *Photochemistry and Photobiology* (1968), volume 8, pages 465-475.
- CORRELL, D. L., E. STEERS, JR., K. M. TOWE, and W. SHROPSHIRE, JR. "Phytochrome in Etiolated Annual Rye, IV: Physical and Chemical Characterization of Phytochrome." *Biochimica et Biophysica Acta* (1968), volume 168, pages 46-57.
- GANTT, E., and S. F. CONTI. "Ultrastructure of Blue-Green Algae." *Journal of Bacteriology* (1969), volume 97, pages 1486-1493.
- MA, TE-HSIU. "Effect of Irradiated Glucose Solution on Mitotic Chromosomes of *Vicia* and *Tradescantia*." *Radiation Botany* (1968), volume 8, pages 307-315.
- MIELKE, J. E., and A. LONG. "Smithsonian Institution Radiocarbon Measurements, V." *Radiocarbon* (1968), volume 11, pages 162-182.

- NEBEL, B. J. "Action Spectra for Photogrowth and Phototropism in Protonema of the Moss *Physcomitrium turbinatum*." *Planta* (1968), volume 81, pages 287-302.
- STEINER, A., L. PRICE, K. MITRAKOS, and W. H. KLEIN. "Red Light Effects on Uptake of  $^{14}\text{C}$  and  $^{32}\text{P}$  into Etiolated Corn Leaf Tissue during Photomorphogenic Leaf Opening." *Physiologia Plantarum* (1968), volume 21, pages 895-901.

# National Zoological Park

THEODORE H. REED, *Director*



WITH AN EXPANDED PROFESSIONAL STAFF and a supporting cast of dedicated keepers, police, maintenance men, gardeners, fiscal and clerical workers, the National Zoological Park has made steady progress toward its objective—"the advancement of science and the instruction and recreation of the people." The collection has prospered, visitors have come by the millions, more than ever before in the Zoo's history, scientific research and cooperative undertakings with government agencies and other institutions here and abroad have moved forward. It has been a good year for the Zoo.

## Status of the Collection

30 June 1969

<i>Phylum</i>	<i>Class</i>	<i>Orders</i>	<i>Families</i>	<i>Species or subspecies</i>	<i>Individuals</i>
Chordata	Mammalia	14	46	196	593
	Aves	25	98	428	1,373
	Reptilia	3	29	155	547
	Amphibia	2	12	34	100
	Pisces	3	4	6	9
Arthropoda	Insecta	—	—	—	—
	Crustacea	1	1	3	96
	Arachnida	1	1	1	1
Mollusca	Gastropoda	1	1	1	1
Annelidae	Polychaeta	1	1	3	5
Coelenterata	Anthozoa	1	1	1	1
Totals		52	194	828	2,726

To these figures should be added the 24 species, comprising 109 individuals of small mammals under the care of the research division—and not always on exhibition—for a grand total of 852 species and 2,835 individuals.

Certain tabulated, statistical, and other information formerly contained 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.

Report of the pathologist.

Complete lists of (a) animals in the collection on 30 June 1969; (b) all births and hatchings during the year; and (c) changes in the collection by gift, purchase, or exchange.

On 28 October 1968, while making a routine test on an orangutan named Susie, the Zoo veterinarian, Clinton W. Gray, discovered that she reacted positively to a skin test for tuberculosis. Mildly alarmed, he then tested the other seven members of the great ape colony and found that five of the eight reacted positively. Precautions that have been taken include giving every Zoo employee a skin test, sealing off the great ape quarters from the public, and treating the orangutans, gorillas, and chimpanzees with daily doses of the anti-TB drug isoniazid.

On 13 February 1969 a clinic for apes was set up in the small mammal house. Dr. Gray and pathologist Dr. Sauer, assisted by medical teams from George Washington University, who brought along a mobile x-ray unit, have conducted the schedule of procedures that include x-ray, blood tests, PPD injections, skin biopsies, and chromosomal analyses.

Archie, the huge male orang, put on a good show. When the syringe from the tranquilizer gun struck his shoulder, he felt it, removed it, tasted it, and smelled it. Then he lumbered over to the bars and handed it to Dr. Gray before succumbing to the anesthetic. Interested doctors and their assistants agree the most dramatic part of the smooth-running procedure occurred when the big gorilla Nikumba, weighing 450 pounds, thundered around in his cage trying to avoid the tranquilizing syringe. The winsome award goes to the baby orangutan.

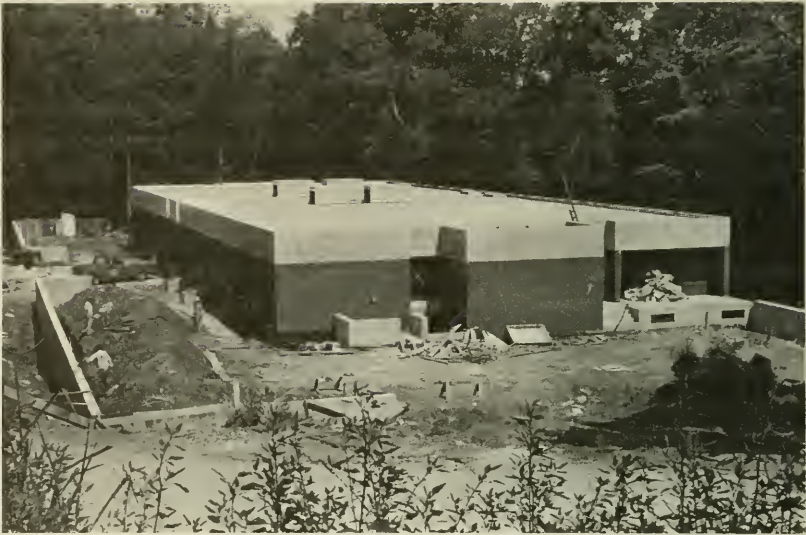
Results of all the tests show that the animals and the human employees are clean, and the quarantine on the big apes has been lifted.

Another problem has concerned the female white rhinoceros Lucy. A malformation of her horns had long been a matter of concern to Zoo officials, and when an infestation of maggots was discovered at the base of one horn, steps had to be taken. On 6 June 1969 Lucy was given one milligram of M99. She was immobilized in fourteen minutes. The base of the horn was cleaned with peroxide and both horns were removed.





Rewati, Mohini Rewa's white cub, at three weeks of age when her eyes were beginning to open. (Photograph by Donna Grosvenor.)



The new Hospital-Research Building in the process of construction.

Dr. Gray used a hand saw on the upper horn and a power saw on the lower, and the rough edges were filed smooth. The animal now presents a much neater and healthier appearance, and it is hoped that the horns will grow out straight after this surgery.

### *Births*

While it can hardly be called a population explosion, except possibly in the bird house, the increase in the collection during the year has been highly gratifying. Efforts to secure mates for single animals have paid off handsomely. The first baby colobus born in the National Zoo made his appearance in February 1969. Although the parent monkeys are coal black with a white fringe around the face, the young one was entirely white at birth and remained so for the first two months. Another white baby is the female cub of Mohini, the celebrated white tigress, who surprised everybody by presenting the Zoo with two babies on 13 April 1969. One cub had her coloring, the other was normal tiger orange. The orange baby was defective and lived only 48 hours (an autopsy showed brain damage). The white cub, named Rewati by the Indian Ambassador, was removed from the mother after two weeks and reared in the director's home. Rewati is now on exhibition in the lion house.



The portable x-ray machine, operated by Edward Eccard of George Washington University's Medical Center, is in position for filming the immobilized orangutan, Archie. Dr. Gray is pushing some of the thick shaggy hair out of the way. (*Evening Star* photographer Owen Duvall.)

The rare and lovely African black-footed cats had kittens; an orangutan was born on 28 March 1969 and is being reared in the home of Mrs. Louise Gallagher, who has previously raised three gorillas and three chimpanzees for the Zoo. The Barbary ape colony has increased to the point where it equals, if not surpasses, the famous colony on





Nickie Gorilla, greatly overlapping a man-size stretcher, is being x-rayed at the end of a ninety-day treatment for tuberculosis. While immobilized, the great apes were also injected with tuberculosis antigens; gastric and blood samples were taken as well as skin biopsies and other samples for chromosome study. (*Evening Star* photographer Owen Duvall.)

Gibraltar. Two scimitar-horned oryxes and a Père David's deer were born.

In the bird house, kookaburras and tinamous have continued to multiply. Two Stanley cranes hatched, and a roadrunner was hand-reared. Birds on the list of endangered species that have hatched at the Zoo include the Laysan duck, Hawaiian duck, and Swinhoe's pheasant. A count made on 25 May 1969 showed that 996 eggs had been laid since 1 January 1969. Of course, not all of them hatched, and of those that did, not all the chicks survived, but the figure is impressive.

The reptile division is proud of the fact that the African pit viper, *Trimeresurus purpureomaculatus*, has had eight young, a first for the National Zoo.

## *Gifts*

Among the outstanding gifts of the year have been a pair of kiwis, the remarkable flightless bird of New Zealand, carefully protected in its native land. On 10 October 1968, the Prime Minister, the Right Honorable Keith Holyoake, presented the birds to the "people of the United States from their friends the people of New Zealand." Because the birds are nocturnal, a special cage in the bird house has been modified for them. It is kept dark during the daytime so that they will move about and search for food during visitors' hours, and then it is lighted at night. The birds have adapted well to this arrangement.

A welcome gift from the Maryland State Fish and Wildlife Commission, in Hancock, consists of 17 American wild turkeys. These have been released in the Park, where they will maintain themselves under natural conditions.

The Right Honorable Keith Holyoake, Prime Minister of New Zealand, with one of the pair of kiwis presented to the people of the United States from the people of New Zealand.







A close-up of New Zealand's rare bird, the kiwi. The kiwi is flightless and tailless but lays an egg that is the largest in proportion to the bird's size of any other egg in the world. A four- to five-pound kiwi will lay an egg weighing 14 to 16 ounces. (*Evening Star* photographer Owen Duvall.)

Gifts other than animals included a bequest of \$5,000 from the estate of Mildred B. Bliss. The money is to be used "for the betterment of the conditions of animals in the National Zoological Park," and has been deposited in the trust funds of the Smithsonian Institution until a decision is reached on how to use it most wisely. Another contribution



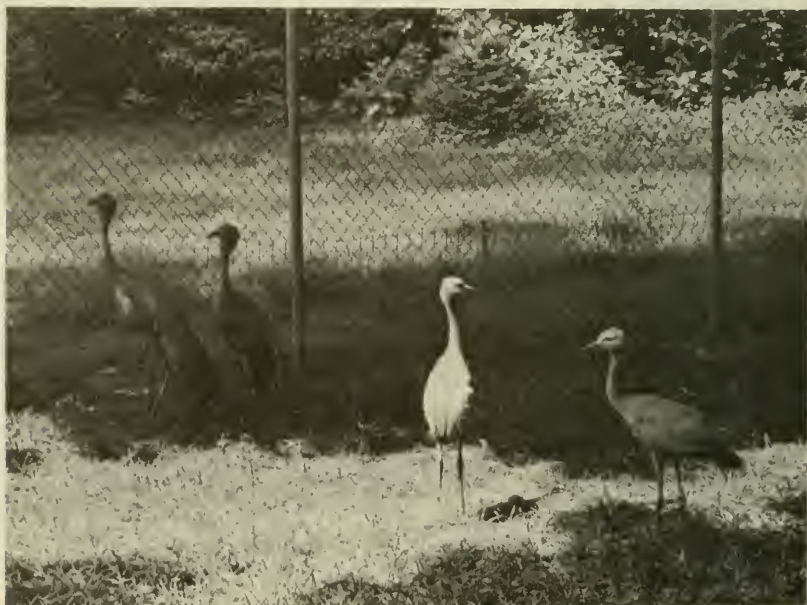
Black-and-white colobus monkey mother and her baby. Although the baby likes the security of her mother's arms, here she leaves to do a little investigating on her own.

has come from *Reader's Digest* in the amount of \$150 for the purchase of animals.

Jacob Lipkin, a noted sculptor, has given the Park a 1,000-pound statue of a bear. The sculpture is rendered in pinkish-brown Italian marble and has been installed just inside the Connecticut Avenue entrance to the Zoo.

As a gesture of goodwill to our Latin American neighbor, the National Zoo has sent a young, Zoo-born Nile hippopotamus to the zoo in Santiago, Chile. Braniff International most generously transported the animal free of charge, and Estela, as she was named, received tremendous publicity when she arrived in Chile.

The American alligator has been hunted for its hide until it is on the verge of extinction. In Mississippi it has been completely eliminated. When the National Zoological Park consulted the Department of the Interior in regard to surplus alligators in its collection, it was learned that the Fish and Wildlife Service wanted to reintroduce the alligator into the Noxubee National Wildlife Refuge near Starkville, Mississippi. The Zoo accordingly has turned over three specimens to help in this project.



The parent blue, or Stanley, cranes with their fast-growing chicks.





Two of the Zoo's three sable antelope pose majestically in their secluded corral.

### *Purchases*

Once again, attention has been focused on building up the Zoo's collection of antelope and deer. A trio of magnificent sable antelope has been acquired, and three females have been added to the growing herd of Père David's deer, a species that no longer exists in the wild. For the first time in more than thirty years, Eld's deer is on display. This small (45 inches high at the shoulder) denizen of southeastern Asia is also known as the thamin or Burmese brow-antlered deer, and the Zoo has been fortunate enough to secure two males and a female. It is rare in the wild and even rarer in captivity; the only sizable herd is in the Paris Zoo.

### *Exchanges*

In order to maintain a representative collection and to improve breeding potentials, zoos occasionally exchange animals. From Busch Gardens in Tampa, Florida, the National Zoo has received two stately Victorian crowned pigeons. From the Jersey Zoo in the Channel Islands have come three Cereopsis geese and an African giant civet. The National Zoo has sent two spider monkeys to the zoo in Calcutta, India,

and has received from them a hanuman langur. American wild turkeys and crested wood partridges have been sent to Jean Delacour in Clères, France, who in turn has sent the National Zoo a Rothschild's mynah. Other exchanges have been made with the Taronga Park Zoo in Sydney, Australia; the Max-Planck Institut in Wuppertal, Germany; and the Royal Zoological Society in Glasgow, Scotland.

### *Removals*

The most serious loss of the year has been the death of Moka, the female gorilla who had given birth to three offspring. Moka and her mate Nikumba came to the Zoo in 1955 as youngsters, gifts from Russell Arundel of Warrenton, Virginia. Moka weighed twenty pounds and Nikumba seventeen. By 1961 they were mature animals and in that year Moka gave birth to Tomoka, a male, which is still living in the National Zoo. In 1964 she produced Leonard, who was later sent to the Toronto Zoo, and in 1967 Inaki, a female, was born. Clinical and pathological findings have shown that Moka died of a form of hepatitis. She was approximately fifteen and a half years old.

One of the trio of Burmese brow-antlered deer—only the males have the unique rocker-shaped antlers. There are no other branches to the antlers except at the forked ends, which may produce several points.







The Zoo's herd of three scimitar-horned oryx has been increased with the birth of two calves—a male and a female.

Another old-timer that died during the year was a spectacled bear (*Tremarctos ornatus*) received on 3 March 1947. It died on 19 March 1969, after more than twenty-two years of captivity—possibly a record for the species.

### *Office of Pathology*

For more than a hundred years the pathologist has spearheaded medical research. Information pertaining to disease has been observed at autopsy and tissues have been further examined by the use of the light microscope. In recent years many techniques and instruments have been found that greatly facilitate the procurement of information. Examples include the fluorescent, phase, and electron microscopes, as well as histochemical and immunopathologic procedures.

The knowledge of disease in exotic animals today stands in about the same position as did human medicine more than a hundred years ago. It is the practice at the National Zoological Park to perform autopsies on all animals and then examine tissues under the light microscope. While much information can be gleaned by these processes, the Zoo today is fortunate that it can profit from the technical progress of recent years



The greater kudu family: Mike, Melda, and daughter Mini, with pregnant Kitty in the background.

by being able to use the more sophisticated techniques to carry a problem to a more nearly complete solution.

The Office of Pathology was born in August 1968 with the arrival at the National Zoological Park of a veterinary pathologist, Dr. Robert M. Sauer, from the staff of the University of Pennsylvania. During the next few months a laboratory was designed and equipped in a new but temporary building on a hill in the hardy-hoofed stock area. During February 1969 a histologic technician, Robert C. Childs, was appointed and the laboratory began to function. Upon completion of a research and hospital building, the entire operation will be moved permanently into this new facility.

By definition the function of a pathologist is to study all disease processes by all available techniques, including the traditional gross post-mortems. The philosophy of the Office of Pathology is that service to the National Zoo is best achieved through a program of professional education and research. To this end, working agreements in comparative pathology have been established with the veterinary section of the Armed Forces Institute of Pathology (AFIP) and the School of Medicine of George Washington University. At the present time, eight veterinary officers from AFIP are participating in the program. They perform the autopsies and carry all cases to completion. The protocols are reviewed

with the trainee by pathologists at the Zoo and AFIP before being accessioned into the records and retrieval systems of both institutions.

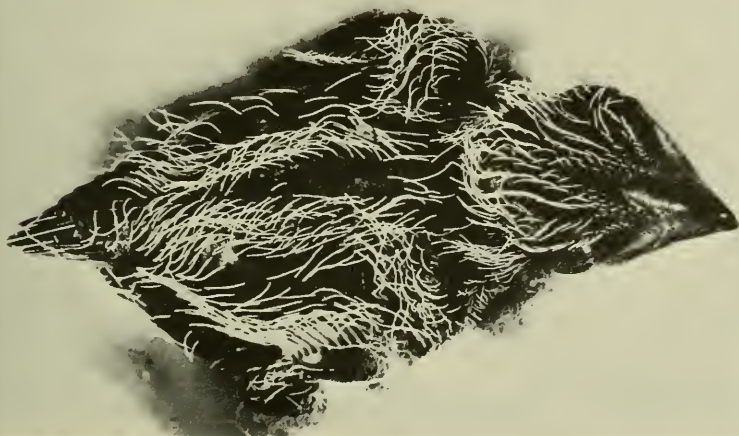
George Washington University Medical School has furnished the Zoo with a resident veterinary pathologist, Dr. Bernard C. Zook, formerly with the Angell Memorial Animal Hospital in Boston. His function is the investigation of conditions of potential biomedical importance. Both of these NZP pathologists hold professorial positions on the George Washington University faculty and will participate in academic courses during the coming year. A seminar course in comparative pathology will be conducted at NZP during the fall of 1969.

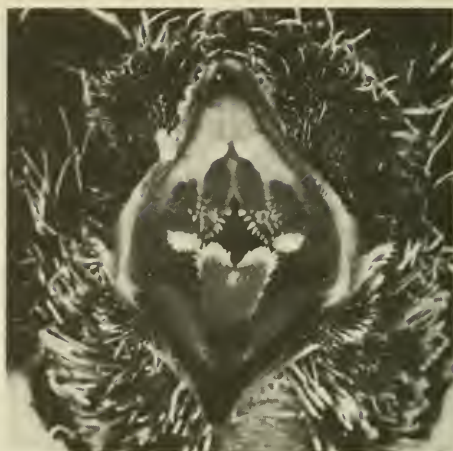
Two undergraduate students have been accepted into a summer research program. Howard M. Laten of Baldwin Wallace College will work in the field of microbiology, and James S. Harper III of the University of Pennsylvania will conduct a survey of enteric pathogens among the collection.

The teaching and research program has been broadened by the inclusion of material from domestic species obtained from a surgical biopsy service that is being rendered for practicing veterinarians in the District of Columbia and tri-state area.

Current research projects include: (1) studies on necrotic enterohepatitis in reptiles; (2) light and electron microscopic studies on inclusion bodies found in reptiles; (3) studies on an idiopathic demyelinating

A four-day-old roadrunner chick, hatched at the Zoo, showing the shiny black skin, which is covered with wiry natal "hairs." (Photo by Constance P. Warner.)





The nestling gape shows a bright red mouth and white hard palate. The white gape marks in the center of the mouth help the parent birds to put the food in the right place. (Photo by Constance P. Warner.)

disease of primates; and (4) studies on spontaneous goiter of streaked tenrecs (*Hemicentetes semispinosus*).

### *Information and Education*

During the year the Information-Education Section has completed 785 laminated reptile and bird labels and 240 metalphoto labels for mammal and other signs. Children from twenty-seven recreation areas have been taken on guided tours during the "Summer in the Parks" program and two special tours have been arranged for mentally or physically retarded children. Forty-five special guests or dignitaries have been given personally escorted tours of the Zoo. The section has assisted with press, radio, and television coverage of Zoo activities on thirty-three different occasions and has disseminated information on natural history and the National Zoo by telephone and correspondence. Special exhibits were prepared for the Secretary's Reception prior to the "Man and Beast" Symposium. An exhibit installed in the lion house displays the various awards and medals that have been presented to the Zoo.

*Tiger Talk*, the Zoo's newspaper, was discontinued in October 1968 because of a shortage of help. *Highlights of the National Zoo* has been rewritten twice during the year. All "care" sheets have been reviewed and are in the process of being updated. A brief history of the Zoo and a history of the construction of the Zoo have been completed.



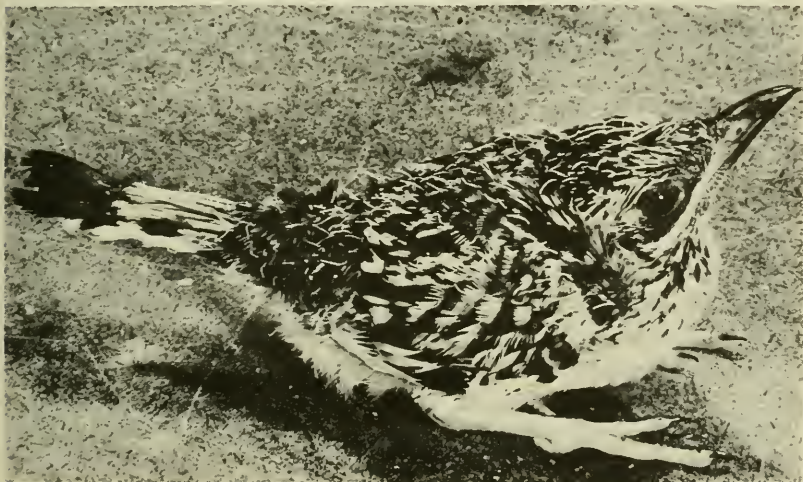
Miss Marion McCrane, zoologist, resigned as head of the Information and Education Section on 1 December 1968, and Mrs. Sybil E. Hamlet became acting chief of the section.

## *Conservation*

The director, Dr. Reed, has continued his service as president of the Wild Animal Propagation Trust (WAPT). This organization, chiefly through specialist committees, promotes the captive breeding of rare and endangered species. The Orangutan Committee has had considerable success in arranging transfers, deposits, and sales between zoos to increase breeding potential. The National Zoo is nominal owner of three male orangutans made available to other zoos through WAPT. The newly organized Giant Tortoise Committee is gathering information on the management and propagation of Galapagos tortoises, and plans are being made for a large new breeding compound in Hawaii. Other committees are concerned with such species as the golden marmoset and Arabian oryx. Future WAPT plans include establishment of breeding herds on farms or ranches.

Assistant director John Perry has continued service as a member of the Survival Service Commission (International Union for Conservation of Nature—IUCN) and chairman of the Endangered Species

At two weeks, the chick is almost completely feathered. Its feet have grown and changed color, and it is now able to run about. There are still some remnants of the natal "hairs." (Photo by Constance P. Warner.)







One of the Zoo's two corncrib cages which, although relatively inexpensive, are sturdy, well built, and provide ample room for small groups of monkeys.

Subcommittee of the American Association of Zoological Parks and Aquariums (AAZPA). In September 1968 he represented IUCN at the World Biosphere Conference held at UNESCO headquarters in Paris. The Survival Service Commission frequently is consulted by various governments on matters of wildlife management and protection. It also initiates projects designed to save critically endangered wildlife species.

Dr. Reed and Mr. Perry represented WAPT and AAZPA in House and Senate hearings on endangered species legislation. Similar legislation

failed of passage in 1968. Since then, private talks with industry groups that had opposed the bill led to technical amendments and a change of positions. All of the witnesses appearing in 1969 have favored passage.

As a result of these talks, fur industry representatives have proposed continuing cooperation with IUCN. Industry leaders recognize that over-exploitation of any fur-bearing animal can have only damaging effects on their business. Perry was named to represent IUCN in preliminary conversations with the International Fur Trade Association in London.

In November 1968 Perry returned to Brazil at the invitation of the Brazilian Academy of Sciences to participate in a symposium on wildlife conservation. A Brazilian law adopted in 1967 declares all wildlife to be national property. Special regulations now protect such endangered species as the giant otter and golden marmoset against commercial exploitation.

While in Brazil, Perry visited the site of an experimental project which the National Zoo is assisting in the state of São Paulo. A Brazilian scientist, Dr. Paulo Nogueira Neto, believes the African eland would adapt to the southern Brazilian savannas and become a valuable source of animal protein. The National Zoo is assisting Dr. Nogueira in obtaining elands. The first two were shipped to São Paulo in January 1969. The experimental site is a large fenced enclosure on Dr. Nogueira's property near Campinas.

The Zoo is continuing to give priority attention to breeding of the rare and endangered species in its collection. Notable births and hatchings of such species in fiscal year 1969 have included the golden marmoset, two scimitar-horned oryxes, orangutan, Père David's deer, Laysan duck, Hawaiian duck, and Swinhoe's pheasant.

### *Friends of the National Zoo*

The Friends of the National Zoo (FONZ) have had an active and profitable year. Dispensing machines for animal food have been installed, three on the bear line, two near the monkey house, and two outside the elephant house. The machines are a gift from Roland Lindemann of the Catskill Game Farm, Catskill, New York, and they make it possible for visitors to buy the proper sort of food to feed the animals. Money received from this source goes into the FONZ educational fund.

The Friends have sponsored two lecture series, both being held at night in the elephant house. The first has consisted of six talks on "Our Wild Animal Resources." The series was opened by Secretary Ripley. Other speakers have been Emily Hahn, Dr. Theodore H. Reed, Dr.



Rhino Dillon then (7 September 1967, at one week) and now

weight: 75 lb. (est.)	1,500 lb. (est.)
height at shoulders: 24½"	4' 6½"
length, head to tail: 44"	7' 10"

Charles J. Stine of Johns Hopkins University, Dr. William J. L. Sladen, also of Johns Hopkins University, and Larry Collins of the National Zoological Park. These lectures are free and are offered to members and their guests. A subscription lecture series on "The Roots of Mankind" has been given by Dr. John R. Napier, director of the Primate Biology Program in the Division of Mammals, National Museum of Natural History.

A group of about twenty members of FONZ has served as volunteer tour guides. During the school year, from the first of October 1968 to the middle of June 1969, the guides conducted 9,300 children in organized classes around the Zoo—a tremendous boon to the Zoo staff. Other activities have included a nighttime "preg-watch" of 160 hours during a false pregnancy of Mohini, the white tigress, 80 hours with a pregnant leopard, sponsoring an art show participated in by school children of the Metropolitan area, publication of the newsletter *Spots and Stripes*, operating the kiosk, and conducting an information booth on busy weekends.

A night tour of the Zoo, attended by over 800 members and guests, was made on 17 June 1969, and the annual meeting was held in the elephant house on 30 June 1969. The annual Mohini award has been presented to Marion McCrane Wolanek, formerly a zoologist on the Zoo staff.

### *Construction and Improvements*

Work has continued on the hospital and research building. It has been exciting to watch this dream facility take shape from a bare patch of ground to the lovely one-story building that it is now. At the close of the year the building is 90 percent completed and the Zoo is looking forward to an early fall occupancy.

This year the District of Columbia Department of Sanitation has started work on the final sewer connection so that the Zoo will no longer contaminate Rock Creek. A previously constructed sewer system had eliminated 75 percent of the Zoo's outflow into Rock Creek.

Design work has continued on the multiclimatic house complex and on the development of the central part of the Zoo from the small mammal house down to the Harvard Street crossroads, in order to have a cohesive plan to submit to the various reviewing boards.

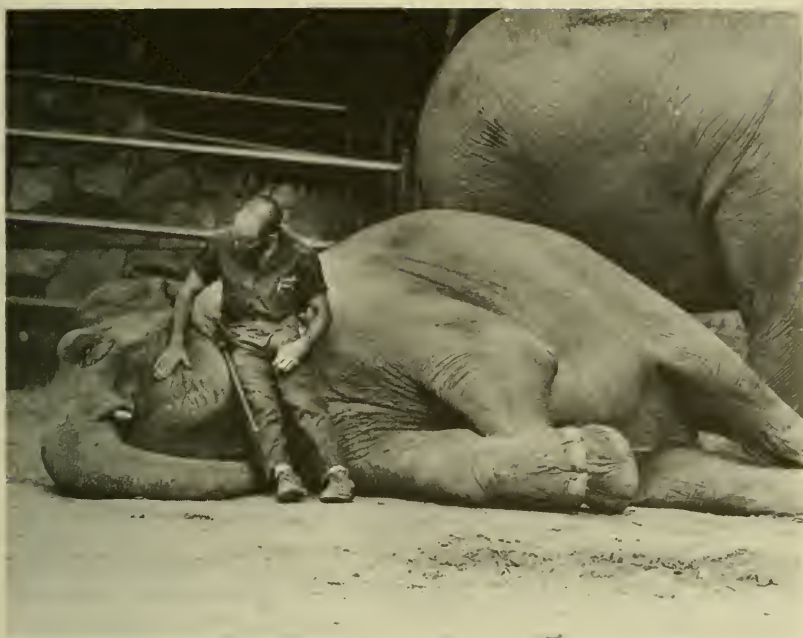
In this year's budget there is an item of \$200,000 to provide continual heating for all Zoo buildings. (The existing boiler plant now providing heat has outlived its usefulness.) Also included in the budget is an item of \$200,000 for renovation and repair of those facilities in the



Mrs. Soedjatmoko and Galuh, wife and daughter of the Indonesian ambassador, admire the 22-day-old Manis orangutan. (Photograph by Donna Grosvenor).







Elephant keeper-trainer Al Perry giving a "love pat" to Shanti following the training period. Both the African and Asiatic elephants are given obedience training twice daily. (*Daily News* photographer Geoffrey Gilbert.)

Zoo that must be worked on before the phased reconstruction program is started. This has resulted in the initiation of many small projects needed to maintain the present physical plant.

### *Research*

Overseas travel and research have played an important part in the activities of scientific research department personnel this year. On 10 June 1968 Dr. John F. Eisenberg, resident scientist, departed for a year's stay in Ceylon to undertake intensive ecological and ethological investigations of the Ceylonese elephant, including a study of the reproductive physiology of domestic Ceylonese elephants. Eisenberg also has continued studies, with the other members of his research team in Ceylon, on the comparative ecology and behavior of Ceylonese primates.

On 22 January 1969 L. Collins left for an eight-week trip to New Zealand and Australia on a grant from the Arundel Foundation. Objectives of this trip are: (1) to investigate the possibilities of obtaining certain

specimens indigenous to these countries, (2) to collect care and maintenance data on captive monotremes and marsupials, (3) to confer with Australian zoologists currently working with the Dasyuridae in conjunction with research being carried out at present with this marsupial family at the National Zoological Park, and (4) to establish a trading rapport between the National Zoological Park and zoos in New Zealand and Australia.

On 9 February 1969 L. Collins was named zoologist in the department, and on 6 April 1969 Mrs. W. Holden was named administrative assistant to the resident scientist.

During the latter part of April 1969, Dr. P. S. Watts, director, Division of Animal Sciences, Institute of Medical and Veterinary Sciences, Adelaide, South Australia, visited the department and discussed with Larry Collins several aspects of the investigations in progress pertaining to the breeding of dasyurid marsupials under captive conditions.

On 2 June 1969 Miss R. Aulisio, a senior biology major at St. Joseph's College, Emmitsburg, Maryland, was appointed as a visiting scientific research assistant by the Office of Academic Programs, Smithsonian Institution. Miss Aulisio has initiated an intensive investigation into the reproductive physiology and reproductive behavior of solenodons, *Solenodon paradoxus*, and pacaranas, *Dinomys branickii*.

During the past year, Dr. Eisenberg has held the following seminars: "Studies on the Ungulates in Ceylon's National Parks" at the Medical Research Institute, Kuala Lumpur, Malaysia, 7 May 1969; and "Communication in *Hemicentetes semispinosus*" at the University of New South Wales, Department of Zoology, Sydney, Australia, 29 May 1969. In addition, Eisenberg taught a class in ecology at the University of Ceylon, Peradeniya, for the month of November 1968.

A curious and brightly colored Asian amphibian, the horned toad *Megaphrys monticola*.



Two 16-mm movie films have been made this year by Larry Collins. One illustrates several behavioral aspects of *Dasyuroides byrnei*; the other film depicts locomotion, grooming, and feeding in the red kangaroos, *Macropus rufus*. In addition, films are currently being made of the maturation and developmental behavior of a white Bengal tiger cub, *Panthera tigrina*, male-female encounter behavior of the Zoo's two white rhinoceroses, *Ceratotherium sinu cottoni*, and behavior films of all specimens of the marsupial family Dasyuridae.

Studies on the following research projects are currently being pursued:

1. The social behavior and ontogeny of behavior among selected species of caviomorph rodents (with N. Smythe, University of Maryland).
2. Predatory behavior of the Viverridae (with C. Wemmer, University of Maryland).
3. General behavior of *Macaca sylvana* (with W. Dittus, University of Maryland).
4. General behavior of *Proechimys* (with E. Maliniak).
5. Reproductive behavior and maturation in the dasyurids (with L. Collins and E. Maliniak).
6. Gestation periods in the Rodentia, Marsupialia, and Insectivora (with E. Maliniak and L. Collins).
7. Reproductive behavior of *Solenodon paradoxus* (with R. Aulizio).
8. Reproductive behavior and reproductive physiology of *Dinomys branickii* (with R. Aulizio).
9. Care and maintenance procedures used with captive monotremes and marsupials (with L. Collins).
10. Communication in selected species of tenrecs (with E. Gould, Johns Hopkins University).

## Staff Publications

EISENBERG, J. F. "Animal Sociology." *Encyclopaedia Britannica* (1969), volume 20, pages 804-818.

———. "Behavior Patterns." Chapter 12 in *Biology of Peromyscus (Rodentia)*, edited by John A. King. Special Publication Number 2. American Society of Mammalogists, 1968.

EISENBERG, J. F., and N. MUCKENHIRN. "Reproduction and Rearing of Tenrecoid Insectivores in Captivity." *International Zoo Yearbook* (1968), volume 8, pages 106-110.





# Office of Oceanography and Limnology

I. E. WALLEN, *Head*

THE OFFICE OF OCEANOGRAPHY AND LIMNOLOGY focuses the needs and capabilities of specimen-oriented oceanographers throughout the world into national goals.

The Office has continued to work closely with the staff of the National Council on Marine Resources and Engineering Development. Representation has been maintained on four of the five standing committees of the Council and with nearly all of the panels, working groups, and task forces generated during the year's activities. Close association also has been maintained with the National Commission on Marine Sciences, Engineering and Resources, not only on an *ad hoc* advisory basis but also by assigning William Aron to the commission staff for one month to assist in the completion of its final report. The commission has recognized the substantive contribution of the Smithsonian Institution to marine research and specifically has recommended that the Smithsonian Oceanographic Sorting Center be adequately funded to permit it to keep pace with the growing volume of and need for marine data.

To assist in improving the freshwater research opportunities of Smithsonian scientists and to include in the national effort facilities for freshwater research, comprising the National Museum of Natural History, the Chesapeake Bay Center for Field Biology, and the Smithsonian Oceanographic Sorting Center, this Office has been invited to serve on the Federal Council for Science and Technology interagency Committee on Water Resources Research. Additionally, the Office, at the request of the National Water Commission, has provided this newly appointed presidential commission with advice and assistance.

The Office has worked closely with each of the government agencies concerned with aquatic research. Particular emphasis has been placed on programs involving the direct intrusion of man into the sea. The implementation of this aspect of the Office activity has included a wide spectrum of activity ranging from joint sponsorship of a special Edwin A. Link Lecture by Jon Lindbergh and Joseph B. MacInnis which was attended by a standing-room-only crowd of more than 1,200 people, to

several field investigations, such as Project Shark 1969, a multidisciplinary study of a coral reef environment achieved mainly by diving from a submersible chamber. Shark 1969 has been sponsored by Seward Johnson, Edwin Link, William Mote, and the Smithsonian Institution.

Dr. Robert Higgins, formerly of the Marine Biological Laboratory in Woods Hole, joined the Office as staff oceanographer in November 1968. A specialist in kinorhynchs and tardigrades, Dr. Higgins provided assistance in program development, particularly to the underseas activities, before leaving for Tunisia in June 1969 to relieve Dr. Neil Hulings as the director of the Mediterranean Marine Sorting Center.

Activities in the international area also have commanded considerable attention by the Office. I. E. Wallen has been named National Correspondent for the United States to the Cooperative Investigations of the Mediterranean, a major expedition of the Intergovernmental Oceanographic Commission of UNESCO. Another IOC-sponsored expedition, the Cooperative Investigations of the Caribbean and Adjacent Regions has taken Wallen and Higgins to the University of Mexico to advise on the establishment of a regional sorting center. Investigative trips to develop the use of Public Law 480 (excess currencies in marine research) have been made under the aegis of the Office to Poland, Yugoslavia, and Egypt by various staff scientists. The Office has participated in the preliminary planning for the International Decade of Ocean Exploration (IDOE) with William Aron participating in the National Academies of Sciences and Engineering planning workshop and Robert Higgins serving on the Marine Sciences IDOE working panel.

## RESEARCH ACTIVITIES

Dr. Aron spent most of August 1968 in Israel, dividing his time between field work in the Gulf of Eilat and the Red Sea and attendance at the International Limnological Congress in Jerusalem. The field program included midwater trawling on both sides of the Straits of Tiran, some benthic sampling in these same areas, and considerable shore collecting on the reefs. Included in the field party were Dr. Eugenie Clark of the University of Maryland, a group of technicians and graduate students of The Hebrew University, and Mr. Menachem Ben-Yami of the Sea Fisheries Research Station in Haifa.

The collections of midwater fishes taken during this expedition have been returned to the Smithsonian and have been studied jointly by Aron and Richard Goodyear of the National Museum of Natural History. A joint paper by them has been accepted by the *Israel Journal*

of *Zoology* for the issue commemorating the 60th birthday of Professor Heinz Steinitz of Hebrew University.

During this project to study the role of the Suez Canal as a pathway for the movement of biota between the Red and the Mediterranean seas, several scientists have visited Israel for research. They include Louis Kornicker and Thomas Bowman of the Smithsonian, E. Bousfield and Neil Powell of the Canadian National Museum, and M. Neushul of the University of California at Santa Barbara. As a result of his field investigations, Neushul has presented a collection of identified algae to the Botany Department of the National Museum of Natural History.

A panel of scientists consisting of Ernst Mayr of the Museum of Comparative Zoology (chairman), Marta Vanucci of the University of São Paulo, Allyn Seymour of the University of Washington, Gregory Sohn of the United States Geological Survey, and Karl Wilbur of Duke University and the Ford Foundation visited Israel in April 1969 to review the Suez migration studies. The panel has urged the continuation of the program and has cited its importance as a model and pilot project for needed research on the proposed Isthmian Sea Level Canal in Central America.

Dr. William Melson was chief scientist on a geophysical cruise on the pride of the United States oceanography fleet, Coast and Geodetic Survey vessel *Oceanographer*, for two weeks in October 1968. Drs. Melson and Simkin from the Sorting Center and scientists from Princeton, the University of Washington, Oregon State University, and Scripps Institution of Oceanography participated in the cruise, which was highly successful. Dr. Melson has contributed a new idea of local sea-floor spreading that involves bilaterally symmetrical features on either side of the Juan de Fuca Ridge. The Coast and Geodetic Survey has been very complimentary in its remarks on the cruise and of the immediate preparation of a useful report. The survey has offered full cooperation to Dr. Melson's group in meeting future requirements for ship time.

During the period 15 February–16 March 1969, a major underwater expedition took place off British Honduras under Office sponsorship. Using funds and direct support from Mr. Seward Johnson and direct support by Messrs. Edwin A. Link and William Mote, five ships and an underseas vehicle ADS IV were assembled to engage in underwater investigations of varied nature. Known as Shark 1969, the expedition grew from a proposal of Perry Gilbert from the Mote Marine Laboratory at Cape Haze, Florida. Dr. Gilbert, Mr. William Evans of the Naval Underseas Research and Development Laboratory, and others contributed a study of shark behavior using a "bite meter" developed by Evans. Walter Starck has studied coral reef fishes and has tried out a new scuba apparatus that he and John Kanwisher have invented.

Kanwisher accompanied the expedition. Dr. Dennis Devaney, post-doctorate specialist at NMNH has studied invertebrate behavior, Mr. Winston Miller of British Honduras has worked on lobsters, Dr. Robert Wilce of the University of Massachusetts has done research on algae, and Mr. Robert Wicklund of the Bureau of Sports Fisheries and Wildlife has experimented on the vertical transfer of fishes for pressure effects. Dr. Joseph MacInnis of Ocean Systems, Inc., again has served as the expedition doctor and has done some photography. Two professional photographers from Hollywood have participated in recording the activity.

Drs. Richard Benson and William Aron made a trip to India in January 1969, accompanied by Dr. Edward Brinton of the Scripps Institution of Oceanography. Consultations with Dr. N. K. Panikkar led to development of a proposal to use Indian rupees for a series of biological and geological cruises from Goa to the middle of the Arabian Sea. These cruises would develop information on the productivity of the shallow-to-deep-water transect at various seasons. Discussions with Dr. B. R. Seshachar, Head of the Indian International Biological Program, have led to approval by the University of Madras to host a symposium on sipunculids to be organized by Dr. Mary Rice in the Division of Worms. This will be the first international symposium on this group and should be an important step toward improved research output by the participating scientists. Discussions also have proceeded on the possibility of establishing a study of a coral reef, cooperatively with other United States and Indian scientists.

The Vetlesen Foundation has continued its support of Miss Julie Booth's activities on the Great Barrier Reef. Miss Booth has worked at Fairfax and Hook Islands, where she has made interesting observations on turtles, corals, birds, and other reef occupants. She is sending back specimens of the flora and fauna for the Smithsonian collections.

For Project Tektite, NASA, Navy, Interior, and General Electric have installed an underwater house off St. John, Virgin Islands. With advice and assistance from this Office, Tektite has been used in studies of man in isolation but in touch with the world by telephone, television, and radio. The instrumented facility, installed at a 42-foot depth, for two months served as home for four scientists. Support of Smithsonian activities in Tektite has been obtained from the Tai Ping Foundation. As a result of these actions, the Smithsonian has been invited to participate in Tektite II, scheduled for early 1970.

Ecological studies on Puerto Rican coral reefs were carried out by Peter Glynn during a three-month period beginning in September 1968.



Main emphasis was given to metabolic measurements of key species associated with *Porites* patch reefs. The food habits of some species, as well as their reproductive activities, was investigated. Further observations on the feeding behavior of the chiton commensal *Dynamenella perforata* (Isopoda) were made in order to clarify the intimacy of this relationship.

A plan for an international decade of ocean exploration has been developed through the Marine Sciences Council to represent federal aspirations in ocean explorations during the next ten years. Dr. M. A. Buzas has served as the Office representative on the task group that assembled this plan and has contributed significantly to its development.

As Chairman of the United States Observer Delegation and United States National Correspondent, I. E. Wallen attended in October 1968 the Monaco meeting of the International Commission for the Scientific Exploration of the Mediterranean Sea (ICSEM). Substantial attention was paid to an approved International Cooperative Investigation of the Mediterranean. This study will be coordinated by a three-man group from the Intergovernmental Oceanographic Commission of UNESCO (Dr. Federov), the General Fisheries Council for the Mediterranean of FAO (Dr. Charbonnier), and ICSEM (Dr. Cousteau). An international coordinator, Dr. J. Joseph, was named and four scientific committees have been chosen. An assistant coordinator for each committee will live in Monaco for the duration of the study, which began officially in October 1969 and will last for five years. There has been substantial interest on the part of Smithsonian oceanographers in participating in the study; the Mediterranean Marine Sorting Center will be the official specimen center.

Dr. Hugh Steedman of England spent the months of July, October, November 1968, March, and June 1969 planning and conducting experiments to be performed in international studies of plankton preservation. His travel to the Sorting Center was paid by the Scientific Committee on Ocean Research of the International Council of Scientific Unions, and his local expenses by the Smithsonian. Dr. Beers of the Scripps Institution of Oceanography will collect plankton for the initial studies, which are expected to be duplicated in Tunisia. Plankton preservation sometimes has been excellent and sometimes very unsatisfactory with similar preservatives. Histochemical work on preserved materials will permit analyses of the reasons for such variation.

On 13 December 1968 a small oil tanker, *Witwater*, was moving oil from a refinery a few miles south of the Panama Canal Zone to the Zone when it broke up about three miles from the Smithsonian Tropical Research Institute (STRI) marine station at Galeta Island. About

15,000 barrels of a mixture of bunker c oil and diesel oil were spilled and another 20,000 barrels gradually leaked into the Atlantic. Much of the oil drifted toward Galeta Island. Although some 500 barrels of the onshore flow was burned, the oil was distributed into the mangrove areas. An accumulation of oil near the STRI facility evidently began killing crabs and other marine organisms. This spill is being studied by STRI personnel for its effect on the marine facility.

Fernandina Island in the Galapagos provided the setting for a spectacular and rare volcanic event in July 1968. A Smithsonian expedition, mounted under the leadership of Dr. Thomas Simkin of the Smithsonian Oceanographic Sorting Center, spent a month in the Galapagos studying the volcano itself and the geological and biological effects on the crater lake and the surrounding ocean. This eruption was most unusual in that it involved the collapse of a significant portion of the caldera, part of which sank more than 300 meters. During his return trip, Dr. Simkin made observations, as a member of a Presidential mission, on the volcanic eruption in Costa Rica.

Drs. Thomas Goreau and Maxwell Doty of Jamaica and Hawaii, respectively, represented the Office and Drs. Talbot and Fosberg the Smithsonian at a meeting in Koror, Palau, in November 1968. The International Union for the Conservation of Nature (IUCN) considered setting aside island preserves for scientific use. This meeting was of great interest in the Office's own efforts toward the establishment of international marine preserves. The Office expects to work closely with IUCN, the Pacific Science Board, and other groups to set aside a system of international scientific preserves before their eventual exploitation.

Dr. Carl George, formerly of the American University, Beirut, Lebanon, has had support from excess currencies and this Office for a tour of the Nile River in Egypt, from Aswan to Alexandria, to gather data concerning the changes in the Mediterranean fisheries owing to construction of the Aswan Dam. The data were gathered in anticipation of a meeting at Airlie House in December 1968. Secretary Ripley spoke then of the environmental consequences of a possible interoceanic sea-level canal and gave examples from the Suez Canal studies. Environmental prediction is being considered by current planners for engineering modification of the environment. As an outcome of this trip, a proposal by Dr. George has been accepted to investigate the effects of the Aswan on some of the lower Egyptian lakes.

Interest in Mediterranean geology led Dr. Daniel Stanley to participate in a NATO-sponsored cruise of *Paolina I*, an Italian vessel in the western Mediterranean in January 1969. Dr. Jack Pierce used Coast Guard vessel *Kane* for a sediment cruise off North Carolina.

Coast Guard vessel *Rockaway* was used by Dr. Dan Stanley in three two-week cruises for studies of the nature and origin of Wilmington Canyon. These large ships were provided by the Coast Guard as a very substantial contribution to Smithsonian Oceanography.

Drs. Neil Hulings and Jose Stirn of the Mediterranean Marine Sorting Center visited Morocco in December 1968 to plan for a ship expedition to gather biological and geological data and specimens for our researches. The cruises across the Moroccan shelf started in June and continued through July 1969.

As a part of the effort to gain support for Smithsonian systematics, a series of field guides has been sponsored for sale or distribution to the general public and to the mission agencies. Dr. George Watson has been the most productive along this line with his *Preliminary Field Guide to the Birds of the Indian Ocean, Seabirds of the Tropical Atlantic Ocean, and Seabirds of the Tropical Pacific Ocean*. He is preparing a similar book on Antarctic birds. Dr. Robert Gibbs joined Dr. Bruce Collette of the Bureau of Commercial Fisheries in producing *Preliminary Field Guide to the Mackerel- and Tuna-like Fishes of the Indian Ocean (Scombridae)*. Recently Dr. Horton Hobbs authored *Keys to Water Quality Indicative Organisms* and Peter Glynn (STRI) produced with Robert Menzies *The Common Marine Isopod Crustacea of Puerto Rico: A Handbook for Marine Biologists*. Support for these efforts has come from the Bureau of Commercial Fisheries, the National Science Foundation, this Office, and the National Museum of Natural History.

The Ocean Acre program, a joint study by Drs. Aron, Gibbs, and Roper and scientists from the United States Navy Underwater Sound Laboratory, the Naval Oceanographic Office, and the University of Rhode Island, has included four cruises using vessels *Gilliss* and *Sands* of the navy and the University of Rhode Island's research vessel *Trident*. Preliminary analysis of the distributions of cephalopods and the meso- and bathypelagic fishes taken during these cruises reveals variations in the migratory behavior patterns between species that may be associated with different sound-scattering layers. The area selected for the intensive studies comprising the program is southeast of Bermuda in water depths greater than 2000 meters. Material collected during these cruises has been made available to other interested scientists including Thomas Hopkins of the University of South Florida, who is working on feeding behavior of fishes, Daniel Cohen of the Bureau of Commercial Fishes, who works on argenteoid fishes, and S. Van Der Spoel of the Zoological Museum of Amsterdam, who studies the pteropods and heteropods.

## SMITHSONIAN OCEANOGRAPHIC SORTING CENTER

The Smithsonian Oceanographic Sorting Center (sosc) began serving the marine sciences community in December 1962. The Center receives, sorts, records, curates, and distributes biological and geological specimens collected by oceanographic expeditions in all seas. By fulfilling the role of a central processing laboratory, sosc reduces the effort and time needed to distribute this great variety of specimens to interested specialists.

The collections of biological and geological materials, which have been received at sosc during the six and a half years of operation, have come from 83 sources. sosc does not accession the material in the sense of acquiring it permanently. A reference number is assigned, however, and the data are entered into a permanent system.

Upon request, sorted groups are distributed according to the commitments made by expedition leaders and principal investigators. Requests for noncommitted specimens are referred to one of a series of seven advisory committees for review and recommendation. Records are kept on the distribution of all specimens, research results, publications, and the final deposition of specimens.

After discussions with the National Institutes of Health, a simple agreement resulted in its purchase of nearly \$5,000 worth of supplies for the Sorting Center. In exchange for the supplies sosc has provided forty species of marine organisms in quantities of one kilogram or more. Shortly after this agreement was reached, Dr. H. A. Fehlmann and Mr. Ernani Menez of the sosc staff and Mr. Victor Haley, an sosc technician, collected in Antarctica on board the National Science Foundation vessel *Hero*, with a Bureau of Commercial Fisheries team based in the state of Washington. Dr. Fehlmann made cold-water collections, and then stopped in Panama for warm-water collections. Common species are sought for unusual chemicals.

sosc personnel have included sixteen federal employees and about twenty positions on private funds. In maintaining this level of private-roll employees, forty-one persons have been supported and trained during the year. Several terminations have resulted from reduction in contract funds by the National Science Foundation.

Owing to the specific nature of sosc's work, nearly every new technician must undergo a few months of intensive on-the-job instruction in the careful handling, identification, and recording of the broad array of specimens to be processed. This training is conducted in the individual sections since each of sosc's sections has unique problems and solutions. Training consists of closely supervised performance, interspersed with



lectures and discussions by consultants, and with the continual use of general identification manuals, some of which have been prepared by sosc. A valuable adjunct to sosc's training efforts is its modest library. Each year new acquisitions of books, reprints, journals, and charts add to the library's scope and usefulness. Training is open ended, although, after about three months, a new technician is able to work with a minimum of supervision. Whether a technician remains at sosc, transfers to the National Museum of Natural History, or joins another agency, sosc training has contributed toward making him a valuable member of a needed, skilled labor force.

Early in 1969, the Smithsonian Institution agreed to accept fifteen young persons as sosc trainees through the United Planning Organization's Neighborhood Youth Corps. They were assigned to the several sections of sosc and for six months learned the particular and varied skills needed to process specimens. Several trainees are expected to reach a level of competence enabling them to remain indefinitely on the technician staff at the Center. Supplementary support has been received from the National Science Foundation to allow trained technicians to act as instructors to the youth group and to provide laboratory equipment.

Nine temporary students were assigned to work in four sosc sections. Three of the students were participants in the Ninth Summer Science Research Program for Senior High School Students sponsored by the American University. One student was awarded a Summer Undergraduate Research Assistantship from the Smithsonian Institution's Office of Academic Programs. Five students were volunteers or were supported by private funds. Aside from routine work in the algae, geology, plankton, and vertebrate sections, all students undertook special projects related to their studies.

Under a contractual agreement with NSF, the Sorting Center maintains a file on all biological and geological specimens collected from the Antarctic by United States investigators. The collections processed at sosc, combined with Antarctic collections held at other institutions throughout the United States and some foreign countries, have provided a wealth of data. In 1966 sosc began to design an automatic data-processing system to permit rapid storage and retrieval of this information.

By the beginning of the year the first phase of the records system was in operation, and the sorting records were being integrated with the routine preparation of specimen labels. The labels, containing essential information, are prepared on automatic typewriter systems, which simultaneously punch the data onto paper tape. Data from the paper tapes are edited and transferred to magnetic tape for permanent storage. Bulk listings of all records or queries for records that satisfy specified param-

eters can be retrieved. The versatility of the records system permits inclusion of records on collections from any source while maintaining the identity of collections processed at sosc.

Most of the efforts of the past year have been invested in preparing labels and records for tape storage, processing the backlog of Antarctic records from manual files, and designing and implementing other phases of the records system. Over 40,000 items have been recorded in the year. More than half of the records have been from the backlog of previous years. Current production includes preparation of labels, inventory cards, and punched paper tapes for each sorted taxonomic group. Treatment of the backlog requires only the production of a paper-tape record. Each record is equivalent to one lot of sorted specimens. The backlog of records on Antarctic specimens processed at sosc prior to July 1968 covered over thirteen million specimens from USNS *Eltanin* Cruises 8-30 taken by Lamont Geological Observatory (LGO) and Texas A&M (TAM) and those taken by the University of Southern California (USC) and sosc on Cruises 1-22. These collections include over 4,000 pelagic and benthic samples. Nearly all the USC and sosc collections that have been sorted and the LGO and TAM samples from Cruises 8-21 are now recorded on magnetic tape.

The first phase of the data-processing system records specimens identified only to taxonomic levels higher than species. These higher categories are suitable for identification of the groups processed and distributed by sosc and for similarly processed collections at other institutions. A second phase of the system, begun this year, will incorporate records on specimens after they are studied and identified to species level by specialists. Programming for this inventory is under a special contract with Mr. Fred Krazinsky, who will continue to assist sosc with development of the system. When programming for the species inventory is completed, both inventories can be collated or queried, or both, to retrieve all available information on any sample or sets of samples regardless of the level to which the specimens have been classified. Initial testing of the species inventory is complete and related programming is under way.

Reduced data sheets are prepared by the records section for some collections for which only the original field logs are available. These data summaries facilitate the distribution of information to specialists who receive specimens and to others who are interested in the collections. Reference information and cruise tracks are used to verify the accuracy of the data; units of measure are converted to standard units. Reduced data sheets have been prepared for seven collections during the year.

sosc designs, produces, and distributes data forms for vessels involved in the United States Antarctic Research Program (USARP).

After consultations with marine biologists and studies of forms used by other institutions and agencies operating research vessels, a sample numbering system and preliminary forms for biological samples were agreed upon in September 1968 during the USARP Orientation Session for participants.

A supply of sosc-USARP forms has been distributed to USNS *Eltanin*, research vessel *Hero*, and USC&GS *Glacier*. The forms are printed in triplicate. One copy will be returned to sosc, where the data will be used in cruise reports. Suitable means of publication are being investigated. The use of the forms and systematic processing of the data will improve the collection and retention of data, and will add to the scientific value of the marine specimens that are collected at considerable cost and effort.

During the past year, the basic concept of "sea floor spreading" has received striking confirmation from many and varied investigations and now has moved from the status of hypothesis to theory. This new concept carries sweeping new implications for all parts of earth science and has stimulated a remarkable surge of geologic interest in the wet two thirds of the globe. sosc has responded to this increased interest by expanding its geology section and by consolidating operations of this section during the past year.

The sosc geology section acts as a clearinghouse that inventories and then distributes incoming collections. Careful inventory is an essential part of efficient distribution because it makes each valuable collection available to a wide group of specialists and because it provides each specialist with prompt retrieval of the desired portion of the collections. Incoming collections may consist of sea floor (a) samples, (b) photographs, or (c) information. Operations on these collections consist of (a) receiving, (b) processing or inventorying, and (c) distributing pertinent parts of the collections to appropriate specialists. Despite this burgeoning interest in marine geology, many oceanic rocks sit undescribed on warehouse shelves, others remain uncollected by vessels lacking petrologists to study them, and still others are thrown back over the side when they appear in a biological collection. The aim is to rescue as many of these samples as possible, identify and inventory them, and make them available so that any specialist interested in specific lithologies, locations, minerals, features, or associations can request appropriate material for detailed examination and the increased understanding of the oceanic crust.

Installation of basic petrographic laboratory equipment at sosc, begun in late 1967, was completed during the past year. The lab now contains a diamond-bladed saw for cutting rocks, grinding laps, microscopes for optical examination of the resulting thin-sections, and refer-

ence works to assist identifications. In addition, materials and equipment are available for chemical staining of rock slices and for semiautomatic photomicrography. Basic drafting equipment for mapmaking has been added.

A major catalog of all oceanic rocks has been produced to include all that have been described in the scientific literature. The bibliographic search has located over 200 papers that mention oceanic rocks and these have been abstracted in catalog form so that rocks of a particular region, depth, topographic feature, or lithology can be easily located. Specific mineral groups and lab information (e.g., age determinations, optical data) in the literature may be found through the catalog, which provides a reference for all those interested. The catalog was circulated as a preprint and submitted for publication at the end of the report year. Supplements to the catalog will be added as required.

Two inventory systems have been developed for the rock samples of the USARP program. The first treats the sample as a whole, and the second treats individual specimens. The sample inventory lists the following on a single-page computer readout: (1) sample *numbers*; (2) *location* data, including topographic features (e.g., ridge crest, seamount); (3) *sampling* history; (4) pertinent supplementary data gathered from *bottom photographs* (at sosc) and *seismic reflection profiles* (obtained from Lamont-Doherty Geological Observatory); (5) physical data of sample: *weight*, *number*, and estimated proportion of sample falling into various categories of *rounding*, *size*, and *surface markings*; (6) lithologies of sample: estimated proportions falling into twenty-three broad lithologic categories; (7) *lab work* done on the specimen(s); and (8) *present location* of sample. These data summarize the major features of the whole sample, give some basis for estimation of the proportion of ice-rafted erratics, and place any given specimen into the context of the full sample collected from that locality. This inventory will be distributed as a sample catalog to interested specialists.

The specimen inventory is based on the petrographic examination of individual specimens. It is designed to meet the needs of specialists interested in specific mineralogic, textural, or lithologic features.

In December 1968, a trip was made by various staff members to Lamont-Doherty Geological Observatory in order to obtain seismic profile records and bathymetric data from *Eltanin* for use with bottom photograph and dredge programs. Some knowledge of surrounding topography and underlying sediment thickness is important in assessing the likelihood that rock samples from a particular dredge are ice-rafted erratics or represent true submarine outcrops. Such knowledge is likewise valuable to interpreters of bottom photographs who can, for



instance, apply scale measurements to objects photographed once the interpreters are assured of a nearly horizontal floor at the photo station. These records have now been scanned and the data entered into the sample inventory. For any camera or sampling station the local topography can be categorized and the apparent distance to the nearest steep slope (i.e., nearest source of locally derived rock) can be indicated.

The collection of deep-sea photographs at sosc has passed 12,000 during the past year. Two basic operations are performed with these photographs: (1) routine printing, distribution, and inventory of incoming photographs; and (2) filling of specific requests, utilizing the inventory system for photographs of specific organisms, bottom features, or localities. Requests for bottom photographs during the year have been up fifty percent over the previous year and the total number of prints distributed has nearly doubled. Although the greatest number of orders is in the request category, routine printing takes up a great bulk of processing time. Five custom enlargements are made of each photograph and as many as 7,600 prints have been required for a single *Eltanin* cruise.

The major geological collection received this year is 2,500 pounds of rocks taken by *Eltanin* from 224 localities on her first thirty-two cruises. This collection reached sosc in January 1969. A collection of thirty-three sediment cores from Florida was received in February 1969 from the Coastal Engineering Research Center (CERC) of the Army Engineers. These cores will be followed by additional collections from the Atlantic coast as the CERC research program proceeds. A small collection of rocks taken by USNS *Kane* has been submitted for identification by Dr. Martin Weiss of the Naval Oceanographic Office.

During the year 4,216 negatives have been received from *Eltanin*, 115 from *Glacier*, and 10 from *Hero*. The Lamont tripod camera now in use on *Eltanin* takes repeated frames of the same scene, and not all frames need to be printed; however, a grand total of 4,341 negatives have been received by sosc, a figure that greatly exceeds receipts of previous years.

Distribution of rock specimens has been limited pending completion of the sample inventory of *Eltanin* rocks. The catalog review, however, has been circulated to a list of 200 specialists interested in oceanic rocks and simultaneously has been submitted for publication. A similar catalog lists received copies of the *Eltanin* collection inventory.

Curatorial responsibilities are a fundamental concern to sosc. All specimens are processed and cared for in proven and acceptable ways. It is universally recognized, however, that relatively little is known about the theory and practice of curating marine organisms and that currently acceptable procedures are very likely not the best. Recently, sosc began

an active program of investigating fixatives and preservatives for marine specimens. Dr. H. F. Steedman, histochemist and Working Group 23 member, came from Bath University, England, in July 1968 to establish curatorial experiments at sosc. He returned to sosc in October 1968, in February 1969, and again in May and June 1969. Dr. Steedman has spent more than six months at sosc. A number of plankton collections have been made, and a large assortment of chemicals, supplies, and equipment have been obtained by sosc for Dr. Steedman's experiments.

A series of experiments has been planned to cover all possible aspects of zooplankton preservation. The series includes about forty separate experiments. The progression of the work has depended on a supply of plankton collected expressly for this project. Some twenty-five liters of concentrated zooplankton are needed for a single array of experiments. The quantity of plankton obtained by April 1969 was sufficient for four of the series.

Formerly at the Smithsonian as a graduate student at George Washington University working with Dr. Thomas Bowman of the National Museum of Natural History, Dr. John McCain joined the permanent staff of the Sorting Center 1 March 1969. As his first assignment, Dr. McCain continued to make collections on the National Science Foundation Antarctic vessel *Hero* during March 1969. Formerly on the staff of the Oregon State University Marine Laboratory at Newport, he will be assistant supervisor for Benthic Invertebrates.

sosc has provided sorted specimens to 322 specialists, who represent 141 institutions or agencies in 32 states and territories of the United States and 26 foreign countries. The Center has received 478 collections from 83 sources.

During the past year, sosc has sorted 2,871,448 specimens and has distributed 771,014 specimens in 405 shipments. The total number of specimens sorted by sosc since 1963 exceeds 20 million; over 7 million specimens have been distributed in 2,159 shipments. In addition to shipments of specimens, sosc has dispatched nearly 300 support shipments consisting of supplies and collecting gear for expeditions, cruise reports, data summaries, and charts.

Members of the sosc staff have participated in six cruises and expeditions and have attended six scientific meetings. Since 1963, sosc personnel have participated in thirty-six cruises and expeditions, with an involved time of 1,682 man days. sosc has filled the part of director of the Mediterranean Marine Sorting Center, Salammbô, Tunisia, since its beginning in November 1966. Scientific meetings have drawn sosc staff on 33 occasions, with a participation time of 207 man days. Fifty-

four other trips, for consultation, correction of records, and visits to museums have required 464 man-days. Thus, sosc personnel have spent nearly nine man years away from the Center.

A major source of supplies and equipment for sosc has been United States government excess property. This source is unpredictable but a variety of useful items has been obtained. In many cases useful material has been transferred to other sections of the Smithsonian Institution. Since 1963, sosc has obtained excess property valued at over \$500,000. Most of this has been used by the Center, but about ten percent has been transferred for use elsewhere in the Institution.

sosc has received more than one hundred visitors from various parts of the United States and from several foreign countries.

## MEDITERRANEAN MARINE SORTING CENTER

The staff of mmsc consists of twenty-nine persons and all but two are Tunisians. The professional and technical staff consists of four supervisors, three assistant supervisors, and fifteen technicians. The administrative staff consists of six persons.

During the past year mmsc has utilized the services of consultants from thirteen countries (Yugoslavia, Algeria, Malta, Canada, England, Italy, United States, Switzerland, France, Libya, Lebanon, Cyprus, and Austria) in the training of the scientific staff and in mmsc activities. Mme J. H. Heldt of Tunisia has served as consultant to the Plankton Division during the first four months.

Several consultants to mmsc have lectured in the Faculty of Sciences of the University of Tunis. mmsc also has cooperated in the Third Cycle Program in Oceanography of the Faculty of Sciences.

During the period covered by this report, mmsc has received 27 collections including 981 samples from ten countries including Cyprus, France, Greece, Italy, Libya, Malta, Morocco, Tunisia, Turkey, and Yugoslavia. The type and source of the collections received are as follows:

Plankton (6 collections including 194 samples)

24 samples from Italy (N. Della Croce, University of Genoa)

29 samples from Greece (V. Kiortsis, University of Athens)

79 samples from Cyprus (A. Demetropoulos, Fisheries Department)

18 samples from Yugoslavia (collected by mmsc during training cruise)

21 samples from Greece (V. Kiortsis, University of Athens),

24 samples from the open Mediterranean (collected by J. Stirn on *Atlantis II*)

The Benthos Division has received a total of twelve collections, three for the Macrobenthos Section and nine for the Meiobenthos Section, totaling 283 samples.

## Macrobenthos Section

93 samples from Yugoslavia

## Meiobenthos Section

- 6 samples from Malta (H. Micallef, Royal University of Malta)
- 3 samples from Morocco (collected by MMSC personnel)
- 7 samples from Italy (G. Bonaduce, Naples Zoological Station)
- 60 samples from Italy (G. Fierro, University of Genoa)
- 9 samples from Yugoslavia (collected by MMSC personnel)
- 107 samples INSTOP and MMSC collections and France (P. Vitiello, Endoume Marin Station)

## Fish Division (4 collections)

- 311 samples from Libya (J. Norris, Tobruk)
- 101 samples from Yugoslavia (collected by MMSC personnel)
- 116 samples from Yugoslavia (Institute of Sea Research, Portoroz)
- 47 samples from Tunisia (INSTOP)

## Algae Division (5 collections)

- 106 samples from Turkey (N. Zeybek, University of Ege)
- 1 sample from Morocco (collected by MMSC personnel)
- 7 samples from Yugoslavia (Institute Sea Research, Portoroz)
- 1 sample from Tunisia (INSTOP)
- 63 samples from Italy (collected by MMSC personnel)

During the period covered by this report, sorting has been completed of 31 collections and 2,186 samples. From these, 1,427,312 specimens have been sorted. By Division, the sorting is as follows:

	<i>Collections</i>	<i>Samples</i>	<i>Specimens</i>
Plankton	6	195	897, 098
Macrobenthos	8	1, 388	46, 597
Meiobenthos	6	69	472, 223
Fish	4	311	811
Algae	7	223	10, 583

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Totals	31	2, 186	1, 427, 312
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MMSC has shipped 1,057,641 sorted specimens to collectors, specialists, and museums during the year. By Division, the number of specimens shipped is as follows:

Plankton	863, 379
Benthos	193, 012
Macrobenthos	10, 576
Meiobenthos	182, 436
Algae	873
Fish	337



Museum collections were sent to:

	<i>Specimens</i>
Tunisian Oceanographic Institute	420
The Paris Museum of Natural History	130
U.S. National Museum of Natural History	6, 333
The American Cooperative School in Tunis	42

A total of sixteen specialists in eight different countries have received specimens from MMSC for study. The countries include Great Britain, Switzerland, France, Canada, United States, Denmark, and Italy. Five collectors have received specimens sent to MMSC for sorting.

In addition to sorted specimens sent for study, a total of 153 samples of plankton residue and 15 samples of sediment have been sent by MMSC.

MMSC formally has received 26 requests for 27 taxa during the past year. All of the requests have been approved by the appropriate Specialist Advisory Committees for MMSC. Sixteen specialists have received 17 taxa for study. The remaining requests will be fulfilled when specimens become available. At the present time, about 15 additional requests are expected or are in the process of being evaluated by Specialist Advisory Committees.

During the year, the staff of MMSC has visited institutions, laboratories, and government officials in Algeria, France, Italy, Libya, Monaco, Morocco, United States, and Yugoslavia.

Scientific meetings and courses attended by MMSC personnel include the Third European Symposium on Marine Biology, a meeting on Plankton Indicators in the Mediterranean, the International Commission for the Scientific Exploration of the Mediterranean Sea, and a Course in Marine Algae in Sicily.

Four MMSC staff members have participated in a training cruise in the Adriatic Sea. The primary objective has been to study methods of collecting, processing, and preserving specimens in the field.

A cooperative program between Mohammed V University, Rabat, the Institute of Fisheries, Casablanca, and MMSC to survey the marine fauna and flora of Moroccan waters on both sides of the Straits of Gibraltar was begun in June 1969. Dr. Stirn is field project leader for this program, and all of the male scientific staff of MMSC will participate in the two-month survey.

Two new programs—the sorting of fish eggs and larvae and of the stomach contents of fishes—have been initiated on a limited basis.

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## Office of Ecology

I. E. WALLEN, *Acting Head*

THE SMITHSONIAN OFFICE OF ECOLOGY was established in 1965 to assist in expanding the research opportunities of scientists in the National Museum of Natural History, the Smithsonian Tropical Research Institute, the Radiation Biology Laboratory, and the Chesapeake Bay Center for Field Biology, and to aid in the coordination of ecological activities with other United States agencies. During this year, the program has continued to be directed toward major problem areas in ecosystem research. Studies of endangered species, of the biology of natural areas, of principles of vegetation change, and of behavior in populations of wild animals have been emphasized in worldwide investigations. The expanding need for participants in ecological research has led to changes in the assignments of Drs. Helmut K. Buechner and Lee M. Talbot. Dr. Buechner, who has served as head of the Office since its inception, has been appointed a senior scientist in the Office. He will pursue research on the ecology of ungulates with emphasis on African species. Dr. Talbot, who has served as deputy head of the Office and coordinator of International Affairs since May 1968, will conduct research as resident ecologist in the Office. He will continue his interest in Asian and African game preserves and assist Secretary Ripley in liaison with the International Union for the Conservation of Nature and Natural Resources and numerous other international conservation activities.

Requests for advice and consultation on ecological problems have been received from the National Park Service and the Fish and Wildlife Service of the Department of the Interior; the Pacific Science Board, the Environmental Sciences Board, and the Division of Behavioral Sciences of the National Academy of Sciences-National Research Council; the Office of Science and Technology; the Department of Defense; the Department of Agriculture; the Department of State; Congress; and a variety of international organizations including UNESCO, FAO, UNDP, and IBP. The Office has participated in appropriate ways on many of the committees and panels of these groups and



Poplar Island in Talbot County showing the rapidly eroding shoreline.

has worked closely with them in the development of cooperative international projects.

During the year Dr. Buechner has continued to serve as an observer on the Federal Council for Science and Technology Committee on Environmental Quality, which has been in existence since 1967. This committee has facilitated communications between federal agencies on activities concerned with the environment, concentrating primarily on problems of pollution. The committee is expected to continue to function and will complement the President's newly created Environmental Quality Council.

Most ecological research and theory has been based on the North Temperate Zones of Europe and North America. With the rapid increases in human population, technology, and consequent development activities, an increasingly urgent need exists for basic and applied research on ecosystems in all parts of the world.

Concern has been expressed for information about the quality of the environment and for the development of sufficient ecological data



for American and international projects. An objective of the Office is to develop and facilitate research in ecosystem science to meet these needs. An associated objective is the provision of appropriate research-related training opportunities.

One of the primary responsibilities of the Office of Ecology has been to develop meaningful research opportunities for Smithsonian affiliated scientists. Ecosystem research requires integrated studies involving a number of disciplines, and cooperative and collaborative programs have been emphasized with appropriate institutions and individuals from the United States, from the host nation, and from other countries and international agencies.

During this period, primary attention has been devoted to the development of research programs in Ceylon, India, Tunisia, Indonesia, and the Mekong Basin. Attention also has been given, however, to exploration and development of research opportunities in Poland, Morocco, and Brazil.

## RESEARCH ACTIVITIES

In considering the conservation of nature and natural resources, the Office focuses the attention and capabilities of the Smithsonian on environmental problems such as the prediction of the consequences of environmental modifications, pollution, and the establishment of parks and reserves. A close working relationship has been maintained and strengthened with the various organizations concerned with international conservation, including the International Union for Conservation of Nature and Natural Resources (IUCN), the International Council for Bird preservation, the Fauna Preservation Society, the Conservation Foundation, the World Wildlife Fund, the International Biological Program (IBP), and the Pacific Science Association. Scientists of the Smithsonian have participated actively in the works of the IUCN Commissions, including the International Commissions on Ecology, National Parks, Survival Services, and Education. Dr. Talbot assists the conservation work of the IBP, collaborating with E. M. Nicholson, convener of the Terrestrial Conservation Section, in the establishment of a worldwide network of research preserves and in developing international cooperation toward the scientific conservation of natural resources.

In connection with the Smithsonian's contribution to the IBP, Lee Talbot and Raymond Fosberg have participated in the IBP Pacific Islands Conservation Program. This program includes an inventory of Pacific islands or parts of islands which, because they have been relatively uninfluenced by human activity and contain unique flora and



The forest of Chestnut Oak (*Quercus prinus*) on Fox Point. This forest has been little disturbed down through the history of human occupation.

fauna, require protection as rare scientific resources; an evaluation of the conservation requirements of these areas; and consequent preparation of recommendations on island protection and associated conservation problems. At a meeting in November 1968 in the Palau Islands and Guam, data were assembled and the resultant inventory, descriptions, and recommendations are currently in press. Talbot continued these discussions at the Pacific Science Association Intercongress meeting in Malaya in May 1969. In response to another request for assistance in conservation in the Asia Pacific region, Dr. Talbot helped develop and conduct, in March 1969, an international conservation conference in Hong Kong, which addressed itself to environmental problems induced by increasing organization.

Assistance has been given to the Office of Science and Technology in American preparations for the UNESCO International Conference on the Scientific Basis for Rational Use and Conservation of the Resources of the Biosphere. In Paris, in September 1968, Dr. Talbot represented the Smithsonian in the United States delegation to the conference.

Arrangements were made with the Oliver Foundation, the Smithsonian Excess Currency Program, UNESCO, and the IUCN for Mr.

Wayne A. Mills to spend six months in Asia, starting in June 1969, serving as the IUCN Regional Representative and coordinating Smithsonian support of the 11th Technical Meeting and the 10th General Assembly of the IUCN, which was held in New Delhi 24 November–1 December 1969. Mr. Mills collected and distributed research data pertinent to the discussions and field studies.

Dr. Buechner completed preparations for a project that was launched in the summer of 1969 to explore the feasibility of using satellites to track free-ranging animals and obtain physiological data. Elk were instrumented in the Jackson Hole area of Wyoming and will be followed for about one year, using the Nimbus B-2 satellite system. Frequent ground observations will verify locations and transmit observations of behavior. The experiments will provide a basis for testing the satellite tracking technique while at the same time producing useful information on the behavior of elk in relation to weather, seasonal changes, migration stimuli, herd composition, habitat requirements, and range condition.

Dr. F. S. L. Williamson, director of the Chesapeake Bay Center for Field Biology, visited Poland in November 1968 to examine IBP field sites and stations where research parallel to that planned for the Bay Center is being conducted and to explore the possibilities of collaboration. On his return he stopped over in Great Britain to tour Oxford University's Wytham Woods Station with Charles Elton. In July and August of 1968, Mr. Elton visited Belém, Brazil, as a Smithsonian Fellow to study certain aspects of the population density and species diversity of the rain-forest fauna. Results of the study are being compared with data from Wytham Woods, which he has studied intensively for more than twenty years.

Dr. Williamson also has made two field trips to Alaska in connection with studies of the species composition, population density, ecological and geographic distribution, breeding biology, and feeding ecology of the birds of Amchitka Island. The Office has provided assistance to Dr. Stanwyn Shetler, Department of Botany, for a survey trip to Alaska in connection with a planned study of pollination systems in the Arctic.

Through a contract with the Air Force Office of Scientific Research, support has been given to a series of studies on various aspects of ecology. Twelve scientists have participated in the program, seven of whom have conducted their research at the Smithsonian's Barro Colorado Island in Panama. Dr. Juan Delius of the University of California at San Diego has visited Barro Colorado Island to record observations on the behavior of various neotropical primates.

Dr. Thomas Eisner of Cornell University has investigated a variety of insects and other invertebrates known to produce defensive secre-





The shoreline of Cheston Peninsula seen across the waters of the Rhode River. The conspicuous stand of Loblolly Pines (*Pinus Taeda*) was planted in 1933.

tions. Efforts have been made to gather secretions in amounts sufficient for subsequent chemical analysis at Cornell, and experiments have been set up in both the field and laboratory aimed at determining the effectiveness of the materials. The animals studied include onychophora, opilionina (Gonyleptidae), tenebrionid and scarabaeid beetles, heliconiid butterflies, and ozaenine beetles. Dr. Robert Enders of Swarthmore College has studied the rate of erosion in a drainage basin on the island to obtain final data for a proposed publication on 40 years of changes in the mammalian fauna and ecology of Barro Colorado. Mr. Douglas Futuyma of the University of Chicago has assessed the potential of Barro Colorado Island and neighboring environments for studies of the magnitude and periodicity of fluctuations in arthropod populations.

Dr. John D. McCrone of the University of Florida has worked with the Smithsonian Tropical Research Institute's Dr. Michael Robinson on various aspects of the pre-capturing behavior of the spiders *Argiope argentata* and *Nephila claripes*. A brief survey tour to examine the opportunities for research on the species diversity of amphibians in Panama has been made by Dr. Eric R. Pianka of Princeton University. Dr. Herbert Rosenberg of Cornell University has conducted a preliminary study on certain aspects of the predator-prey relationships of various arthropods.

Support has been given for Dr. James Peters of the Reptile Department to visit several of the larger collections of reptiles in Latin America and examine their holotypes. Mr. Timothy C. Williams of



Rockefeller University has been assisted in his study of the nocturnal behavior of bats. Support has been provided for Dr. Ernest J. Huggins of South Dakota State University to study the zoogeographical relationships of South American fishes as indicated by their parasites. Dr. Ke Chung Kim of Pennsylvania State University has visited the Pribilof Islands to conduct research on the ectoparasites of the northern fur seal.

In cooperation with IBP, support has been provided for Dr. Donald W. Rennie of the State University of New York at Buffalo to conduct research on the physical fitness, work capacity, and respiratory functions of Eskimos in Wainwright, Alaska. The study has been coordinated with a multidisciplinary investigation of health, child growth, genetics, and ecology of Eskimos under the direction of Drs. Frederick Milan and William S. Laughlin of the Department of Anthropology, University of Wisconsin. With the support of the Office, Mr. Nicholas Smythe, a student of the National Zoological Park's Dr. John Eisenberg, has conducted field research on the behavior and ecology of the caviomorph rodent *Dolichotis patagonum* in Argentina. Assistance has been provided for Dr. Cleofé E. Calderon to collaborate with Dr. Thomas S. Soderstrom of the Botany Department in an interdisciplinary study of the insect pollination of rain-forest grasses.

## *Korea*

The preliminary phase of a program of ecological studies in Korea, sponsored by the Smithsonian Institution and the Air Force Office of Scientific Research, drew to a close in September 1968. A general description of the vegetation, animal life, soils, physiography, and climate of the study area, which is just south of the Demilitarized Zone and contiguous with it, has been completed. The reports of individual research projects, conducted over a period of two years by thirteen Korean scientists and their twenty-one student assistants, have also been received. A five-year plan has been developed that calls for the establishment of a Korean Center for Environmental Studies to advance, through research and education, the understanding of the ecological systems within this developing country.

## *Ceylon*

Smithsonian studies of the ecology and ethology of elephants in Ceylon have continued with Dr. Fred Kurt concentrating in Ruhunu (Yala) National Park and Mr. George McKay surveying the adjacent areas of Lahugala and Gal Oya National Park. In Ruhunu, comparative studies

are underway on the population dynamics of elephants and their potential competitors for food and living space (buffalo, sambar deer, axis deer, and wild swine). Research on the role of waterholes, which serve as a focus for inter- and intraspecific competition, with reference to the ecology and behavior of elephants and ungulates, is also in progress at this site.

In the Gal Oya Valley, the study includes the catchment area of Senanayake Samudra and totals 720 square miles, most of which is forest savanna and monsoonal forest with an estimated elephant population of 300 to 330. Research emphasis at this site is on food habits and patterns of movement.

In late June of 1968 Dr. John F. Eisenberg and family began an eleven-month residence in Ceylon. His primary research effort has been directed toward the third and last national park that has not been surveyed by the team. This park, named Wilpattu, has presented some difficulty. Since it is densely forested, direct observation is somewhat impeded. Nevertheless, the study of the area has provided valuable comparative data concerning the land-use patterns of the elephant. Refinement of field-censusing techniques has been an early objective. The final census information on the numbers of each age and sex class will be combined with estimates of abundance in different habitats to delineate such population parameters as the reproductive state of the population, the density of habitat usage, and the degree of competition with other species.

Two supplementary studies were initiated in August 1968. The first involved Mr. A. P. W. Nettasinge in a survey of the elephant population in the Maheveli Ganga basin northeast of Polonnaruwa. The second study required the participation of Drs. J. B. Jayasinghe and Jainudeen of the faculty of Veterinary Medicine, University of Ceylon, Peradeniya. Together with Dr. Eisenberg, they have attempted to breed domestic elephants in order to determine such basic physiological data as periodicity of oestrus, duration of oestrus, physiological manifestations of oestrus, and sexual behavior patterns of the male and female. The experiment has never been scientifically conducted in Ceylon. Two female elephants were successfully bred with one male during December 1968, January and February 1969, and a preliminary review of the data obtained seems to indicate that the basic structure of the elephant reproductive cycle has been worked out for the first time. Further tests are urgently needed as well as laboratory tests on the hormonal content of the blood in pregnant, nonpregnant, and oestrus females.

In collaboration with the team of zoologists, Dr. Dieter Mueller-Dombois, a botanist and plant ecologist, also supported by a Smithsonian PL 480 grant, has led his team in the continuation of its studies. A



Muddy Creek, the principal freshwater source to the estuary as it flows between Corn Island (distant) and Fox Point (foreground).

vegetation map of Ruhuna has been prepared. The scale (1:31,680) allows for distinguishing several herbaceous physiognomic types, a fact that has provided a meaningful frame of reference for the animal studies. An access-systems map is also being prepared. This map will show the roads and trails, artificial waterholes and dikes, major rock outcrops, lagoons, and sample plot locations of the plant, ecological, and animal activity surveys. If suitable data are obtained, they will also show the elephant's specific home ranges.

A major environmental influence on the vegetation of the park is the large animals—elephant, buffalo, axis deer, sambar deer, and wild boar. Conversely, the vegetation types are expected to exert an influence on the daily and seasonal distribution of the animals. To explore these relationships, a new method to assess the animal activity patterns is being developed and tested. Dr. Mueller-Dombois, in addition to help with the identification of plants used as food by the animals, is studying the rate and pattern of grass recovery in areas grazed by telephants in an attempt to gauge the carrying capacity of the nonwoody vegetation.

In addition to these studies, a preliminary investigation of the relationships between man and domestic elephants has been continued by Dr. Eisenberg and Dr. Suzanne Ripley. The purpose of this project has been to lay the groundwork for intensive study of the interspecific social adaptation of man and tame elephants in Ceylon. Major orientations of the investigation are: (1) to relate knowledge about the ecology and behavior of wild elephants to the taming transitions and human society, and (2) to relate the above to the sociocultural roles of elephants at present and in historical perspective in Ceylon within the general context of South Asia. Present emphasis is on the collation of the results of interviews with owners of tame elephants and with mahouts and the initiation of a bibliographic search in connection with the historical dimension of the study.

Under the direction of Eisenberg and Ripley, studies on the ecology and behavior of the Ceylonese primates has continued. The ultimate objective of this program is to determine the modes of exploitation of the environment by the different species and races of primates by relating data on ecology, sociology, energy budget, and form and function to relevant variations in the environment. In order to set up comparisons based on habitat differences, some basic knowledge of climatic and vegetational variations must be assumed, and in this connection, Dr. Mueller-Dombois and his associates have provided valuable assistance. With the results of their work on climate, vegetation, and soils in Ruhunu National Park, it has been possible to launch comparative, intraspecific studies now in progress on *Perslytis entellus* (common langur). Special problems have been raised since the early 1960s regarding the population dynamics of this species in India, especially with reference to habitat richness, population density, group size and composition, and the role of aggression in spacing. It is anticipated that data from the Smithsonian project will prove to be helpful.

## India

During the year, the Office has developed two research projects in India, both based on reserves and both in collaboration with Indian institutions.

The Gir Forest project is a comprehensive series of interdisciplinary studies on the indigenous flora and fauna, the human inhabitants and their livestock, and various associated environmental factors. The Gir Forest is a surviving relic of an environment that formerly existed over much of that part of the Indian subcontinent, and it offers unique op-





This field on Java Farm was previously a pasture, but was abandoned twenty-five years ago. Such fields are undergoing rapid changes in plant and animal composition and are a valuable research asset.

portunities for research. Following up earlier work there, Dr. Lee M. Talbot visited the area in November 1968 and secured Indian institutional approval and sponsorship for development of a research center in the Gir and a research program based on it.

With Dr. Talbot serving as project coordinator, field activity during the year has been conducted by Paul W. Joslin on the social behavior of the Asiatic lion (*Panthera leo persica*), a species whose range once extended through the Middle East and much of the Indian sub-continent but today is found only in the Gir. Fewer than 175 of the animals are alive today, and the influence of cattle on the area is rapidly decreasing the lion's habitat. K. T. B. Hodd, a botanist, is conducting vegetation studies designed to discover the causes of vegetation deterioration. Grazing intensity is being monitored and studied through the use of enclosures and experimental control plots. These studies will produce broad conclusions applicable to the management and conservation of the area.

Professor Ramdeo Misra, head of the Department of Botany at Benares Hindu University, one of the leading centers for plant ecology in India, has visited the Smithsonian and other institutions in the United

States to discuss the possibilities for cooperative IBP research projects in his country. As a result of this visit a cooperative ecological research program has been developed with Dr. Frank B. Golley, executive director of the Institute of Ecology, University of Georgia. The project involves study of the productivity and mineral cycling of deciduous forest, grassland, and cropland in the Chakia District of India. In March 1969 on behalf of the Smithsonian, Dr. Golley visited the research area in India for further planning for the project.

Following completion of his work on the Smithsonian Elephant Project in Ceylon, Dr. Fred Kurt made a one-month research visit to India to obtain comparative data on the elephants of Mysore Province.

### *Tunisia*

Development has been continued of a long-term research program involving a pre-Saharan ecological research station in southern Tunisia. Desertization is a key environmental problem in this area, with a loss of lands and of productivity for humans, a loss of flora, fauna and habitat, and associated problems of use, management, and conservation of natural resources in general.

During the year, Dr. Talbot has made two visits to the area to complete research plans with representatives of the Tunisian government, FAO, UNESCO, the French National Center for Scientific Research, and the United Nations Development Fund (UNDF). Approval of the plan has been given by the Tunisian authorities and a request made to the UNDF. Research has been started by French scientists, and, in April 1969, Dr. Thomas Soderstrom made a survey trip, resulting in the development of a plan for research on grasses.

### *East Africa*

On behalf of the Office, Dr. Walter Leuthold has conducted a study of the most suitable areas in East Africa for ecological and behavioral studies of individual species of ungulates, particularly those on which little or no ecological research has been conducted to date. Dr. Leuthold's final report was submitted in August 1968. Current information is given on the game areas of Kenya, on research carried out in the past, and on that which is at present under way. Summaries are included of the programs of existing research institutions.

## *Morocco*

Arrangements have been made for Dr. Wallace Ernst, associate curator in the Department of Botany, and Dr. Robert Ornduff of the University of California in Berkeley to visit Morocco to investigate the possibilities for collaborative ecological research.

## *Pakistan*

In November 1968 Dr. Talbot visited Pakistan to explore possibilities for collaborative research and to identify personnel and procedures. A research project has been developed on the ecology of the wild boar (*Sus scrofa cristatus*) of West Pakistan, a species of ecological and economic interest because of the damage it does to agricultural crops. Dr. M. I. R. Khan, director of the Pakistan Forest Research Institute, and Professor R. D. Tabor of the University of Washington will conduct the research.

## *Mekong Basin*

One of the world's largest river basin programs is being studied for development in the four riparian countries of the lower Mekong Basin: Laos, Cambodia, Thailand, and Vietnam. Nearly thirty countries and a variety of international organizations are cooperating on a program that eventually will involve a series of main river dams, plus more than twenty tributary dams, with vast irrigation projects and power plants. To date virtually all the feasibility studies and preconstruction research has involved engineering and economics, to the exclusion of considerations of sociological and ecological consequences. Under arrangements made with the Southeast Asia Development Advisory Group (SEADAG), Smithsonian ecologists Raymond Fosberg, David Challinor, and Lee Talbot, assisted by Dr. Richard van Cleve of the University of Washington, made an ecological survey of selected areas of the Mekong during the summer of 1969 to identify and plan the longer-term research needed to predict the consequences of the dam construction and irrigation projects. The survey will identify and develop a description of needed research projects.

## *Indonesia*

In response to a request from the National Academy of Sciences, the Office has assisted United States AID and Indonesian authorities in the

development of plans for a Southeast Asian Regional Study Center for Biological Research and Training (BIOTROPE) to be located in Indonesia. The plan, approved by Southeast Asian authorities, calls for initial projects involving ecological research on coral reefs, man-made lakes, and tropical forests. It is in part an extension of prior research in Indonesia carried out by Fosberg and Talbot.

## CHESAPEAKE BAY CENTER FOR FIELD BIOLOGY

Under the direction of Dr. Francis S. L. Williamson, the Chesapeake Bay Center for Field Biology (CBCFB) has accelerated its program and progress in close cooperation with the Johns Hopkins University and the University of Maryland. Some major administrative accomplishments have been the restructuring of the Articles of Operation and their ratification by the Scientific Advisory Committee. This document, together with newly developed and appropriate forms for the use of facilities, a fee schedule, and a format for research proposals, should aid in the proper functioning of the Center. The Scientific Advisory Committee has been enlarged by the addition of members from Duke, North Carolina State, and Cornell universities. These members increase the scientific scope of this important body, which is central to scientific programming at the Center.

One of the objectives of the Center is to plan for the protection, improvement, and establishment of sound practices in soil conservation and land management of the Center and its watershed. In accordance with this objective the Center has entered into a conservation agreement with the Anne Arundel Soil Conservation District, and a lease has been developed for the farming of its agricultural lands. To further this objective, Dr. Williamson has become a member of the Anne Arundel County Committee for the Maryland Environmental Trust, and the Mayo Civic Association. Other land-management plans are in active progress.

The renovation of one level of the main laboratory and office building has been completed, and the first two laboratory cubicles have been constructed on the lower level. A detailed proposal for facilities developed has been prepared, and this document currently serves as the guideline for continuing construction.

### *Research*

The major emphasis of research at the Center has been in studies of the adjacent estuary (Rhode River), terrestrial situations, diseases of



plants and animals, archeological findings, and the history of land use.

**ESTUARINE STUDIES.** Measurements have been made of physical parameters and of the populations of organisms occupying different trophic levels in the estuary.

Dr. Charles H. Southwick of Johns Hopkins University has continued his monthly measurements of temperature, salinity, light penetration, pH, conductivity, dissolved oxygen, and nutrients such as ammonia-, nitrate-, and nitrite-nitrogen, polyphosphates, orthophosphates, and total phosphates. The results of these measurements have revealed that while the Rhode River has been generally in a healthy condition and had normal nutrient levels in July and August 1968, an increase in ammonia nitrogen and phosphates occurred in September 1968. When compared with September 1968 samples taken in the Back River estuary, one mile below the outfall of effluents from the Baltimore sewage treatment plant, ammonia nitrogen level in the Rhode River was higher: 1.3 ppm as opposed to 0.8 ppm. The fact that 2 ppm of this nutrient may indicate a detrimental water quality condition points to the need for studies of the land-water interface and of the movements of materials of diverse sorts into the estuary. The principal contrasting types of land-use—rural versus heavily urbanized—that characterize the opposite shores of the estuary, encourage this important comparison.

The nutrients in the estuary support the lowest trophic level in that ecosystem—the plankton—now under study by Drs. William D. McElroy, Howard H. Seliger, and William G. Fastie of Johns Hopkins University. An intensive, long-term investigation of primary production began in late winter when sampling revealed very low levels of phytoplankton and only moderate levels of zooplankton. Studies of seasonal succession are under way, together with bioluminescence, which was first detected in June 1968. The night and day patterns of intensities of bioluminescence may provide an index of primary productivity although, due to faunal diversity, the system in this estuary is a very complex one.

Monitoring of fish populations has continued under the direction of Dr. Southwick. Sampling at three Rhode River localities (Fox, Sellman, and Muddy Creeks) has been done with nylon graded-mesh gill nets. Netting in August and September 1968 revealed dense populations of *Alosa sapidissima*, *Pomatomous saltatrix*, *Leiostomus xanthurus*, and *Fundulus* species. The results of sampling at the Center are being compared with those from other estuaries with adjacent land areas differently utilized and whose characteristics of water quality and plankton biota may differ. These comparative areas include the highly eutrophic Back River. Three studies of estuarine birds, the Osprey, the Whistling Swan, and waterfowl populations are also under investigation.

Dr. George E. Watson and Mr. Jan Reese of the Smithsonian Institution have completed a three-year study of the productivity of breeding Ospreys (*Pandion haliaetus*) at Poplar Island, that portion of the Center in Talbot County, Maryland, on the eastern shore of the Chesapeake Bay. This cosmopolitan species is dwindling in numbers, and, in North America, has almost disappeared from some northern areas. Unsuccessful reproduction and the encroachment by man upon the nesting areas are factors influencing this decline. The Ospreys on Poplar Island, a part of one of the largest colonies along the east coast, have averaged thirty nests per year for three years. The birds prefer standing dead trees for nest sites, but their availability has decreased due to loss by shore erosion, and the birds have been forced to nest on lower sites. Although other Osprey populations have reproductive rates too low for normal annual recruitment, this colony is now producing about one fledgling per active nest. This number is about three times the rate in Connecticut, where few eggs now hatch. Pesticides, particularly chlorinated hydrocarbons such as DDT, are strongly indicated as the cause of the general decline in breeding success; for example, Connecticut birds have five to ten times more pesticide residues in their body tissues than the Maryland birds. Eggs taken from Connecticut nests have produced few young when placed in Maryland nests although a reverse switching has produced normal numbers of young in Connecticut.

Studies of the Whistling Swan (*Olor columbianus*) at the Center, on the eastern shore of Chesapeake Bay, and on their northern breeding grounds were begun in 1967 by Dr. William J. L. Sladen of Johns Hopkins University and are continuing as a major project. Over half of the North American population of these birds, in excess of 50,000, winter in the bay, and annual counts indicate that their numbers are increasing. The objectives of the study, local and long-distance movements, feeding ecology, social behavior, and diseases are being achieved by observations of both unmarked and conspicuously dyed birds, tracking of birds carrying small transmitters, and autopsies of diseased birds (see below). The results of this study include evidence of fidelity to precise wintering areas between years, the exact nature of local, premigratory movements, and—through observations of color-marked birds in Pennsylvania, New York, Wisconsin, North Dakota, Ontario, Manitoba, Saskatchewan, and on the breeding grounds in the Northwest Territories—the timing, course, and altitude of long-distance flights. Thus, by utilizing the techniques of conspicuous dyeing and biotelemetry, this swan is proving to be an ideal model for migratory studies of waterfowl. These studies shed much light on the hazards posed by these birds to commercial aircraft and on their important role in the ecology of the local estuarine ecosystem.

The cooperation of neighbors in permitting the Center to purchase rights to shooting blinds along the shoreline of their respective properties again has provided a twelve-mile sanctuary for wintering waterfowl. Mr. John Moore of the Baltimore Zoological Society has conducted a banding program on Fox Point and other localities, thus providing information on composition of the wintering duck population: at Fox Point approximately 300 Lesser Scaup (*Aythya affinis*), 16 Ruddy Ducks (*Oxyura jamaicensis*), and 18 Canvasbacks (*Aythya valisineria*). Four pairs of Ring-necked Ducks (*Aythya collaris*) have been collected for the Baltimore Zoological Society collection. The Ruddy Duck is especially abundant as is the Mallard (*Anas platyrhynchos*), but the number of Canvasbacks is down from those seen in previous years.

**TERRESTRIAL STUDIES.** Investigations in the land areas adjacent to the estuary have centered around vertebrate populations, especially birds and rodents, although studies of the flora are continuing.

New additions to the vascular flora of the Center have been made by Mr. Daniel Higman, staff botanist, and collections have been begun on the Star Company land (south of Java Farm). This interesting property includes an extensive freshwater marsh containing a plant community unlike any other at the Center. Collections from this marsh are being studied. Ten additional vascular plants have been identified, bringing the total for the Center to 568 species.

The Center, with its mosaic of vegetation types, is ideally suited for the studies of avian populations being conducted by Dr. Williamson. The goals are the gathering of data on species composition, density, breeding biology, the spatial and temporal structuring of populations, and their interrelationships. The initial study area of seventy-five acres, located in mature deciduous woodland, contains four rows of eleven mist nets each, spaced at 50-meter intervals. The rows are 100 meters apart. The marking and releasing of over 500 breeding birds, combined with censuses of singing males, has provided the basic data. Forty-two species of birds have been recorded in the climax forest during the reproductive season, and the numbers and distribution of breeding pairs have been recorded. In addition to their intrinsic ecological interest, these results provide baseline data of considerable value for long-term study of the effects of varying patterns of land use in adjacent areas—including the use of diverse chemicals—on the large avian populations that comprise an important trophic level in the forest ecosystem, essentially that of anthropod predators.

Studies of the foraging ecology of the most abundant and important insectivorous bird at the Center, the Red-eyed Vireo (*Vireo olivaceus*), have been completed by Mrs. Penny Williamson of Johns Hopkins University. Observations of this species at the Patuxent Wildlife Research



Center and the CBCFB, have revealed a spatial dichotomy in the foraging areas of the structurally similar sexes, with only about a 35 percent overlap. The males forage higher than the females, and particular, non-random sequences of movements are employed to maintain this separation. Thus, the small territory (1.3–1.7 acres) of this extremely abundant species can be seen to actually consist of a cylinder extending from the forest canopy to the low understory. One associated vireo (*V. griseus*) is generally separated from *V. olivaceus* by habitat, and another, *V. flavifrons*, overlaps in habitat and behavior but possesses structural differences indicating different prey preferences. Other foliage-gleaning insectivorous birds occupying the same forests have been included in the study, and have been found to possess their own particular foraging ecology (niche exploitation patterns). This type of study is basic to an understanding of the use of space by primary and secondary consumers and the functioning of the forest ecosystem.

The studies of Dr. Southwick on population dynamics of the White-footed Mouse (*Peromyscus leucopus*), on a 17-acre island in the estuary, are now in the third year. Population size and age composition of this population have proven unstable. The numbers declined markedly in 1967 but rose sharply in 1968. This long-term study of population fluctuations of a small rodent, confined in areal space, is now complicated by the recent discovery on the island of the House Mouse (*Mus musculus*) and the Rice Rat (*Oryzomys palustris*).

**DISEASE STUDIES.** The work of several investigators has been concerned with the role of diseases in affecting the welfare of plant and animal populations. Diseases of infinite variety, involving intricate host-parasite relationships, are a significant part of the biology of virtually every organism, and yet their function in the regulation of numbers, through either proximate or ultimate effects, remains with few exceptions essentially unknown.

A long-term study of poxvirus disease in the Starling (*Sturnus vulgaris*) at the Center and in nearby Pennsylvania has been completed, at least in its broad aspects, by Dr. Williamson. In the field, data gathered on the prevalence of the disease during three consecutive epizootics have revealed that greater than 50 percent of the population (regardless of sex or age) may be infected at one time, coincident with the gathering of the birds into the communal roosts of winter. These roosts are formed during that period of the year when environmental conditions (snow, low temperature) are most unfavorable for the birds. It is believed that transmission occurs via direct contact between individuals and that the virus enters through injured skin surfaces or intact mucosa. Indirect evidence of mortality under natural conditions has been obtained. In birds experimentally inoculated intradermally there



is a incubation period of about seven days following which the disease manifests itself by the production of caseous, proliferating lesions. The appearance of the lesions is preceded by multiplication of the virus in the liver, lungs, and spleen where there are associated histopathological changes. This disseminating form of pathogenesis has not been previously described in poxvirus diseases of birds. The course of the disease is three to five weeks. The disease kills some Starling under experimental conditions and this fact, coupled with the indirect evidence of mortality in those naturally infected, indicates the possible importance of this infection in the welfare of Starling populations. Mr. C. John Ralph, a predoctoral student, will continue experimentation with this disease.

A study of the incidence of blood parasites in birds of the deciduous forest by Dr. Paul E. M. Fine, University of Pennsylvania, School of Veterinary Medicine, has resulted in valuable baseline data for more detailed investigations. Blood smears have been taken from 353 birds (42 species), and 182 infections in 129 birds (36.5 percent) have been disclosed. Eighteen infections are confirmed as *Plasmodium*, 64 are either *Haemaproteus* or *Plasmodium*, 31 are *Haemaproteus*, 15 were *Leucocytozoon*, 35 are *Trypanosoma*, and 19 are *Lankesterella*. Forty-five of 60 Red-eyed Vireos (75 percent) have been infected with one or more species of parasites, and multiple infections are common. Similarly, 29 of 39 Cardinals (*Richmondia cardinalis*), 74 percent, have been infected. Subinoculation of 19 Canaries with blood from Red-eyed Vireos have revealed that most of the questionable *Plasmodium* or *Haemaproteus* infections in that bird are with the latter parasite. The Cardinal had high levels of both *Leucocytozoon* and *Haemaproteus*. Studies of the epizootiology of *Haemaproteus* in the Red-eyed Vireo, a migrant, and *Leucocytozoon* in the Cardinal, a permanent resident, have been begun, and point toward local transmission. The pathogenicity of these parasites is difficult to assess, but it seems probable that they may be of importance to the welfare of avian populations under particular conditions.

In conjunction with the work on the Whistling Swan, in Chesapeake Bay, studies have been continued by Miss Barbara Holden and Dr. Sladen on infections with the heart worm (*Sarconema eurycerca*). This parasite is common in the swans overwintering in the bay and is known to be pathogenic and capable of causing mortality. It is suspected that light infections may not be deleterious, but further study of the relationship of infection to behavior, particularly to migration, is under way.

Miss Suzanne Bayley of Johns Hopkins University has continued her research on the distribution, abundance, and diseases of Eurasian Milfoil (*Myriophyllum spicatum*) in several estuaries in the bay, including Rhode River. This plant declined significantly (95 percent) between

1965 and 1967. The decline has been associated with Lake Venice and northeast diseases, and the latter has been shown to be infectious and transmissible in the laboratory. The inoculum, a filtrate free of bacteria, indicates that the etiologic agent is a virus or virus-like particle. Further studies are underway in an attempt to more clearly characterize this agent. In September of 1967 the plants again increased and flowered in several areas of the bay, and these remnant populations may be disease-resistant. Especially interesting is the recent data collected on the rapid reestablishment of native plants (especially *Elodea canadensis*, *Potamogeton pectinatus*, *P. perfoliatus*, and *Ruppia maritima*). The abundance and health of *Myriophyllum spicatum* may markedly affect the functioning of entire estuarine ecosystems, and thus the significance of this research cannot be underestimated.

**ARCHEOLOGY.** Field work at the Center on aboriginal culture has been continued by Dr. Henry T. Wright of the University of Michigan. The objectives remain those of providing information on the age, size, and characteristics of the sites, in order to allow for explanation of prehistoric cultural development in the middle Chesapeake Bay region. An excavation at the site, "Smithsonian Pier West," has revealed a large shell heap that was occupied during the transition from the Middle to Late Woodland periods, about A.D. 500 to 1000. Deer bones dominate the animal remains, and fragments of pine, oak, and ash (not now found together) have been recovered. Excavation of this and other sites reveals that if we are to add substantially to knowledge concerning seasons of occupation, proportions of tool types, or the contribution of various foods to the diet, a sample of small excavation units from each site will be necessary. Some 35 to 40 sites now have been located on the lands comprising the Center, dating back to 500 B.C.

**LAND-USE HISTORY.** In any effort to understand the present nature, distribution, and abundance of plant and animal communities at the Center, the nature of the soils supporting them, the drainage patterns, and the history of sedimentation with its associated estuarine changes, it is essential to have detailed information on the history of previous land use. This fact extends to prehistoric management of the land and especially to that since the arrival of western man. Mr. Daniel Higman of the Center staff has continued his studies in this area, and the data are now in manuscript form. Prior to human settlement, the Chesapeake Bay area was covered by a heterogeneous hardwood forest whose structure and ecology have been tentatively reconstructed. The arrival of settlers in the period 1649-1652 presaged a general devastation of the plant and animal communities of the region. There followed three fairly well-defined periods with particular sequences of land use: the Exploitation Period (1650-1775), the Reconstruction Period (1775-1850),

and Variegation Period (1850–present). The first of these was one of uncontrolled change in the forest characterized by the establishment of large plantations for the cultivation of tobacco. The soils were depleted and severely eroded and virtually all presettlement forest was eventually cleared.

In 1680 and 1704 the Virginia and Maryland Assemblies passed legislation to control indiscriminate clearing and associated erosion and silting, and the Maryland Assembly passed a further, similar law in 1735. The Revolutionary War and the end of the British tobacco trade ended the Exploitation Period, at which time it seems reasonable to assume that the presettlement forest and its associated fauna had been almost totally destroyed in the bay area. The Reconstruction Period was marked by a greater cultivation of grain crops for home markets (forced at least in part by two wars, 1775 and 1812) and the transition from large plantations to small, self-sufficient farms. This trend, with concurrent improvement in cultivation methods, soil conservation, and the growing of varied crops, was interrupted by the Civil War and subsequent depression but has continued until the present day. There is now, late in the Variegation Period, an increasing concern for proper land use, and the plans for future use of the Center reflect this concern.

## *Education*

The program of education at the Center has developed rapidly in three major areas: the use of the CBCFB for teaching basic ecological principles as a part of organized university courses, the training in ecology of undergraduate and graduate students through specific research projects, and a general interpretive program for various school groups and organizations concerned with the promotion of conservation of natural resources.

**ORGANIZED UNIVERSITY COURSES.** Three courses at the Johns Hopkins University have been in part conducted at the Center: Pathobiology I, the Biology of Populations; Pathobiology 18, Field Studies in Ecology and Behavior; and Biology 307, Advanced General Biology (essentially ecology). Similarly, the courses at the University of Maryland that utilize the Center are: Zoology 182, General Ecology; Zoology 235, Comparative Behavior; and Entomology 15. The Animal Ecology course, Biological Science 143, at the George Washington University, and the General Biology Course at St. John's College have conducted their field trips at the CBCFB. The Ornithology course, 1–151, at the United States Department of Agriculture Graduate School also has used the Center.

UNDERGRADUATE AND GRADUATE STUDENTS. Graduate students from Johns Hopkins University, including Mrs. Penny Williamson, Miss Suzanne Bayley, Mr. David Ainley (feeding ecology of Whistling Swans), and Mr. David Dyer (ecology of the Diamond-backed Terrapin), have conducted studies at the Center. The National Science Foundation, through a cooperative program with the Smithsonian Institution, has supported the avian ecology work of Mr. Paul Fine of Oberlin College, Miss Mary Faegin of Duke University, and Mr. William Wiggin of Colorado State University. Mr. William Zimmerman (artist) has provided his own support for work at the Center on his portfolio of paintings of North American waterfowl. The Department of Vertebrate Zoology has provided support for the training of Mr. Sherif Terwik (Egypt) in the techniques of mist-netting birds and in the collection of ectoparasites and blood samples. This training has been done in cooperation with the Palearctic Migratory Bird Survey.

THE INTERPRETIVE PROGRAM. Interpretive services have been provided for the Maryland Ornithological Society, the Smithsonian Associates, The Delaware Natural History Society, the Research Division of the National Fisheries Center, and the Senior Science Seminar students from Yorktown High School, Arlington, Virginia. Lectures on the ecology of the Center, its programs and plans, have been given to the Mayo Civic Association, the Phi Sigma Society at the University of Maryland, and to the Ad Hoc Committee for review of Smithsonian programs in ecology. Additionally, a brochure on the Center has been prepared for general distribution and should be of great assistance in making the Center better known around the country.

### *Gifts and Grants*

Two generous grants from the Old Dominion Foundation and the Scaife Family of Pittsburgh have been made to the Smithsonian Institution for land acquisition at the Center. The McCollum-Pratt Institute at Johns Hopkins University has made funds available to assist in the development of research facilities.

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- BUECHNER, HELMUT K. "Herbicidal Control of Vegetation." *Enciclopedia Della Scienza e Della Tecnica Mondadori* (1969), pages 86-90.



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- HOLDEN, BARBARA L., and WILLIAM J. L. SLADEN. "Heart Worms, *Sarconema eurycerca*, Infection in Whistling Swans, *Cygnus columbianus*, in Chesapeake Bay." *Bulletin Wildlife Disease Association* (1968), volume 4, pages 126-128.
- TALBOT, LEE M. "Ecological Consequences of Development of Masailand." 33 pages. Conference on the Ecological Aspects of International Development, The Conservation Foundation, Airlie House, Warrenton, Virginia, December 1968.
- . "The Wildlife Society and the IUCN." *The Wildlife Society News* (1968), volume 115, page 10.
- . "Major Factors Affecting Parks in Southeast Asia." 12 pages. Conference on Development and Conservation of the Countryside, University of Hong Kong, March 1969.
- . "An International View of the Role of Wildlife in the Biology and Concept of Wilderness." 7 pages. Eleventh Biennial Wilderness Conference, San Francisco, March 1969.
- . "The Wail of Kashmir: Man's Impact on the Land." Pages 50-51 in Garrett Hardin, editor, *Population, Evolution and Birth Control*. San Francisco: Freeman and Co., 1969.
- . "Ecological Implications of Pa Mong Project and the Lessons of Tropical Reservoirs." 8 pages. Southeast Asia Development Advisory Group, New York City, May 1969.
- . "Highlights of Conservation in the International Program in the Asia Pacific Region." 7 pages. Inter-Congress Conference of the Pacific Science Association, University of Malaya, Kuala Lumpur, Malaysia, May 1969.
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# Center for the Study of Man

SOL TAX, *Acting Director*

ON 5 JUNE 1968, SECRETARY RIPLEY announced the establishment, effective 1 July 1968, of the Center for the Study of Man in the Smithsonian Institution. From its inception, the Center has been responsible for most of the cooperative research and information programs formerly administered by the former Office of Anthropology. This responsibility is part of its broader mission, namely, to coordinate and carry out programs involving research, education, and service to facilitate the study of man on a worldwide scale.

On 13 May 1969, the Center completed a three-day meeting at the Smithsonian Institution. This was the first formal gathering to which all the center members were invited. The meeting was significant for a number of reasons. First, the membership confirmed its establishment as an international body to coordinate a worldwide development of the human sciences as they impinge upon species-wide social problems of mankind.

Second, the membership agreed that it was particularly appropriate for the Center to be located in the Smithsonian Institution, whose long tradition of international, nongovernmental research assures the freedom and independence of such a worldwide scholarly enterprise.

Third, the membership recommended the establishment of an appropriate building in Washington to house the Center, with facilities both for research and for museum functions, the two under a single director. This proposed "Museum of Man" would be devoted exclusively to the sciences of man, as they deal with all cultures and peoples from the earliest times to the present.

Finally, the membership discussed present and future programs of the Center and agreed to develop for their next meeting a seminar to explore the past, present, and potential relevance of anthropological knowledge to major problems which beset mankind.

Throughout the past year, the Center has continued to be responsible for a number of programs. It also has developed some new ones.

Work on a new, revised handbook or encyclopedia of North American Indian history and cultures has continued in the planning stage—for



Hunting and Fishing Rights session, American Anthropological Association annual meeting, November 1968, in Seattle, Washington.

Center for the Study of Man Program Coordinator, Samuel Stanley (bottom right), representing the Smithsonian Urgent Anthropology Program at a Conference on Urgent Research in Social Anthropology at the Indian Institute of Advanced Study in Simla, India, July 1968.





example, several specialists have been consulted by editor Sturtevant on mapping of the areal subdivisions of the continent suitable for organizing the encyclopedia's contents. In November 1968, Tax and Stanley organized the special session on Indian hunting and fishing rights for the annual meeting of the American Anthropological Association in Seattle, where a panel of experts—economists, lawyers, anthropologists, and conservationists—discussed the specific problems of fishing rights in the Pacific Northwest. A number of Indians participated in the session and materials were developed that can be incorporated into one of the volumes of the encyclopedia.

The Center has continued its coordination of urgent anthropology through its support of communication and research. The program for supporting field studies of scientifically important peoples, on an urgent basis, has operated throughout the year. Nine grants have been made covering research in seven countries. In July 1968, Stanley was invited by the Indian Institute for Advanced Study to attend a week-long conference at Simla. In September 1968, Tax, Reining, and Sturtevant attended a conference in Tokyo during the VIIIth International Congress of Anthropological and Ethnological Sciences. Questions of determining policy for international research were discussed at length. A summary of both conferences was reported by Reining for *Current Anthropology*.

During the past year a current bibliography of all anthropological publications has been developing as a responsibility of Laughlin. This program has begun to produce bimonthly lists of journal contents and current books. As the procedures become more established and routinized, the program will be computerized.

A computerized directory of anthropologists and anthropological institutions is immediately planned. Experience in preparing this directory will be useful in a feasibility study of electronic data processing for a more comprehensive directory and bibliography. The development of this program will lead to rapid increases in the rate and quantity of information exchange in the human sciences.

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### *Staff Publications and Papers*

REINING, PRISCILLA. "Social Factors Influencing Food Production in an East African Peasant Society." In Peter McLoughlin, editor, *Food Production in Africa*. Baltimore: Johns Hopkins University Press, 1969.

STANLEY, SAM. "Why American Folklife Studies?" Page 12 in *1968 Festival of American Folklife*. Washington: Smithsonian Institution, 1968.

———. "Smithsonian Urgent Anthropology Program." Conference on Urgent Research in Social Anthropology at the Indian Institute of Advanced Study, Simla, India. July 1968.

- . "The Smithsonian Institution's Role in Folk Life Studies." American Folklore Society, Bloomington, Indiana. November 1968.
- , co-organizer (with Sol Tax). "Experimental Session: American Indian Hunting and Fishing Rights." 67th Annual Meeting American Anthropological Association, Seattle, Washington. November 1968.
- . "Mankind: An Anthropological Perspective." Conference on Opportunities for Intercultural Education, Washington, D.C., March 1969.
- STANLEY, SAM, and WILLIAM C. STURTEVANT. "Indian Communities in the Eastern United States." *Indian Historian* (June 1968), volume 1, number 3, pages 15–19.
- TAX, SOL. "Anthropologists: Are They Modern Medicine Man?" Chapter (pages 3–16) in *Anthropological Backgrounds of Adult Education*. Boston: Center for the Study of Liberal Education for Adults at Boston University, 1968.
- . "Amerindian." In European edition, *Encyclopaedia Britannica*, 1968.
- , editor. *The Draft: A Handbook of Facts and Alternatives*. 497 pages. Chicago: The University of Chicago Press, 1967 [also in paperback and national debate edition].
- , editor. *The People vs. The System, A Dialogue in Urban Conflict*. 515 pages. Chicago: Acme Press, 1968.
- . "Self and Society." In *Claremont Reading Conference, Thirty-Second Yearbook*, Malcolm P. Douglass, editor. Claremont: Claremont University Center, 1968.
- . "Society, The Individual and National Service." *Current History* (August 1968), pages 78–83, 109.
- . Chairman, "Urgent Anthropology Session." 9th International Congress of Anthropological and Ethnological Sciences, Tokyo, Japan. September 1968.
- . Chairman, "Experimental Session: American Indian Hunting and Fishing Rights." 67th Annual Meeting American Anthropological Association, Seattle, Washington. November 1968.
- . "American Indians." Luther College, Decorah, Iowa. March 1969.
- . Chairman, "Problems of Research Across National Boundaries." Society for Applied Anthropology, Mexico City, Mexico. April 1969.
- . "Can Man Invent His Future?" *Action People* series produced by the Stone-Brandel Center in cooperation with WTTW (Channel 11) Chicago. 18 February 1969.
- . "The University of Chicago Round Table. WTTW (Channel 11) Chicago. 31 March 1969.
- . "Perspectives." Two programs on American Indians syndicated by the American Broadcasting Company. April 1969.





# Center for the Study of Short-Lived Phenomena

ROBERT CITRON, *Director*

**D**URING THE YEAR, THE CENTER has investigated 127 geological, astrophysical, and biological events, including 21 major earthquakes, 18 volcanic eruptions (one involving the birth and disappearance of an island), 21 fireballs, 11 major oil spills, 9 fish kills, 4 rare-animal migrations, 3 freshly fallen meteorite recoveries, the discovery of a stone-axe tribe, and 3 archeological events urgently requiring investigation.

Field investigators have traveled to 74 of the 127 events. Of the investigations, 68 were local or regional and included participation by other agencies, institutions, or foreign governments; 6 were Smithsonian-sponsored reconnaissance missions or field expeditions that together involved eighteen scientists from five countries and eight institutions.

Center participation in these events has included professional contacts in the event areas, obtaining information on the events, interviewing reliable witnesses, collecting photographic and cinematographic documentation, and issuing written materials to correspondents of the Center around the world.

The Center has assisted in the coordination of activities for reconnaissance missions and scientific field expeditions to the Fernandina Caldera collapse, Galapagos Islands; the Mt. Arenal volcanic eruption, Costa Rica; the Cerro Negro volcanic eruption, Nicaragua; the Appalachian squirrel migration in the eastern United States; the Mt. Merapi volcanic eruption, Indonesia; and the Pueblito de Allende meteorite shower in Mexico.

The Center has obtained photographic and cinematographic documentation and sample specimens on a number of occasions. Center or Smithsonian archives now contain over 10,000 feet of color motion picture film on five volcanic eruptions and the Appalachian squirrel migration, 3,500 color and black-and-white photographs obtained on seven field expeditions and reconnaissance missions, more than 2,000



Chinandega footprints, Chinandega, Nicaragua, discovered October 1968. Footprints made by prehistoric man, covered with volcanic ash and subsequently exposed by erosion. (Photo courtesy Professor Gladys Quant, Department of Biology, National University of Nicaragua.)

high-resolution aerial photographs of the Mt. Mayon volcanic-eruption activity taken during a six-week period by the United States Air Force, color motion picture and aerial photographs taken during the eight-week period of Cerro Negro volcanic activity, a number of stereo aerial photographs of volcanic eruptions, and specimens of eruption products, lava, bombs, ash, and—in some instances—biological specimens from most of the major volcanic eruptions of the year.

During the Apollo 10 Manned Lunar Mission, the Center arranged communications between 187 astronomical observers in thirty-one countries and maintained daily contact with the Manned Spacecraft Center, NASA, at Houston, Texas. Reports from ground-based observers were relayed to the MSC for transmittal to the astronauts en route to and orbiting the moon; this mission provided an opportunity for astronauts to confirm (by observation and photography) ground-based observations of transient lunar events.

The Center has established an effective global reporting network of over 2,000 correspondents in many disciplines and from 118 countries. Correspondents are individual scientists, scientific institutions, and field stations that cooperate with the Center by reporting events, obtaining



Cerro Negro volcanic eruption, Nicaragua, 14 November 1968. (Photo courtesy Professor Robert Decker, Dartmouth College, New Hampshire.)



Ocean Eagle oil spill, San Juan, Puerto Rico, 3 March 1968. Effect of oil on marine life. A team of marine biologists from the Department of Marine Sciences, University of Puerto Rico, studied the effects of the oil and detergents, used to emulsify the oil, on the marine flora and fauna. (Photo courtesy Dr. Cirame Vivas, Department of Marine Sciences, University of Puerto Rico.)

follow-up information about events that occur in their areas, traveling to events occurring in their areas to make up-to-date reports to the Center, and occasionally providing assistance to research teams. They also receive Center reports on short-lived events of interest to them.

The Center has issued 127 event notification reports, 764 event information reports, 16 final event publications, and 11 preprints of scientific papers on the preliminary results of field investigations.

The Center now participates in an average of one new event every two and a half days and currently issues event notification and information report cards at a rate exceeding 45,000 per month to interested scientists around the world.



# HISTORY AND ART

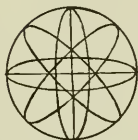
CHARLES BLITZER

*Assistant Secretary*



# National Museum of History and Technology

ROBERT P. MULTHAUF, *Director*



FOR OVER A DECADE THIS MUSEUM has been concerned with the solution of a somewhat unusual problem—preservation of the material record of a science that is essentially new but developing with such a rapidity that it forces the historian to accelerate his deliberation. The material record of technological innovation in the steam engine and the electric telegraph can be assembled in leisurely fashion. This is clearly not the case with the record of scientific and technical development in nuclear energy. In the following section, the Museum program for collection in this field is described by its initiator, Dr. Philip Bishop.

## THE NUCLEAR ENERGY COLLECTIONS

In 1942, a group of scientists led by Enrico Fermi brought together in a squash court almost a century of probing into the structure of matter. Their success with Chicago Pile No. 1 opened a new era in research. The crash program called Manhattan, which produced the bombs that fell on Hiroshima and Nagasaki, yielded a more peaceful fallout at the end of World War II when the great emergency laboratories began the transition to pure research and to the study of ways in which to apply the newfound knowledge to peaceful uses. As the wartime teams broke up, some members returned to their universities to pursue research in some specialized aspect of the subject, others went to industrial firms to concentrate on the design of more complicated equipment for themselves and other researchers, and yet others remained with the government-supported laboratories—all of these



An aerial view of the National Museum of History and Technology featuring the new Constitution Avenue fountain and the Calder stabile. (Photo by Henry Alexander and Richard Hofmeister.)

specialists experimenting, synthesizing, and probing ever deeper into the new mysteries.

Nuclear physics became part of the everyday life of America. When the wartime story could be revealed, the public was assailed by a new vocabulary that rapidly passed into the vernacular of the daily newspaper and weekly magazine. New words were coined daily to cover the findings of the scientists, who themselves kept going deeper and deeper into their specialized fields until soon they, like the public, were losing any knowledge they might have had about the sources from which the new knowledge had been derived.

In 1956, the Museum accepted the challenge of collecting the artifacts and recording the history of this exciting revolution in science in a period when many of the barriers between chemistry and physics as separate disciplines had been broken down and when specialized laboratories were preoccupied with particles of matter that had no mass but that literally could pass through the earth. The task facing the Museum became one of discrimination, to find memorabilia of those fundamental experiments that represented the turning points in the development of nuclear science.

The Museum was fortunate in securing as consultant, the nuclear physicist Dr. Clyde R. Cowan, Jr., of the Catholic University of



America. Co-discoverer of the neutrino, he is a highly specialized research scientist with unusually broad experience in both physics and chemistry. Collaboration between scientist and curator, pursuing a kind of Socratic dialogue, resulted in a model for a collecting program that would establish a coherent, if simplified, account of the origins of the search for means to harness the power of the nucleus. This model has proved to be remarkably effective and, aided by considerable good fortune, the Museum has been able to prevent laboratories from cannibalizing classic equipment that had been responsible for many great discoveries.

Most of the early work that was to lay the foundations for nuclear physics took place in Europe, especially at the Cavendish Laboratory of Cambridge University and at the Sorbonne in Paris, where the original pioneering equipment is preserved. Geissler's vacuum tube (1855) and Crooke's improvement on it (1875) provided the apparatus that made possible the subsequent work of Thomson, Rutherford, and others, culminating in the last decade of the 19th century in the series of climactic discoveries mentioned below. Since much of the apparatus used in these experiments fortunately has been preserved in European museums, it has been possible for this Museum to obtain precise replicas.

The first fruit of the vacuum tube was the discovery of x-rays by Roentgen in 1895. A tube made by Roentgen is in the Museum's col-

Given to the Smithsonian Institution by The Morris and Gwendolyn Cafritz Foundation, this forty-foot jet-black stabile by Alexander Calder has been erected in a reflecting pool on the west terrace of the National Museum of History and Technology at 14th Street. (Photo by Henry Alexander and Richard Hofmeister.)





With its delightfully intricate spray patterns, this latest example in fountain technology is an exciting visual experience at the north entrance of the Museum. (Photo by Henry Alexander and Richard Hofmeister.)

lection, as is another, made in the United States almost immediately after the publication of Roentgen's work. The latter, produced at the Catholic University of America, was demonstrated for William Howard Taft (then the United States circuit court judge for the sixth district), who was able to see the bones of his hands. A group of discoveries, all of them of fundamental purpose and, like x-rays, the result of experiments with the vacuum tube, was made around the turn of the century by J. J. Thomson and Ernest Rutherford at Cambridge, at the same time that Becquerel and, soon after, the Curies were identifying the phenomenon of radioactivity at the Sorbonne. The Cavendish Laboratory made for the Museum a replica of Thomson's experiment in which he distinguished the electron as a particle and established the relation between the charge on the electron to its mass. Another replica from the same source is of the tiny brass chamber with which Ernest Rutherford studied alpha particles and—from their behavior when they struck gold foil—evolved the concept of the nucleus. Later he was to observe in the same chamber the first nuclear transformation when alpha particles penetrated the nucleus of nitrogen, reacted with it, and transmuted it to oxygen and a fast proton.

These fundamental experiments led to Chadwick's discovery in 1932 of the neutron, the first step to the realization in 1939 that the nucleus of uranium could be split into two more or less equal parts by exposing it to neutrons. This later discovery by Meitner and Frisch was confirmed by Mme Joliot-Curie in Paris and in the independent work of Bohr and Fermi at Columbia University. It was the technique of slowing down neutrons in nitrogenous matter evolved by Fermi in 1934 that contributed significantly to these experiments. This work is represented by a radon beryllium source presented to the Museum by Fermi's associate Emilio Segrè, then at the University of Rome.

Meanwhile, the men experimenting with the bombardment of the nucleus needed to find particles with higher energy than that observed in the alpha particles emitted by naturally radioactive elements. The Museum has collected a replica of the cloud chamber developed by C. T. R. Wilson that from 1894 permitted scientists to measure the charges on atomic particles and to observe collisions with atomic nuclei.

Cockcroft and Walton at Cambridge devised a voltage multiplier to accelerate protons (ionized hydrogen atoms), and by 1932 they had achieved the first nuclear reaction brought about by artificially accelerated particles and without any form of natural radioactivity. The Museum has a replica of this apparatus from the original in the Science Museum in London as well as the original Van de Graaff electrostatic accelerator built in 1932 by M. A. Tuve at the Carnegie Institution of Washington. This machine, the first to attain one million volts, followed quickly after Van de Graaff's table-top demonstration of the principle at Princeton. Tuve's accelerator was used later to measure the forces that bind nuclei together.

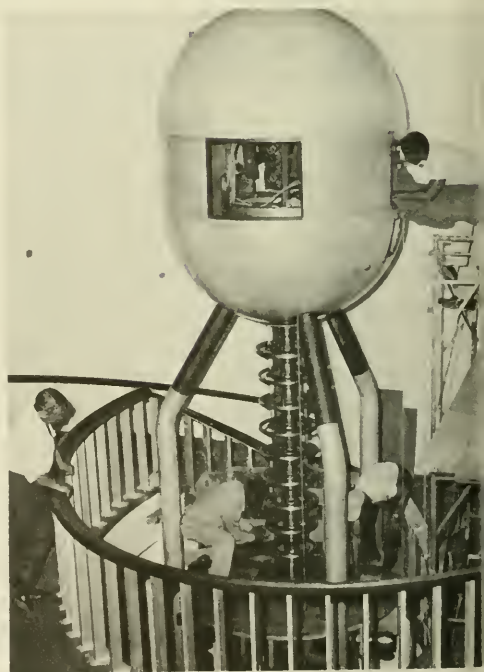
These voltage accelerators had their limitations, and it was the work of the team headed by E. O. Lawrence and M. Stanley Livingston at Berkeley, California, that was to give the nuclear physicist even better tools with which to bombard the nucleus. The Lawrence Radiation Laboratory and the Museum are collaborating in the construction of a replica of the first cyclotron (1931). The "Ds" from the 27-inch model (1933) have been collected by the Museum as well as the torpedo and "Ds" of the cyclotron built by Dunning at Columbia University, representative of a series of big machines built in the early 1940s by American universities. The problem of accelerating electrons that are much lighter than protons was met by Donald W. Kerst's betatron of 1940, which is now in the Museum.

The linear accelerator developed from the work of Wideröe (1928) was also the subject of experiments in the 1930s, but it was not to reach its major development until after World War II. One of these accelerators, constructed by Luis Alvarez and his associates at the Radiation

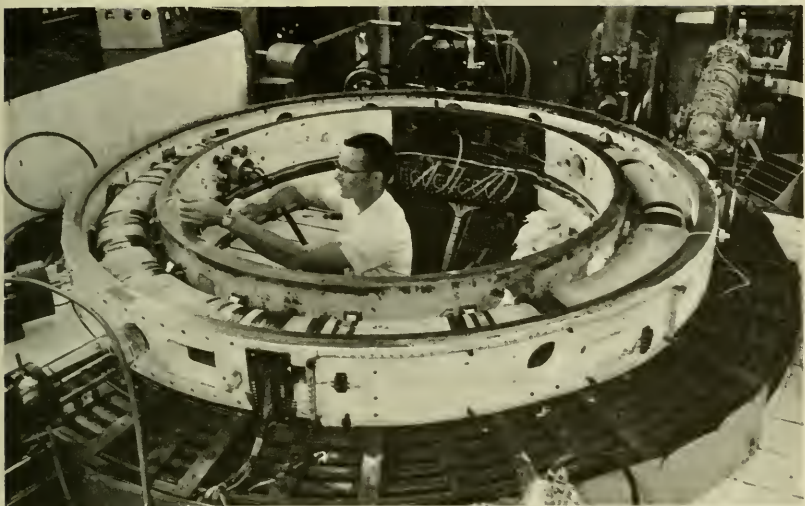


Albert Einstein, bronze, Robert Berks. (Gift of Mrs. Leo Pollak in 1954.)

Installation of the Tuve Van De Graaff electrostatic generator in the National Museum of History and Technology.

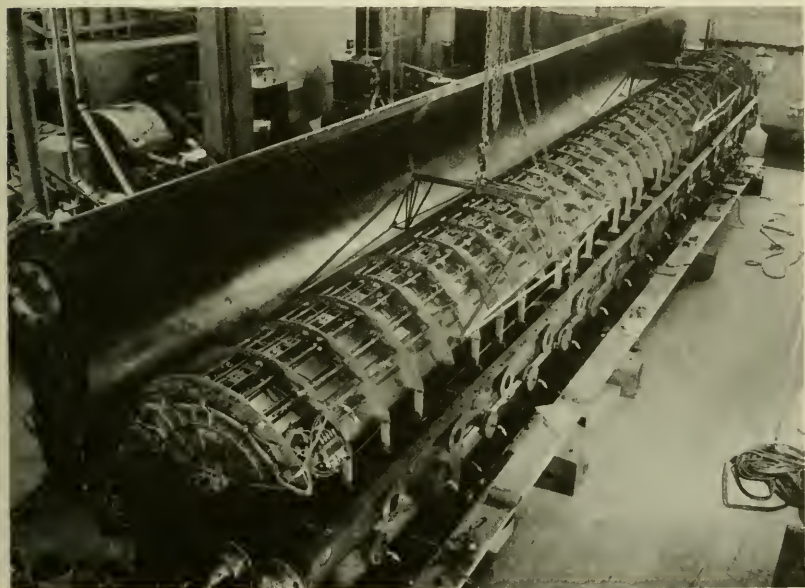






Synchrocyclotron (1946) built by E. M. McMillan at Berkeley. View of the vacuum chamber ("Ds") with upper coil removed. The Museum has retained only token sections of the 4300-ton magnet, parts of which are seen in the photograph.

Linear accelerator (1947) built by L. W. Alvarez at Berkeley to produce high-energy protons. The Museum has preserved two 7-foot sections of the vacuum chamber and related equipment.





One 60-millionth of an ounce of plutonium 239 with its discoverers, Glenn T. Seaborg and Emilio Segrè. The sample, on the disc at Dr. Seaborg's finger tip, is in the original cigar box in which it was placed after the discovery in 1940.

Laboratory of the University of California, has been preserved in part in the Museum. Another (complete except for some parts of the giant magnets), built at the Lawrence Radiation Laboratory of the University of California by Edwin M. McMillan (1945–1948), is the synchrocyclotron used in the discovery of the neutral pi-meson, the first of many new particles produced in these large machines.

The most spectacular result of the use of the high-energy accelerators was the discovery of radioactive elements with extremely short half-lives. The first of these, neptunium, was produced by McMillan and Abelson in 1940 at Berkeley by bombarding uranium with neutrons produced in a cyclotron. The second, plutonium 238, was found in 1940 by deuteron bombardment of uranium in the Berkeley 60-inch cyclotron. Its heavier isotope, plutonium 239, was found soon after. Its discoverers Glenn T. Seaborg and Emilio Segrè have deposited with the Museum a sample of plutonium 239 weighing about one 60-millionth of an ounce. The sample, an invisible smear on a disc of platinum, rests in the original cigar box in which it was stored after the conclusion of the experiment. One of the balances used in measuring this infinitesimal quantity also is reserved for the Museum.

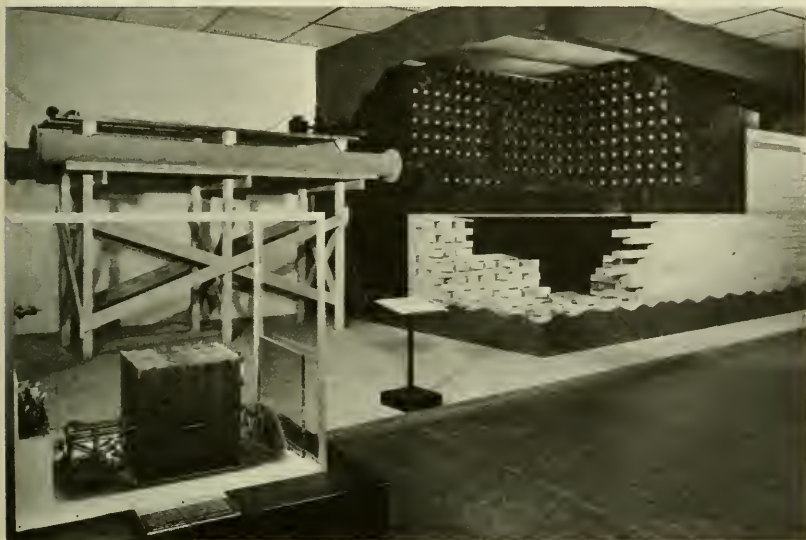
The Seaborg-Segrè experiment had as its direct consequence the decision to construct at the University of Chicago the first nuclear reactor. Fermi's work was the climax of a great number of experiments. As early as 1934 Fermi had produced nuclear reactions in many elements with nuclear bombardment, and in 1939 Meitner and Frisch in Germany, Mme Joliot-Curie in France, and Fermi and Bohr at Columbia University observed fission of the uranium nucleus with the release of energy. Malcolm Henderson's apparatus with which he measured this energy in 1940 is, in effect, the forerunner of the great nuclear power plants of

today and fortunately was preserved at the Catholic University of America and has been given to the Museum.

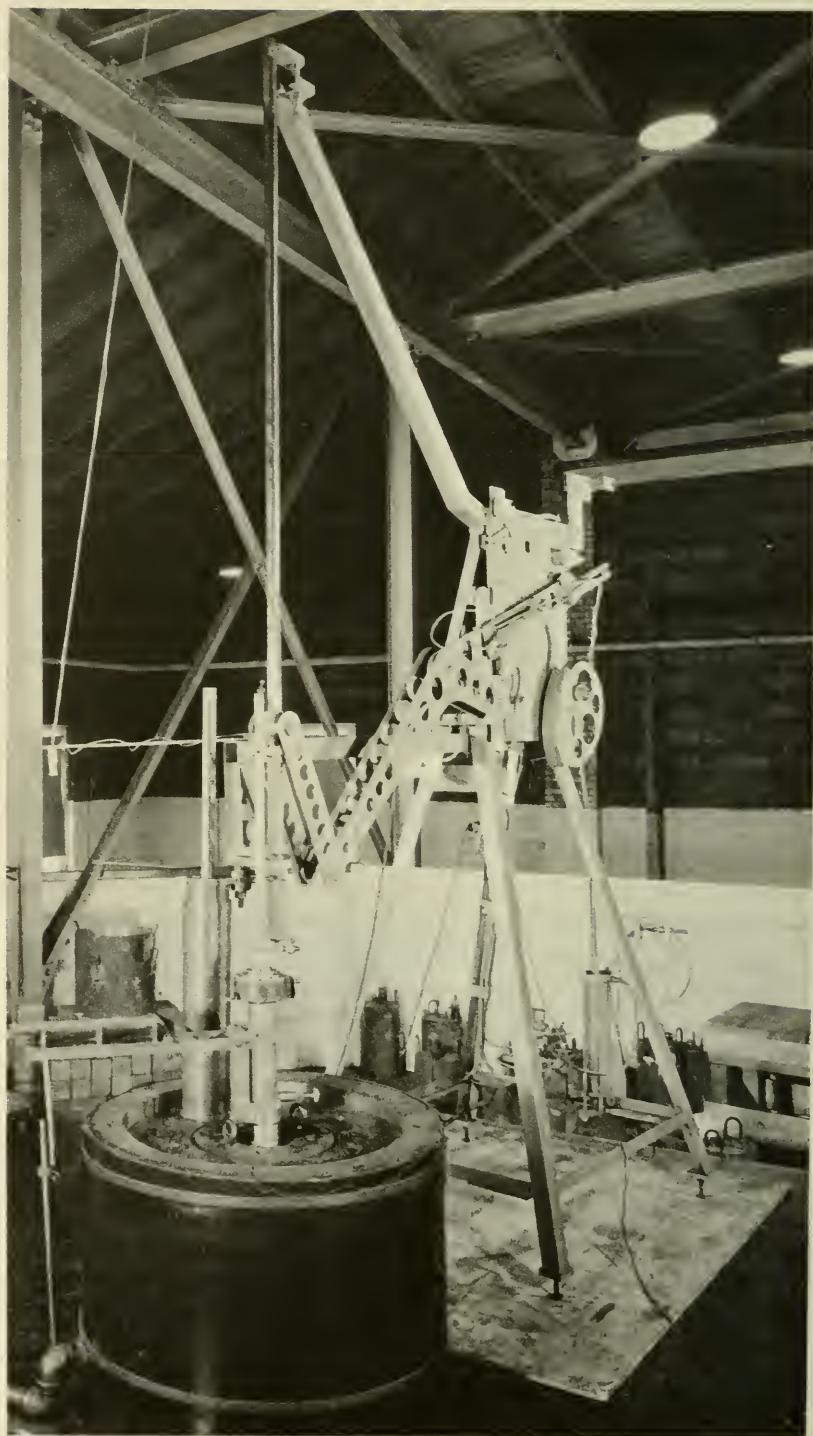
Fermi had worked out his theory of the method to achieve a sustained nuclear reaction by mathematical means and, later, by experiments involving the stacking of large numbers of uranium blocks in which his team had placed lumps of uranium metal and uranium oxide. A number of these subcritical piles had been made before that final experiment under the bleachers of Stagg Field at the University of Chicago. Layer after layer of graphite was stacked, with the uranium arranged to form a lattice. As the pile grew, measurements of neutron flux were made showing that criticality (the point at which the fission chain would grow instead of die out) was being approached. Calculations showed that when the fifty-sixth layer was reached the great moment would be imminent. On 2 December 1942 the first controlled chain reaction began.

The graphite used by Fermi was used again and again when Chicago Pile No. 1 was dismantled, and eventually it was brought to the Museum, where the pile has been re-erected insofar as surviving nonradioactive components permit. A sample of the original fuel, Fermi's neutron chopper, and the pile-oscillator used in subsequent experiments have also been added to the collections.

**Fermi's Chicago Pile No. 1. The first nuclear reactor (1940), re-erected by the Museum. The small model at left represents the scene on 2 December 1942 when the reactor first went critical.**









The search after World War II for ways in which to apply wartime discoveries to peaceful uses has resulted in a whole range of nuclear reactors. Their size obviously has prevented the collection of any of the early experiments in this direction, but two interesting items have been found that represent their wide scope.

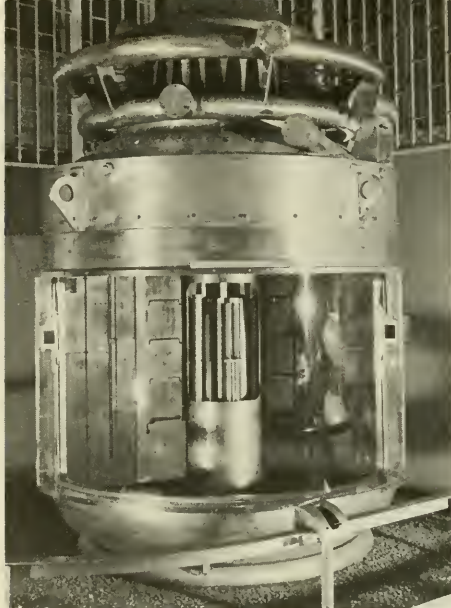
In 1955, the Atomic Energy Commission lent two tons of uranium and two grams of radium beryllium to New York University to enable engineering students to experiment with nuclear reactions below the level of a full chain reaction. This subcritical reactor was assembled in a \$25 pickle or olive barrel and was used until the early 1960s when the whole assembly was given to the Museum. At the other end of the scale were the experiments carried out at Los Alamos and elsewhere with the object of developing a reactor small enough to be a power source in a space vehicle. A replica of one product of Project Rover at Los Alamos, Kiwi A, was made by the laboratory for the Museum. The name, derived from the New Zealand flightless bird, was given because at this stage of development the reactor was tested on the ground on a special railroad track.

Most reactors are built with heavy shielding to protect nearby workers from radiation. A "naked" reactor, called obviously Godiva, was developed at Los Alamos so that observations could be made of the effects of nuclear bursts on materials and equipment. After a thousand such tests in the Pajarito canyon near Los Alamos, New Mexico, Godiva was deliberately destroyed, but the laboratory has made a replica for the Museum. The duplicate differs from the original in the one important respect that the fuel used is uranium 238 instead of uranium 235, thus making it safe for public demonstrations.

Scientists are searching for an alternative source of energy to be found in the fusion of the nuclei of the isotopes of hydrogen, deuterium, and tritium. If and when it becomes possible to achieve and sustain by electrical means the extremely high temperatures generated in a nuclear-fission explosion, an inexhaustible source of energy will be obtainable from the deuterium in the waters of the ocean. The demonstration device used in early experiments by Lyman Spitzer at Princeton, called the Stellarator, has been given to the Museum. One of the latest experiments at Los Alamos Scientific Laboratory also has been preserved. In this experiment, called Scylla, the first authenticated thermonuclear

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Pile oscillator used in early fission reactors for ascertaining the absorptive power of various nuclei for neutrons (neutron cross section). Developed at Argonne National Laboratory by Alexander Langsdorf (1945).



Kiwi A (1965), cutaway replica showing fuel elements of experimental nuclear engine for space vehicles. A product of project "Rover" of Los Alamos Scientific Laboratory. This was the first of a series of test designs. Its operating power was 70 megawatts.

reaction took place, culminating the work of James Tuck and his associates.

Finally, the Museum has been interested in collecting original equipment associated with the application of isotopes to the service of man. The most interesting example was found, on the eve of its dismemberment, in the original equipment used by W. F. Libby to prove the possibility of dating natural material by reference to the content of the carbon 14 isotopes.

## RESEARCH

### *Cultural History*

Under contract, Carroll Greene, Jr., has undertaken and largely completed a study of existing exhibitions relating to Afro-American history and of materials still extant for the preservation of a record of Negro history in the United States. Richard Ahlborn continued his study of Spanish-American culture, on which he published a monograph, "The Penitente Moradas of Abiquiu," last year. He is presently studying the religious art of San Xavier del Bac (circa 1783), near Tucson, Arizona. J. Scott Odell is engaged in a program of interviews and recordings of folk musicians in the area of Galax, Virginia.

For some years Edgar Howell, with the assistance of Donald Kloster, has been engaged in a history and catalog of the dress of the United States Army, of which our collection is the most comprehensive in ex-

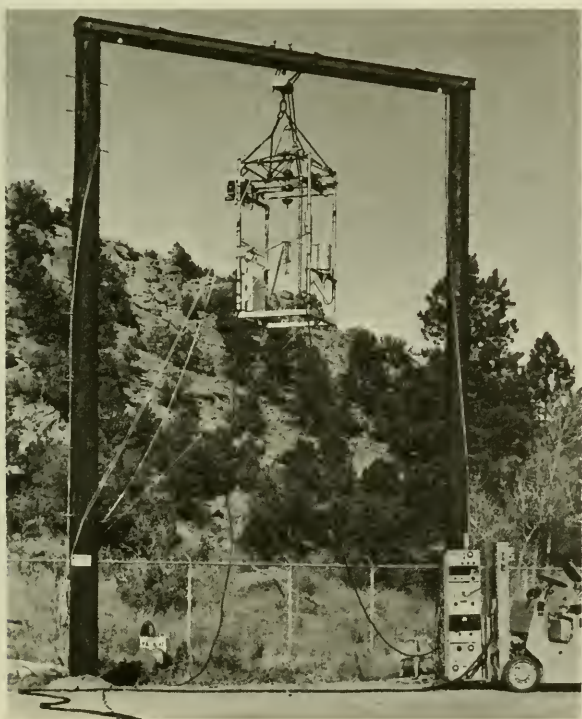
istence. The first publication, dealing with military headgear in use prior to 1854, appeared this year, and Mr. Howell occupied his sabbatical leave with research for the next volume in this series.

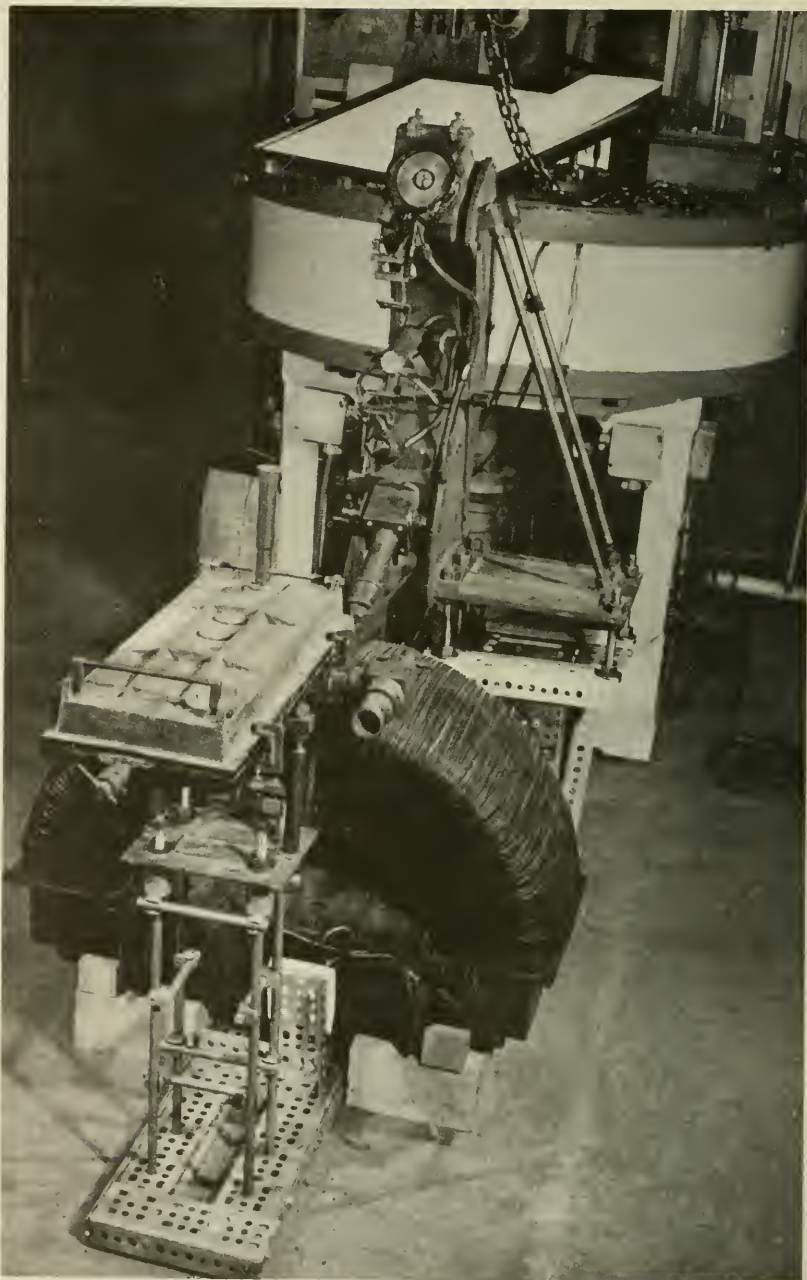
Three staff members are engaged in research in American furniture. Betty Walters has completed a study of Indiana cabinetmakers, Anne Golovin has in progress a study of the furniture makers of Washington, D.C., and Rodris Roth is investigating American furniture as it was represented in the Philadelphia Exposition of 1876.

Two staff members are engaged in research in the history of music in the United States. Cynthia A. Hoover has finished a paper on J. Norton, a trumpeter of the early 19th century, and John Fesperman has completed a manuscript analysis of the John Snetzler organ in our collection. This organ, built in 1761, was first owned by Samuel Bard, best known as surgeon to George Washington.

Claudia Kidwell is studying 19th-century dressmaker's drafting tools

Lady Godiva, a reactor without shielding, used to study effects of nuclear bursts on materials and equipment, shown on location in maximum isolation at Los Alamos Scientific Laboratory of the University of California before the deliberate destruction of the reactor in 1957.





Mass spectrometer developed at Harvard University 1932–1936 by Kenneth T. Bainbridge. With this apparatus Bainbridge determined the isotopic mass of the heavier isotope of hydrogen, deuterium, discovered by H. C. Urey in the same period.





Conservator Scott Odell applies gold leaf over gesso to front pipes for restoration of chamber organ by John Snetzler, London, 1761.

in the collection as a probable link between the “art” of dressmaking and the “ready-to-wear” industry. As participant in a program of research on the Museum’s textile collections, Rita Adrosko is engaged in a study of woven patterned shawls of the 19th century.

In connection with the political campaign of 1968 and the subsequent inauguration, two large special exhibits have been shown in the Museum. The curators responsible, Margaret Klapthor and Herbert Collins, used the occasion to undertake a general survey of the extant memorabilia of past inaugural ceremonies. Anne Serio has used the Museum’s Harry T. Peters’ collection of American lithographs to portray the convention of the Free Soil Party of 1848 as it was represented in political cartoons. Keith Melder is on sabbatical leave in the study of the feminist movement in the United States.

Studying as a by-product of archeological work in Alexandria, Virginia, C. Malcolm Watkins and Richard Muzzrole are engaged in the



Chamber Organ, John Snetzler, London, 1761  
(restoration completed in June 1969).



**"The Quest for the Presidency"** exhibition on the third floor of the National Museum of History and Technology, as displayed from 17 August to 1 December 1968.

Archeological aide Richard Muzzrole shows Mr. V. Ward Boswell of Alexandria, Virginia, a piece of kiln furniture from the Henry Piercy pottery (active 1792–1801) located on his property.



preparation of a history of pottery making in that colonial town. Mr. Watkins, with the collaboration of Joan Pearson Watkins, also has completed a study of the pioneer pottery of California as part of a larger study of the material culture of California in the gold-rush period.

### *Archeology*

Philip Lundeberg and Alan Albright have conducted a survey of underwater sites in Lake Champlain, a project that was sponsored by the National Geographic Society as part of the continuing study of Benedict Arnold's squadron during the northern campaign of 1776. In a continued program of underwater exploration in the Caribbean, Mendel Peterson has participated in the investigation of a wreck site in the Florida Keys that probably represents the large Spanish ship *St. Joseph*, which sank in 1773.

Jefferson Miller has completed a monograph on the ceramic remains excavated at Fort Machilimackinac, Michigan, a fort that was active during the period 1715–1780.

### *Numismatics and Philately*

In cooperation with Adon A. Gordus, University of Michigan, the Division of Numismatics is engaged in the analysis by neutron-activation of a number of Sassanian, Arab, and Indo-Sassanian silver coins. In cooperation with the Society of Philatelic Americans, the Division of Philately is preparing a catalog of its library to be published in installments by the Society journal and finally as a book.

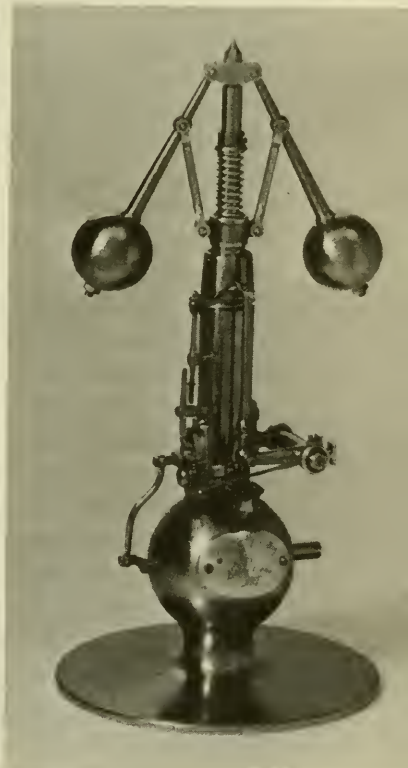
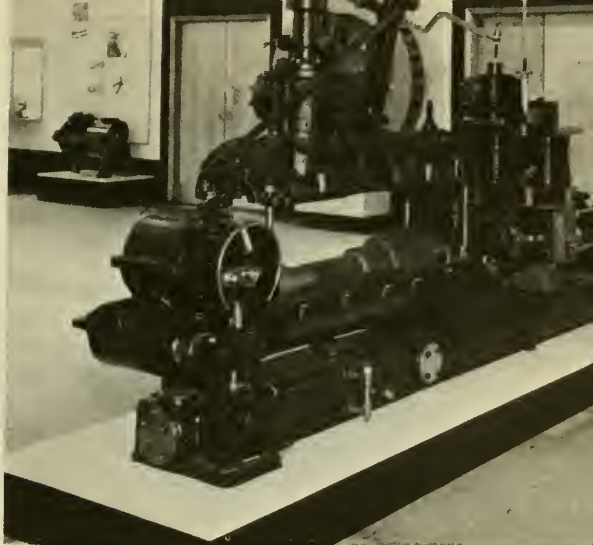
The Postal History Society of the Americas has awarded John McCusker, Smithsonian Fellow, a gold medal for his research on the 18th-century British-American mail packets.

### *Applied Art*

Paul Gardner has completed a book-length biography of Frederick Carder, founder of the Steuben Glass works. Nearly completed is a monograph on the inventions of the pioneer photographer W. H. Fox Talbot. The letter, by Eugene Ostroff, will be accompanied by a catalog of the photographs and other materials dating from 1835–77, which remain at the home of Fox Talbot, Lacock Abby, Wiltshire.

Elizabeth Harris is engaged in the extension of her catalog and his-





Examples of feed-back devices in the museum: (*top left*) Arc-lamp regulator, (*top right*) Parsons turbine-generator with electrical solenoid operating steam valve, (*bottom left*) Earliest American example extant of Watt-type governor, (*bottom right*) 1864 patent model of centrifugal pendulum (Watt-type) governor with proportional and integral responses.



Original galvano model for Christian Gobrecht's famous "defiant eagle" design, circa 1838. First known use of electro-deposition processes in United States coin manufacturing techniques. (Donated by Messrs. Stack, New York City.)

tory of the photomechanical print, of which the Museum has the most comprehensive collection in existence. As completed last year, this study covers the period 1840–1880.

### *History of Science*

Silvio A. Bedini has completed a book-length manuscript dealing with early American navigational instruments. The study of the characteristics of early electrical instruments, using modern measuring apparatus, is a continuing project in the Division of Electricity, where Bernard Finn published an article last year on the performance of early telephones in our collection. This year he has studied the performance of 18th-century static electricity machines and has presented his findings to the International Congress of the History of Science in Paris.

Deborah Warner is engaged in a study of celestial cartography through the analysis of published star charts from the period 1500–1800. Robert Multhauf has continued on sabbatical leave his study of the role of science in the industrialization of chemistry. Audrey Davis has completed a dissertation, "The Circulation of the Blood and Medical Chemistry in England, 1650–80," as a requirement for a PhD at Johns Hopkins University.

### *History of Technology*

The Computer History Project, supported by the American Federation of Information Processing Societies, is now in its second year under the direction of Uta Merzbach. This project comprehends the collection

"Masse d'Or," struck circa 1296–1310 by Philip IV of France, referred to as the largest French medieval gold coin. Reflecting Gothic artistic developments, its issuance was the result of the French war against England in Gascony and Flanders. (The Josiah K. Lilly, Jr., Collection.)



of documents and tape-recorded interviews with persons who are important in the development of the computer.

Robert Vogel is in the second year of a survey of early New England textile mills as part of a larger program in industrial archeology. A report of the first summer's work, chiefly at Manchester, New Hampshire, was published this year.

Several book-length studies in the history of transportation are complete or nearly so. These include George Hilton's history of the cable railway in America, John White's history of American railroad cars during the period of wood construction, and Donald Berkebile's dictionary of the terminology of the carriage builder. Melvin Jackson has submitted to a publisher a study of the Woolwich cannon foundry, research that is based on drawings made by members of the Dutch family Verbruggen between 1772 and 1782.

Other individual projects are a history of feedback mechanisms, as they are illustrated in this Museum's collections, by Otto Mayr; a study of the development and use of the spinning wheel in America by Grace Cooper; and a comparative history of the development of electric lighting in the United States, England, and Germany by Thomas Hughes.

Edwin Battison has been awarded a citation by the Smithsonian Institution for his activity in selecting for translation Russian works on the history of technology. Mr. Battison's contribution, as the citation states, is virtually to revolutionize the knowledge of the English reader of early technology in Russia. In the course of the year, Mr. Battison also has completed a documentary film on the manufacture of ax handles by using primitive equipment that includes the pattern lathe of the type developed by Thomas Blanchard about 1840.



A catalog of philatelic publications being compiled by the research staff of the Division of Postal History will be published by the Society of Philatelic Americans.

## THE COLLECTIONS

### *Department of Applied Arts*

The Josiah K. Lilly collection of gold coins, which was acquired this year, is the most important single acquisition ever received by the Numismatic Division. This collection includes a virtually complete series of official issues of the United States and an unparalleled series of pioneer and territorial issues. The Latin American section is outstanding for its nearly complete series of Spanish colonial issues from Mexico, Peru, Chile, and Bolivia. Other numismatic rarities have been received from Mrs. Henry Norweb, Mr. and Mrs. Mortimer L. Neinken, Dr. Sidney A. Peerless, and, through their continued generosity, from Mr. Willis H. DuPont and members of the Stack family of New York. From the latter, the Department has received the original galvano model for Christian Gobrecht's famous "defiant eagle" design (circa 1838), the first known example of the use of electro deposition processes in coin manufacture in the United States.

The Mergenthaler Linotype Company has presented to the Museum linotype machines of 1889 and 1961, the former the oldest surviving example of the machine with which Otmar Mergenthaler of Baltimore replaced hand with machine typesetting and the latter the current model

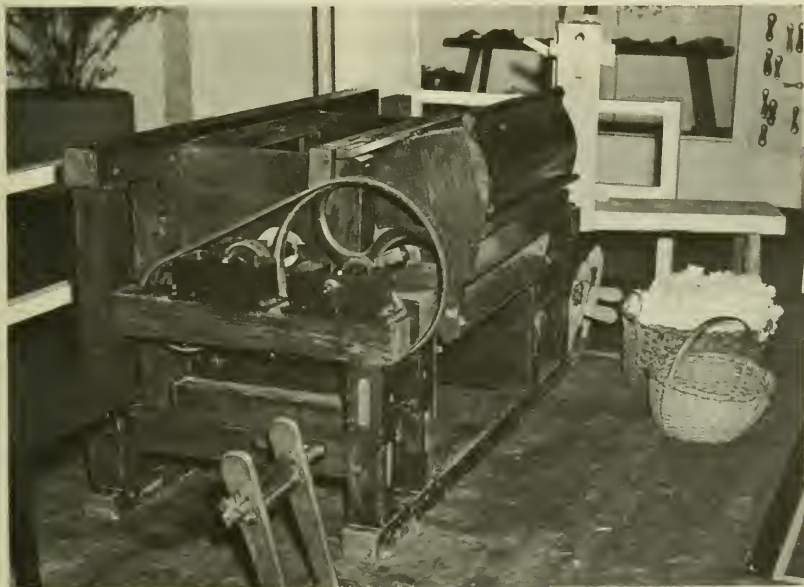


of the same type of machine. Such "hot metal" typesetting machines are now in competition with photocomposition machines, of which an example, the Mergenthaler "Linofilm," also has been received. In the field of printing, an example of the Hoe drum-cylinder printing press of 1879 has been received from Judd and Detweiler, Inc., a press that was the mainstay of newspaper publishers in the last four decades of the 19th century.

In connection with a research project dealing with the movement and handling of mail, the Department has assembled a collection of objects ranging from a letterbox of Boyd's City Express (New York) of the 1840s, given by Leo Scarlet, to the "Transorama" mail-sorting machine installed in 1957 at Silver Spring, Maryland. More conventional additions to the philatelic collections have included materials related to Palestine under Turkish rule, from Sidney N. Shure, and the personal philatelic collection of Amelia Earhart, including a number of rare covers, given by Mrs. Elsie M. Williamson.

Of a number of other important objects received in the Department, the most remarkable perhaps are examples of collodion microfilm pelli-  
cles, which during the seige of Paris (1870) in the Franco-Prussian war, had been sent by pigeon post. The Division of Textiles has received from Clemson University a 40-saw cotton gin (circa 1825-50) as well as

19th-century cotton gin (gift of Clemson University).



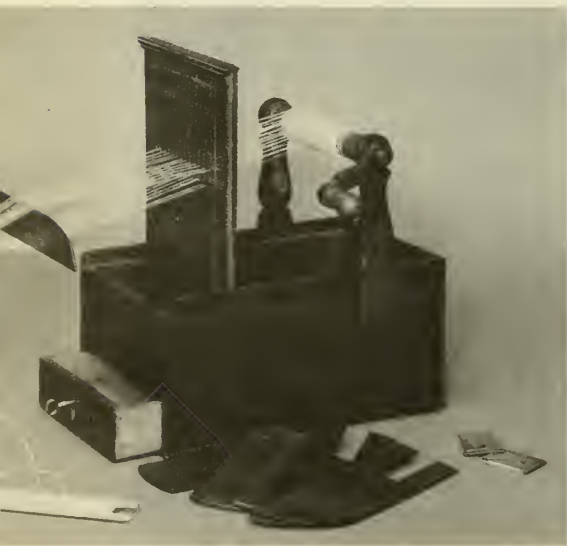
a primitive Churka-type roller gin presented by Alfred Pendleton. Mr. and Mrs. James G. Stahlman have presented an example of the historic Breeches Bible of 1587, so called from a distinction made in the raiment of Adam and Eve: the "aprons" woven from fig leaves (as later translated in the King James Version) were rendered by the translators in 1587 as "breeches."

The range of acquisitions during the year perhaps is best illustrated by the diamond-encrusted (450 diamonds) medal Order of the Golden Fleece, made in 1849 by order of the Prince of Lobkowitz, Duke of Raudnitz, and the "Bible quilt," depicting stories from the Old and New Testaments, which was exhibited in the Athens, Georgia, Cotton Fair of 1886 by an elderly Negro farm woman identified only as Harriet. The former was given by Mrs. Marjorie Merriweather Post; the latter, by Mr. and Mrs. H. M. Heckman.

The work of the textile laboratory has been extended to include the scientific cleaning of multiple-unit items such as early embroidered and hooked rugs.

### *Department of Cultural History*

The colonial and federal period collections have been enriched by a gift from the Maryland Historical Society: ballroom paneling from John Frederick Amelung's late 18th-century mansion in Frederick



Tape loom, English, late 18th century, a rare example from the collection and currently a research project of Rita J. Adrosko.

County, Maryland, which overlooked the site of his ambitious but ill-fated "New Bremen Glassmanufactory." From the same period, in Alexandria, Virginia, the archeological activity of Richard Muzzrole has yielded kiln-site artifacts of the pottery of Henry Piercy (1793–1801).

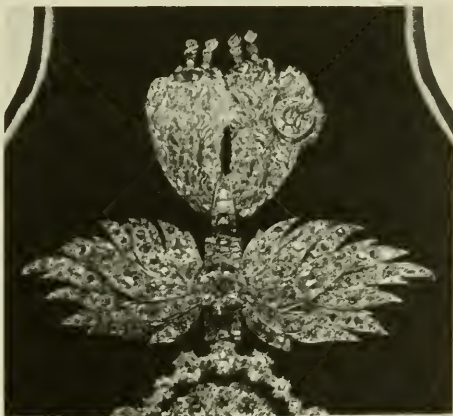
Similar in its range of interest and usefulness is Frederick Maloney's gift of a pipe-pressing machine, together with molds and pottery pipe bowls, from a 19th- and early 20th-century pottery and pipe factory in Pamplin, Virginia.

The Copp collection, one of the most notable extant collections of materials representing the history of a single family, has been augmented by the receipt of Johathan Copp's "great chair" (as described in his 18th-century inventory) from Miss Catherine B. Avery. A pictorial record of Negro life in rural Florida in the 1930s has been provided in seven oil paintings given by the artist, Henry Hutchinson Shaw; and the collection of Spanish-American materials has been augmented by a figure of the flagellated Christ, *Jesus Nazareno*, made in New Mexico about 1900.

The most notable acquisition in the field of American culture for the post-Civil War era has been a 60,000-piece pictorial center table, together with tools, inlay fragments, and awards pertaining to the maker, Peter C. Glass, a German-American master of inlay furniture. The table was the gift of Mrs. Frank Vidano.

A complete remodeling of the reference area of the Division of Musical Instruments has provided continuous glass enclosures with the result that instruments now are immediately visible. Use of the Termatrex data-retrieval system, a continuing project directed by Betty J. Walters,

Order of the Golden Fleece, containing approximately 450 diamonds. This outstanding historical piece was made in 1849 by order of Prince Lobkowitz, Duke of Raudnitz. Some of its parts, including the fleece as such, may date from the 18th century. (Donated by Mrs. Merriweather Post.)



Museum technician Ulysses G. Lyon removes a pipe bowl from the mold of a pipe-pressing machine that museum technician Richard Drake has just opened. (Gift of Fred Maloney.)



has comprehended 8500 specimens in this department, greatly facilitating the effort to improve the accessibility and documentation of the collection.

### *Department of Industries*

The Division of Transportation has acquired two hundred original drawings, prepared for the Bureau of American Fisheries between 1865 and 1885, that deal with fishing techniques and apparatus. Since the marine transportation collections of this museum, as originally assembled by the United States Fish Commission, predecessor of the Bureau of Fisheries, were oriented toward fishing vessels, this acquisition augments one of the strongest features of the collections.

Added to the ceramics collections are two rare examples from the celebrated Chelsea pottery, the most important English producer of porcelain in the 18th century. The superb quality of this soft-paste porcelain is well depicted in these two decorative pieces, one an owl with foliage and the other a canary with leaves and flowers. Both represent



the period of finest work at Chelsea (about 1750). Other important pieces received include an 18th-century Liverpool plate, from Dr. Lloyd E. Hawes, and a magnificent glass globlet decorated with a German townscape, from Mr. and Mrs. Rudolph Strasser. As in previous years, Dr. Hans Syz has added to the important collection that bears his name.

The gift of a 1905 Mercedes sports touring car, by Frederic Gibbs, introduces the first foreign vehicle into the automobile collection. Limitation of this collection to American vehicles results partly from lack of space, but primarily it reflects the extreme rarity of European vehicles of very early date. The 1905 Mercedes represents something of a culmination in the ingenuity of the early designer in both style and capability.

A planned series of models illustrating the development of the street railway car has been completed with acquisition of the model of a Chicago street car of 1910. Similarly, a gift by the Norfolk and Western Railway, a model of their eight-wheel switching locomotive number 244, has completed a series planned, at the opening of this Museum, of representative American locomotives. Number 244 is in fact the last steam locomotive built in the United States for domestic service.

A project is in progress for documentation of ship plans in the collection by the use of modern data-retrieval methods.



"Celery Pickers," one of a series of paintings depicting Negro life in rural Florida in the 1930s (given by the artist Harry Hutchison Shaw).

My dear Fleury,

Captain Randall of the Ship Jay of New-York, will, I expect have the honor to deliver you this letter. He is a part owner of the Ship and Cargo, and as I wish him success, both on his own account and that of the rest of the Owners, with whom I am acquainted, I take the liberty of recommending him to your kind attention, requesting you to favor him with your advice and influence, which I shall consider as a personal obligation to me.

I am just returned to Europe from America, and am charged to present a letter from Congress to the King of France, in consequence of which I expect to embark in the next Fleet of Evolution. — What this may lead to I know not: but if the new Constitution is adopted, as there is reason to expect, America will soon be a very respectable Nation, and the creation of a Marine Force will necessarily be among the first objects of her policy.

Since your departure I have spent the chief part of my time in France, and have heard frequently, and with great pleasure, of your health and welfare. — I am with great regard, my dear Fleury,

Your affectionate  
and most humble servant  
JOHN PAUL JONES

Monsieur le Chevalier de Fleury,

Colonel en chef du Regt. de Poissinony à l'Île de France.

Letter from Commodore John Paul Jones to Marquis de Fleury regarding the future "Marine Force" of the United States.

### Department of National and Military History

The Department has received memorabilia of the presidency ranging from the administration of George Washington to that of Richard Nixon, the most important items being a portrait of Mrs. Benjamin Harrison by Lilly Martin Spencer, presented by Mrs. Donald R. Gates, and the gavel used at the 1968 Republican National Convention, presented by Congressman Gerald R. Ford. Other notable acquisitions in this cate-

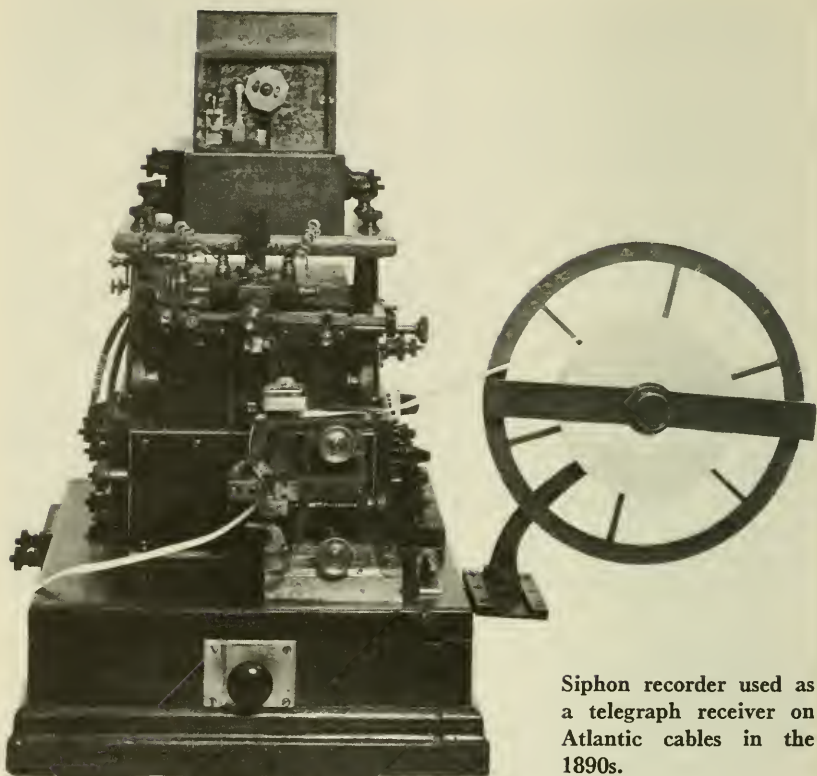
English commemorative glass goblet with an image of John Wilkes holding the "Bill of Rights" with garlands on each side, circa 1760 (possibly Newcastle), height 11½ inches, diameter of bowl 5½ inches, diameter of foot 5 inches.



gory are the carriage used at the White House by President Grant, gift of Pearson S. Meeks, and specimens of the state china used at the White House by President Lyndon Johnson.

To the collection of materials representing political and social movements has been added a number of objects associated with the Poor People's Campaign of 1968, including a family-unit dwelling from "Resurrection City," which was presented by the Southern Christian Leadership Conference.

A truly remarkable acquisition has come to the Department in a group of seven commissions issued to William Sylvester between 1744 and 1781. These range from a commission for coroner in the "County of Plimouth," Massachusetts Bay, dated 6 February 1744, signed by W. Shirley, and bearing the seal of King George II, to a commission for justice of the peace of Cumberland County, Province of Massachusetts Bay, dated 18 October 1781, signed by John Hancock and John Avery, and affixed with the seal of the Commonwealth of Massachusetts. Most interesting of the group is a printed commission bearing the seal of Massachusetts Bay on which the letterhead of George III has been scratched out and "The Government and People of Massachusetts Bay, New England" has been written in its place. This commission, appointing Sylvester justice of the peace of Cumberland County, is signed by Samuel Adams and fifteen members of the Council of Safety and is dated 7 September 1776.



Siphon recorder used as a telegraph receiver on Atlantic cables in the 1890s.

Oldest of the year's military and naval acquisitions is an Admiralty-style model of the 50-gun ship-of-the-line, H.M.S. *Falkland*, which was built at Portsmouth, New Hampshire, in 1695. The model is based on dockyard plans taken off about 1700. Contributing an item for the following century, the family of William H. McKay, Jr., has presented a letter dispatched in 1787 by John Paul Jones to the Chevalier de Fleury, who fought at Yorktown and was the only foreign officer awarded a medal by the Continental Congress during the American Revolution.

The nineteenth century has been represented by a number of weapons received, including an early production model of the breech-loading pistol invented and manufactured by Alonzo Perry in 1855. The latter item was presented by Glen C. Perry, grandson of the inventor, and by Cleveland Lane. The collections relating to both World Wars have been augmented by such varied acquisitions as a group of 175 glass-plate negatives of American submarines of World War I, given by the Old Dartmouth Historical Society, and the "tanker's jacket" worn by Gen-



eral of the Army Omar Bradley when he commanded the Twelfth Army Group in Europe in 1945.

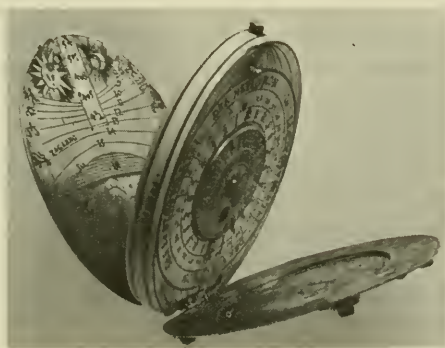
In the program for underwater exploration, trading artifacts, including ax and mallet heads, augurs, blocks and sheaves, and fragments of smoking pipes, have been recovered from the sites of the *Warwick* (wrecked in 1619) and the *Virgina Merchant* (wrecked in 1660), both of which, en route to Jamestown, sank off Bermuda.

Archeological activity in Alexandria, Virginia, and Fort Michilimackinac, Michigan, has yielded artifacts that are reported under "Research" for Cultural History. The work of the preservation laboratory has been facilitated by technical changes that make possible several simultaneous electrolytic reductions in the preservation of submerged objects and by the volunteer work of Mrs. Florence Horney in the restoration of ceramic artifacts.

### *Department of Science and Technology*

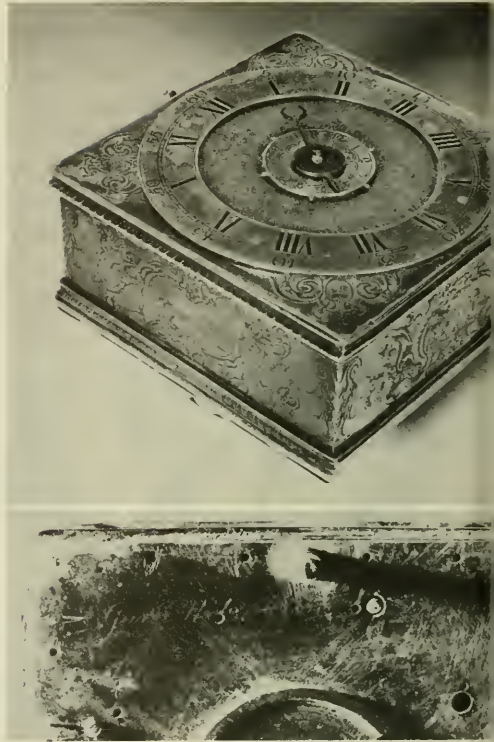
The most important accession of the year probably is a collection of about 200 pieces of apparatus given by Western Union International from its cable stations in Newfoundland. Together with other materials already on hand, these items give the Department an almost complete cross section of apparatus used in the hundred-year history of transatlantic telegraphy.

Accessions in the field of mathematics have ranged from a seventeenth-century compendium of ivory and gilt brass, comprising two sun dials, a lunar dial, and a compass rose, to a digital computer system



Unusual 17th-century German astronomical compendium made of ivory and gilt bronze and signed by Hans Ducher.

This early-17th-century table clock is the work of David Ramsay, one of England's greatest clockmakers, who served as clockmaker to both James I and Charles I and as foundation master of the Clockmakers Company, when it was founded in 1631. Several watches by Ramsay are known but only one other clock, which is in the Victoria and Albert Museum. An inscription (below) on the interior plate, "George Washington," in an 18th-century hand has not been positively identified as that of the first president.



of 1958. Among the more noteworthy pieces are a logic machine made by Benjamin Burack in the 1930s and a photoelectric serial-lag correlator made by Gordon Gibson in the 1940s.

In the departmental reorganization, which is represented for the first time in this report, the collections relating to nuclear energy have been transferred to the Department of Science and Technology. A decade of collecting activity in the field is reported by Philip Bishop in the introduction to the Museum report. Dr. Bishop's continued efforts during the year have led to notable additions to the collection: the proton nuclear accelerator of 1956-57, which is associated with the Nobel Prize work of Luis W. Alvarez, and "Scylla I," the first thermonuclear reactor for peaceful purposes, developed at the University of California, to which we are indebted for the acquisition.

The Department also has received, from a pioneer developer of the electron microscope, L. Marton, a reproduction of his first instrument, made in Belgium in 1932. In addition, the Department has acquired two of the earliest instruments developed in this country after Dr. Marton had joined RCA in 1938. One of these, from Colorado State University, is from the first group of six instruments produced by RCA after

J. Hillier had joined and continued the project. Representing a slightly later date is another instrument received from the United Shoe Machinery Corporation.

Individual objects of particular significance received this year are a David Ramsay table clock of about 1630, which is one of the oldest English clocks extant, a nuclear magnetic resonance cavity, from E. M. Purcell and R. B. Pound, which was used in experiments for which Purcell shared a Nobel Prize with Felix Bloch in 1952 (a magnet representing some of Bloch's later work was received last year). Some of the first microbalances used in the United States have been received from Mrs. Wilbur Patterson.

### Specimens in the National Collections

10 June 1969

(Prepared by Office of the Registrar)

	<i>Additions in 1969</i>	<i>On hand totals</i>
Department of Armed Forces History		
Military History	1, 720	46, 945
Naval History	1, 338	15, 173
Totals	3, 058	62, 118
Department of Arts and Manufactures		
Agriculture and Forest Products	33	10, 724
Ceramics and Glass	213	19, 466
Graphic Arts	7, 207	61, 374
Manufactures and Heavy Industries	507	36, 943
Textiles	197	36, 800
Totals	8, 157	165, 307
Department of Civil History		
American Costume	139	13, 177
Cultural History	573	27, 177
Musical Instruments	23	80
Numismatics	18, 804	345, 925
Philately and Postal History	56, 889	11, 714, 945
Political History*	1, 156	38, 179
Totals	77, 584	12, 139, 483
Department of Science and Technology		
Electricity	189	8, 416
Mechanical and Civil Engineering	266	13, 033
Medical Sciences	76	37, 029
Physical Sciences	144	4, 876
Transportation	34	43, 220
Totals	709	106, 574
Grand Totals	89, 508	12, 473, 482

\*Count for American Costume Section separated from Political History in 1968.

Specimen Transactions, Fiscal Year 1969  
(Prepared by Office of the Registrar)

<i>Departments</i>	<i>New acces- sions</i>	<i>Re- ceived on loan</i>	<i>Exchanged with other institu- tions</i>	<i>Trans- ferred to other govern- ment agencies</i>	<i>Lent for study to investi- gators and other institu- tions</i>	<i>Speci- mens identi- fied</i>
Armed Forces History	141	0	0	1	34	564
Arts and Manufac- tures	177	1	1	0	178	685
Civil History	606	197	740	500	1,322	2,304
Science and Tech- nology	140	385	0	0	133	5
Totals	1,064	583	741	501	1,667	3,558

## EXHIBITS

No substantial progress has been made during the year on exhibitions of the collections, but a number of outstanding special exhibits encompassing a wide variety of subject matter have brought significant portions of the national collections to public attention.

The most timely exhibit of the year has been "The Quest for the Presidency," an extensive presentation of the history of political campaigning, that opened 17 August at the height of the 1968 presidential campaign. Prepared by Herbert R. Collins, the campaigning memorabilia featured broadsides, buttons, banners, and ballots from the time of George Washington to Lyndon B. Johnson. In addition to this history of political organizations, techniques of individual candidates were represented.

This production was followed by "Hail to the Chief," a spectacular exhibit on the history of presidential inaugurations that opened 8 January. Prepared by Margaret B. Klapthor, the exhibit presented in historical content treasured memorabilia ranging from the balcony railing from which Washington took his oath of office to the gowns worn at several inaugural balls. Taped recordings of campaign songs and silent movies recreated inaugurals of presidents from McKinley to Coolidge. As a supplement, a display of the historical development of the Inaugural Medal was prepared by Mrs. Elvira E. Clain-Stefanelli especially for the inaugural ceremonies held in the Museum in January 1969.

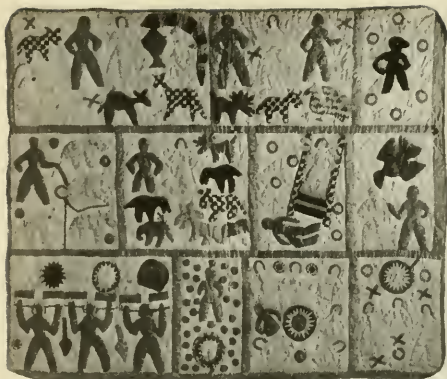




After a concert in the National Museum of History and Technology in honor of the Music Council of UNESCO and the International Association of Music Libraries, 18 September 1969 (left to right): Carole Bogard, soprano; Judith Davidoff (holding Barak Norman gamba of 1718); Sonya Monosoff (holding Marshall violin of 1759); James Weaver, harpsichordist; Walter Trampler (holding Aman viola d'amore of 1705).

Only surviving example of the so-called half doubloon, struck by Ephraim Brasher in 1787. Living in New York at No. 5 Cherry Street, this goldsmith was at one time a next-door neighbor to George Washington. (This is the earliest among the United States gold coins in the Josiah K. Lilly, Jr., Collection.)





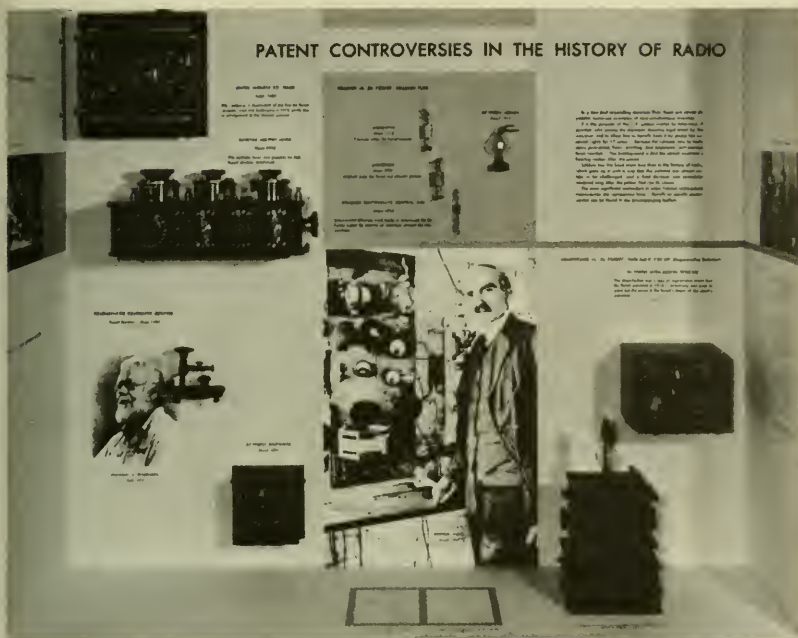
Appliqué Bible quilt depicting stories from the Old and New Testaments, made by an elderly Negro farm woman named Harriet, from the outskirts of Athens, Georgia, and exhibited in the Athens Cotton Fair of 1886.

Undoubtedly the most dramatic of the Musuem's special exhibits has been the display, also prepared by Mrs. Clain-Stefanelli, of the entire collection of 6,135 gold coins assembled by the late Josiah K. Lilly and presented to the Smithsonian.

The Division of Graphic Arts and Photography has produced a retrospective display of lithographs, etchings, and silkscreen prints of Raphael Soyer, an exhibit of drawings of Austin, Texas, rendered by Edgar Dorsey Taylor, and a print show of "High School Graphics," the latter of which was organized jointly by the Division of Graphic Arts and Photography, the Washington Print Club, and the District high schools in an attempt to foster print making as a part of the school curriculum.

**Demonstration of Hall Neurairtome, used for cutting and drilling bone.**





Half of a special exhibit on radio patent controversies that opened in October 1968 at a meeting of the Antique Wireless Association.

A new series of photographic print exhibitions entitled "Women, Cameras, and Images" was inaugurated in December 1968 by the same Division, along with an Imogen Cunningham retrospective exhibit. "The Lingering Shadow," a display of photographs from the national collections representing outstanding technological and artistic accomplishments was opened in June 1969.

Two exhibits of industrial art produced by the Division of Manufactures have included a selection of art works on "The Coke Push" and a series of oil paintings of "Abandoned Mine Scenes" by Carol Riley.

The development of the cotton gin from the use of the simple roller gin in the East to the 19th-century American spiked-tooth gin has been the subject of a display installed by the Division of Textiles with live demonstrations of the equipment. A 19th-century "Bible quilt," which incorporated eleven vignettes from Old and New Testament stories has been a display of considerable interest.

A series of special exhibit cases featuring recent gifts to the collections have been initiated during the year in an effort to inform visitors of the wide range of the Museum's collections and to acknowledge donors' gifts of Museum objects. These displays have proved to be ex-

Northern Liberties Fire Company scene about 1855, oil painting by John Shreeve.



tremely successful and the program will be continued with the periodic addition of new units.

In the Hall of Medical Sciences a display of modern developments in surgical instrumentation has featured instruments driven by compressed air for operating at ultra-high speed, instruments that were designed and produced by Dr. Robert Hall and now are widely used to perform difficult operations not previously possible.

"Patent Controversies in the History of Radio" was prepared for the convention of the Antiques Wireless Association in October 1968, and a special exhibit was prepared to commemorate the Golden Spike ceremony on its anniversary in May 1969.

A special exhibit commemorating "Human Rights Year" has been installed in the Hall of Historic Americans, where the continuing struggle for human rights in America is depicted. Articles on display range from materials relating to Abolition, Emancipation, the Women's Rights movement, and the efforts of Negroes from 1830 to 1968 to gain full rights, the latter climaxed by a memorial to Dr. Martin Luther King, Jr.

For the first time, a large group of rare and historic postage stamps and covers from the national collection have been included in a significant international philatelic exhibition in a foreign nation: the Division of Philately and Postal History participated in EFIMEX '68





Transcontinental railroad special case placed on exhibit May 1969 in the Railroad Hall, to mark the centennial of its opening.

[Exposición Filatélica Internacional México] in Mexico City in November. Several philatelic exhibits were prepared in cooperation with foreign embassies, including an exhibit of the stamps of Malta that featured original artwork, proofs, and other rarely seen Maltese philatelic materials, a collection loaned by the Federal Republic of Germany to commemorate the twentieth anniversary of Germany's government, an exhibition of stamps of the nations of the African and Caribbean Commonwealth, and a significant display of stamps, as issued by various countries, honoring the late Dr. Martin Luther King, Jr.

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- . "Women, Cameras, and Images I: Imogen Cunningham." 2 pages. Washington, D.C.: Smithsonian Institution Press, November 1968. [Exhibition catalog leaflet.]
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- MCCUSKER, JOHN J. "New York City and the Bristol Packet: A Chapter in 18th-Century Postal History." *Postal History Journal* (July 1968), volume 13, number 2, pages 15–24.

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- . [Translation from Norwegian and editorial preparation of:] "Norway – The Stereotyped Stamps of 1883–85" by T. Soot-Reyn. *The Posthorn* (June 1968), volume 25, number 3, pages 56–66.
- . "Project Smithsonian – A Review and Report, and Plan for Next Move." *Scandinavian Scribe* (July 1968), volume 4, number 8, pages 142–46.
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- . "The Smithsonian Institution and Philately." *The Collectors Club Philatelist* (May 1969), volume 48, number 3, pages 143–44, 146.
- . Address at opening of special exhibition at National Museum of History and Technology in "Federal Republic of Germany's 20th Anniversary Exhibition in Washington, D.C." *Stamps* (7 June 1969), volume 147, number 10, pages 505–07.

## Department of Cultural History

- AHLBORN, RICHARD E. "The Ecclesiastic Silver of Colonial Mexico"; "Domestic Silver of Colonial Mexico." In *1968 Winterthur Conference Report: Spanish,*

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- KIDWELL, CLAUDIA B. "Women's Bathing and Swimming Costume in the United States." Paper 64 in *Contributions from the Museum of History and Technology* (United States National Museum Bulletin 250). Pages 1–32, illustrated. Washington, D.C.: Smithsonian Institution Press, 1968.
- WELSH, PETER C. "Introduction." In "An Improved Method of Tanning Leather," by David Macbride. *The Smithsonian Journal of History* (winter 1967–1968), volume II, number 4, pages 67–76.

## Department of Industries

- BISHOP, PHILIP W. "L'Introduction des techniques modernes sur le Nouveau Continent." In *Histoire Generale des Techniques*, Maurice Dumas, editor. Volume III, pages 808–819. Paris: Presses Universitaires de France, 1968.
- . *Petroleum*. 31 pages. Washington: Smithsonian Institution Press, 1969.
- . "John Wesley Hyatt and the Discovery of Celluloid." *Plastics World* (October 1968), volume 26, pages 30–38.
- CHAPELLE, HOWARD I., and LIEUTENANT COLONEL M. E. S. LAWS, R.A. (Ret.). "H.M.S. *DeBraak*: The Stories of a Treasure Ship." *Smithsonian Journal of History* (winter 1967–1968), volume 2, pages 57–66.
- GEOGHEGAN, WILLIAM E. "The Auxiliary Steam Packet *Massachusetts*." *Nautical Research Journal* (spring 1969), volume 16, number 1, pages 27–37.
- GEOGHEGAN, WILLIAM E., THOMAS W. GREEN, CAPTAIN R. STEENSEN, RDN, and FRANK J. MERLI. "The South's Scottish Sea Monster." *American Neptune* (January 1969), volume 29, number 1, pages 5–29.
- HILTON, GEORGE W. *The Night Boat*. 271 pages. Berkeley: Howell-North Books, 1968.
- . *The Transportation Act of 1958*. x + 272 pages. Bloomington and London: Indiana University Press, 1969.
- . "The Hosmer Report: A Decennial Evaluation." *ICC Practitioners' Journal* (1969), volume XXXVI, pages 1470–1486.
- . "Introduction." In John A. Droege, *Passenger Terminals and Trains*. pages i–iv. 1916. [Reprinted by the Kalmbach Publishing Company, 1969.]
- MILLER, J. JEFFERSON, II. "Canadian Views on English Transfer-Printed Earthenware." *Canadian Antiques Collector* (October 1968), pages 10–14.
- . "Unrecorded American Views on Two Liverpool-Type Earthenware Pitchers." *Winterthur Portfolio* (1968), volume 4, pages 109–117.
- OLIVER, SMITH HEMPSTONE, and DONALD H. BERKEBILE. *The Smithsonian Collection of Automobiles and Motorcycles*. 164 pages, 126 illustrations. Washington: Smithsonian Institution Press, 1969.
- SCHLEBECKER, JOHN T. *To Walk Into the Past: Living Historical Farms*. 32 pages. Washington: Smithsonian Institution Press, 1968.
- . "The Symposium on 18th-Century Agriculture, October 1967." *Agricultural History* (January 1969), volume 43, pages 1–3.
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- . "The Great Holding Action: The NFO in September 1962." Reprint. Pages 359–372 in *Readings in Collective Behavior*, Robert R. Evans, editor. Chicago: Rand McNally, 1969.
- SUMMONS, TERRY. "Animal Feed Additives." *Agricultural History* (October 1968), volume 42, pages 309–313.
- WESSEL, THOMAS R. *The Honey Bee*. Information Leaflet 482. Revised edition. 16 pages. Washington, D.C.: Smithsonian Institution Press, 1968.
- . "Roosevelt and the Great Plains Shelterbelt." *Great Plains Journal* (spring 1969), pages 57–74.
- WHITE, JOHN H. "The Cincinnati Inclined Plane Railway Company: The Mount Auburn Incline and the Lookout House." *The Cincinnati Historical Society Bulletin* (spring 1969), volume 27, number 1, pages 7–23.
- . "Facing on a Single Track . . . Jupiter and 119." *Trains* (May 1969), pages 48–50.
- . "The Cuyahoga Steam Furnace Company." *Smithsonian Journal of History* (spring 1968), volume 3, number 1, pages 59–76. [Issued June 1969.]

### *Department of National and Military History*

- BROOKS, PHILIP C., JR. "Rolls-Royce and the Smithsonian." *The Flying Lady* (January 1969), number 69–1, pages 1128–1129.
- . "Inaugural Committees, Yesterday and Today." In *The Inaugural Story*. Pages 22–23. 1969 Inaugural Committee with *American Heritage Magazine*, 1969.
- HOWELL, EDGAR M. "An Artist Goes to War: Harvey Dunn and the A.E.F. War Art Program." *Smithsonian Journal of History* (winter 1967–1968), volume 2, number 4, pages 45–56.
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- LUNDEBERG, PHILIP K. "The Museum Perspective." *Military Affairs* (1968), volume 32, numbers 2–4, pages 76–78, 143–146, 201–202; (1969), volume 33, number 1, pages 267–269.
- PETERSON, MENDEL. *History under the Sea: A Manual for Underwater Exploration*. 208 pages. Third edition. Washington: Smithsonian Institution Press, 1969.
- . "Magnetic Search for Bermuda Wrecks." *Explorers Journal* (December 1968), volume XLVI, number 4, pages 266–274.
- PETERSON, MENDEL, and JOHN ELLIS. "Bermuda's History under the Sea." *Oceans* (February 1969), volume 1, number 2, pages 28–39.

### *Department of Science and Technology*

- FINN, BERNARD S. "Electron Theories of Conduction in the 19th Century." *Actes du XIe Congres International d'Histoire des Sciences* (1968), volume 3, pages 398–401.

- HAMARNEH, SAMI K. "The Climax of Medieval Arabic Professional Pharmacy." *Bulletin of the History of Medicine* (fall 1968), volume 42, number 5, pages 450-461.
- VOGEL, ROBERT M. *The New England Textile Mill Survey I - Report on the First Summer's Work of the New England Textile Mill Survey*. 38 pages, 23 illustrations. Washington, D.C.: Smithsonian Institution, Division of Mechanical and Civil Engineering, 1969.
- WARNER, DEBORAH J. *Alvan Clark & Sons: Artists in Optics*. vi+120 pages, 28 figures. (United States National Museum Bulletin 274). Washington, D.C.: Smithsonian Institution Press, 1968.

## PAPERS, LECTURES, AND SEMINARS

### *Office of the Director*

#### TEACHING

- MULTHAUF, ROBERT P. "An Introduction to the History of Science." Year course (three credit hours), George Washington University.
- . "Readings in the History of Science." One term (three hours, one student), George Washington University.

#### LECTURES

- BEDINI, SILVIO A. "Hardware of History—Artifacts of Colonial American Science." Special Libraries Association, at the Museum, 19 March 1969.
- MULTHAUF, ROBERT P. "Adrift in a Sea of Saltpeter." Chemistry Group, Brookhaven National Laboratory, 30 April 1969; Corning Section, American Chemical Society, 5 May 1969.

### *Department of Applied Arts*

#### LECTURES

- ADROSKO, RITA J. "American Textiles, 1750-1850." School of Architecture, Columbia University, March 1969.
- . "Looms." Textiles Department, Moore College of Art, March 1969.
- . "Dyes from Nature." Potomac Craftsmen, Washington, D.C., May 1969.
- . "Museums as a Classroom Resource." American Home Economics Association Convention, Milwaukee, Wisconsin, June 1969.
- . "Woven Textiles in 18th-century America." College of Home Economics, University of Maryland, at the Museum, June 1969.
- CLAIN-STEFANELLI, ELVIRA. "The Artistic Evolution of the American Medal." Associates of the Smithsonian Institution, 11 June 1968. [Not reported in *Smithsonian Year 1968*.]
- . "The Coinage of Italy Throughout the Ages." Montgomery County [Maryland] Coin Club, 16 October 1968.
- . Opening address. Inauguration of Israel Numismatic Society of Washington, 24 November 1968.

- . "United States Inaugural Medals." Radio broadcast in Romanian language for Voice of America, January 1969.
- . Opening address. Second Annual Washington Numismatic Forum, at the Smithsonian, 1 March 1969.
- . "The American Medal." New York Numismatic Coin Club, 14 March 1969.
- . "Josiah K. Lilly, Coin Collector." 14th Metropolitan Numismatic Convention, New York City, 12 April 1969.
- CLAIN-STEFANELLI, ELVIRA, and VLADIMIR CLAIN-STEFANELLI. Television programs on the Josiah K. Lilly Collection for Time-Life, Inc., with Don MacKinnon, taped 31 October and 8 November 1968.
- CLAIN-STEFANELLI, VLADIMIR. "The Significance of the Josiah K. Lilly Collection." Georgia Numismatic Association Convention, 3 August 1968.
- . "Christian Gobrecht and His Work." Middle Atlantic Numismatic Convention, Philadelphia, Pennsylvania, 24 October 1968.
- . "Historically Significant Pieces in the J. K. Lilly Collection." Second Annual Washington Numismatic Forum, at the Smithsonian, 1 March 1969.
- . Participant in panel discussion "Numismatics at the University as Part of a College Curriculum." Central States Education Forum, Chicago, Illinois, 3 May 1969.
- COOPER, GRACE R. "Smithsonian Institution, Mecca on the Mall." Alumnae Association, College of Home Economics, University of Maryland, April 1969.
- . Planning and leading of one-day seminar, "Textiles and Clothing in the Museum Collections." Part of graduate course "The Role of the Federal Government in the Textile and Clothing Industries," University of Maryland, June 1969.
- HABERSTICH, DAVID. "Early Photographic Patents." Photographic trade show and lecture series "Photography in 1969" sponsored by Fuller and d'Albert, Washington, D.C., April 1969.
- NORBY, REIDAR. "Early European Stamps and Their Printing Methods, Using the Norwegian 1863-66 Issues as Examples." Philatelic Society, Washington, D.C., 23 October 1968.
- . "Smithsonian's Research Facilities and Reference Collections—and Their Availability." North Jersey Scandinavian Collectors Club, Upper Montclair, New Jersey, 20 November 1968.
- . "Methods and Techniques for Comparing Details on Classic Postage Stamps, As Developed by the use of Smithsonian Instruments." North Jersey Scandinavian Collectors Club, Upper Montclair, New Jersey, 20 March 1969.
- OSTROFF, EUGENE. "Photomechanical Reproduction." Society of Photographic Science and Engineers, Washintgon, D.C., Chapter, 23 April 1968.
- . "The Invention of Photomechanical Reproduction." American Association of Museums—Annual Conference, New Orleans, Louisiana, 24 May 1968.
- . "Photography and Printers' Ink." International history of photography symposium sponsored by Czechoslovakian Academy of Sciences, 21 April 1969.
- SCHEELE, CARL H. "The National Postage Stamp Collection and Philatelic Exhibition at the Smithsonian." Silver Spring [Maryland] Philatelic Society, October 1968.
- . "Philatelic Activities of the Smithsonian Institution." Dolly Madison Stamp Club of McLean, Virginia, February 1969.

- . "The Philatelic Collection and Facilities of the Smithsonian." Falls Church Philatelic Society, Virginia, April 1969.
- . "Outstanding Philatelic Materials and the Work of the Division of Philately." Library of Congress Recreation Association Stamp Club, May 1969.

## *Department of Cultural History*

### TEACHING

- AHLBORN, RICHARD E. "Spanish-American Building Technology." Graduate seminar on architectural restoration and preservation, Columbia University, at the Museum, February 1969.
- GOLOVIN, ANNE C. Discussion (in the hall) of the Growth of the United States exhibit. Graduate students from Hagley Program and Winterthur Program in Early American Culture, University of Delaware, April 1969.
- ROTH, RODRIS. "Material Objects as Documents." Discussion session, undergraduate class, Fine Arts Department, George Washington University, in the Museum, Cultural History reference collection rooms, April 1969.
- WATKINS, C. MALCOLM. "The Role of the Object in the History Museum." Half-day lecture and discussion session, part of docents training course, Oakland Museum Association, Oakland, California, September 1968.

### LECTURES

- AHLBORN, RICHARD E. "A Survey of Religious Medals in Smithsonian Collections and in Spanish-American Archeological Sites." Annual Meeting of Society of Historical Archaeology, 8 January 1969, Tucson, Arizona.
- . "The Colonial Arts of Spanish America." History class, University of Maryland, 5 May 1969.
- . "The Arts of Mexico Since Independence." University of Maryland, 5 May 1969.
- GOLOVIN, ANNE C. "Techniques of Construction in the Ipswich House Exhibited in the Growth of the United States Halls." Graduate seminar on architectural restoration and preservation, Columbia University, at the Museum, April 1969.
- GREENE, CARROLL, Jr. Afro-American artifacts. Bibliographic workshop on Negro resources, Howard University, at the Museum, August 1969.
- . Participant in panel "New Urban Opportunities for Museums." 64th annual meeting of American Association of Museums, San Francisco, 27 May 1969.
- KIDWELL, CLAUDIA. American costume. Founder's Day Dinner, American Association of University Women, Hagerstown, Maryland, Branch, 18 March 1969.
- ROTH, RODRIS. "Furniture at the Centennial." New Hampshire Historical Society, Concord, New Hampshire, March 1969.
- WATKINS, C. MALCOLM. "Utensils of the Pioneer" (including a later class tour of Hall of Everyday Life in the American Past). Adult education extension course on pioneer life, Northern Virginia Community College and Pioneer America Society, Falls Church, Virginia, April 1969.



*Department of Industries*

## LECTURES

- GARDNER, PAUL V. "The Stourbridge Heritage." Ninth Annual Seminar on Glass, Corning Museum of Glass, October 1968.
- JACKSON, MELVIN H. "Marine Technology and the Age of Exploration." Series of lecture seminars, University of Pennsylvania, fall term 1968.
- SCHLEBECKER, JOHN T. "Comparison of Shenandoah Valley Farming in 1850 and 1969." Paper, special meeting, National Trust for Historic Preservation, Grove Plantation, Middletown, Virginia, May 1969.
- WHITE, JOHN H. "Public Transport in Washington before the Great Consolidation of 1902." Paper, Smithsonian-George Washington University Summer Seminar, August 1968.

*Department of National and Military History*

## TEACHING

- LANGLEY, HAROLD D. Diplomatic History of the United States; Rise of the American City; American Age of Enterprise; Historical Methods Seminar; Jacksonian America Seminar. Courses, Catholic University of America, Washington, D.C., 1968-69.
- LUNDEBERG, PHILIP K. Reading course in American Military History. American Studies Program, Smithsonian Institution, in association with George Washington University, 1968-69.

## LECTURES

- ALBRIGHT, ALAN B. "The Preservation of Artifacts from under Water." Washington Regional Conservation Guild, February 1969; National Park Service Headquarters, Harpers Ferry, West Virginia, April 1969.
- . "Electronic Survey of the Bermuda Coast." National Museum of Natural History and National Museum of History and Technology, March 1969; St. Mary's Historical Commission, St. Mary's, Maryland, May 1969.
- COLLINS, HERBERT R. "Campaigning for the Presidency." Talbot County [Maryland] Historical Society, October 1968.
- . "The Quest for the Presidency." Southern Pennsylvania Council for Social Studies, Lancaster, Pennsylvania, October 1968.
- . "Political Campaign Collection at the Smithsonian Institution." Charles County [Maryland] Historical Society, October 1968.
- . "History of Presidential Campaigning." Chester County Historical Society, West Chester, Pennsylvania, October 1968.
- . "Campaign Techniques of the 19th and 20th Century." History Department, Virginia Commonwealth University, Richmond, Virginia, February 1969.
- KLAPHOR, MARGARET B. "Costume of the 1930s." Chicago Historical Society and Chicago Fashion Group at opening of special exhibit "Costume of the 1930s," April 1969.

- . "Dress of the First Ladies of the White House" (including tour). Wives of District Commissioners of Internal Revenue during annual conference, September 1968.
- . "An Afternoon with the First Ladies." National convention of National Association of Counties in Washington, D.C., March 1969.
- . "The Smithsonian Institution Presents George Washington." Congressional Club, Washington, D.C., February 1969.
- LANGLEY, HAROLD D. "The Negro in the Armed Forces: A Historical Perspective from the Revolution to Vietnam." Teachers Institute, Board of Education, Baltimore, Maryland, December 1968.
- LUNDEBERG, PHILIP K. "Sea Power Prior to and During World War I." United States Naval War College, Newport, Rhode Island, December 1968.
- . "The Evolution of American Naval Construction: The National Collection of Warship Models." Pennsylvania Military College, Chester, Pennsylvania, February 1969.
- PETERSON, MENDEL. "History under the Sea." Washington Club, Washington, D.C., January 1969; Ohio Council of Skindivers, Canton, Ohio, January 1969; The Military Order of the World Wars, Washington, D.C., February 1969; American Society of Arms Collectors and Adult Education Program, Montclair, New Jersey, March 1969.
- VAN DER SLOOT, R. B. F. (of Dutch Army and Arms Museum, Leiden) and J. B. KIST (of Rijksmuseum, Amsterdam). "The Personal Armament of Dutch Citizens of Substance in the First Half of the Seventeenth Century As Shown in Dutch Museums and Illustrated in Dutch Portraits." American Society of Arms Collectors, at the Smithsonian, March 1969.

## *Department of Science and Technology*

### TEACHING

- CANNON, WALTER F. "Some Problems of Methodology in Nineteenth-Century History of Science." Lecture, history seminar, University of Maryland, February 1969.
- EKLUND, JON B. "Rational Chemistry before Lavoisier." Lecture, undergraduate course, University of Maryland, February 1969.
- . "Quantitative Chemistry and Atomic Theory in the Early Nineteenth Century." Lecture, history seminar, University of Maryland, March 1969.
- HAMARNEH, SAMI K. "The Natural Sciences in Medieval Islam." Semester course, University of Pennsylvania, spring 1969.
- VOGEL, ROBERT M. "Industrial Archeology." Field trip, Smithsonian American Studies Program, October 1968.
- . "Historic Architecture." Seminar session, Columbia University, November 1968.
- WARNER, DEBORAH J. "Astrophysics." Course for young people, given twice, Smithsonian Associates, fall 1968.

### LECTURES

- CANNON, WALTER F. "Methodology in History of Science." Lecture, faculty seminar, Department of History and Philosophy of Science, Cambridge University, England, April 1969.

- EKLUND, JON B. "Weights and Measures in the Eighteenth Century." National Scale Men's Association, Washington, June 1969.
- FINN, BERNARD S. "The Influence of Experimental Apparatus on Eighteenth Century Electrical Theory." Twelfth International Congress of the History of Science, Paris, August 1968.
- HAMARNEH, SAMI K. "History of Pharmacy and the Smithsonian Collections." Southern School of Pharmacy, Mercer University, Atlanta, Georgia, December 1968; at McDowell Museum, Danville, Kentucky, December 1968.
- . "Origins of Arabic Medicine." Department of Oriental Studies and Department of History and Philosophy of Science, University of Pennsylvania, March 1969.
- . "Arabic Medicine and Its Impact on Teaching and Practice of the Healing Arts in the West." Accademia Nazionale dei Lincei, Rome, April 1969.
- . "Greek Pharmacy in Perspective." American Institute on the History of Pharmacy, Montreal, Canada, May 1969.
- SIVOWITCH, ELLIOT. "Mechanical Television Systems." Annual meeting, Antique Wireless Association, Washington, October 1968.
- VOGEL, ROBERT M. "The Use of Archeology in Historic Preservation." Pennsbury Forum, October 1968.

## MUSICAL EVENTS

- 10 July 1968 through 28 August 1969. Tower music, weekly.
- 8 September 1968. Special concert for International Music Council of UNESCO and International Association of Music Libraries: Judith Davidoff, viola da gamba; Sonya Monosoff, violin; Walter Trampler, viola; Carole Bogard, soprano; James Weaver, harpsichord (instruments from Smithsonian collection used: Barak Norman viola da gamba, Marshall violin, Dodd bow, Stehlin harpsichord).
- 28 October 1968. Gustav Leonhardt, harpsichordist (using Smithsonian's Stehlin harpsichord).
- 13–15 November 1968. August Wenzinger and Hannelorre Mueller, violas da gamba; Robert Conant, harpsichord; Hans-Martin Linde, flute and recorder (Smithsonian's Stehlin harpsichord used).
- 18 November 1968. Cententus Musicus (Italian harpsichord of 1693 used).
- 14 January 1969. Jean Hakes, soprano; Stoddard Lincoln, piano (Schmidt piano of 1788 used).
- 4 February 1969. Hugues Cuenod, baritone; Raymond Lynch, lute.
- 3 March 1969. Danzi Quintet.
- 11 March 1969. Sonya Monosoff, violin; James Weaver, harpsichord (instruments from Smithsonian collection used: Marshall violin, Dodd bow, Vuillaume violin [first public use], Stehlin harpsichord, and Schmidt piano).

- 22 April 1969. Alarius Ensemble (Stehlin harpsichord and DeQuoco harpsichord of 1694 [first public use] used).
- 6 May 1969. Jean-Louis Barrault, Mme Renaud, New York Chamber Soloists (in cooperation with Smithsonian Associates).



# Freer Gallery of Art

JOHN A. POPE, *Director*



AS SET FORTH IN MR. FREER'S WILL, the function of the Freer Gallery of Art is twofold. In the first place, it is a center for research in the civilizations of the East; this research is the basic function of the staff. In addition to the Freer collections and library, materials for this research are available in libraries and museums in this country and abroad and in many archeological and historic sites in Asia, Africa, and elsewhere. Members of the staff travel as necessary to make use of these resources and to discuss problems with colleagues elsewhere who have similar interests. Results of this research are published intermittently either in the *Freer Gallery of Art Occasional Papers* or in the *Freer Gallery of Art Oriental Studies* as well as in outside scholarly journals.

The second function of the Gallery is to continue adding oriental objects of the finest quality to the collection whenever they become available. In the course of the travel mentioned above, all staff members keep their eyes open for objects that might be considered for purchase. The facilities of the Gallery are always at the disposal of visiting scholars who may wish to use them; and under established scholarship programs students are given encouragement and supervision in the advanced study of the history of oriental art.

## *Grant*

The Ellen Bayard Weedon Foundation has continued its notable and important contribution to the Gallery for library acquisitions.



Bronze, Japanese (Yayoi period, 2nd-3rd centuries A.D.): *Dotaku* with six rectangular panels on each side framed by crosshatched borders, broad thin flange with eighteen circular protrusions (of which eleven remain) on the narrow edge and over the top (68.73).

### *The Collections*

Among the twenty important works of art added to the collections by purchase, five may be singled out for illustration and comment here. A Japanese bronze bell-shaped object known as a *dotaku* and dating from the late Yayoi period, third century A.D., is the largest and one of the finest examples outside of Japan (68.73). Also Japanese is the painting of the Secret Five Bodhisattvas of the Shingon Sect of Buddhism dating from the early Kamakura period about the year A.D. 1200 (68.75). Two important Chinese acquisitions date from the Ming dynasty. A covered stem-bowl of blue and white porcelain bears the mark of the Hsüan-te reign (1426-1435) (68.77ab). Representing a slightly later period is a carved lacquer box showing figures in a garden before a palace carved with extreme delicacy in dark chocolate brown lacquer against a ground of the more usual cinnabar red, also richly carved with the conventional patterns for land, sea, and sky. Signed by the carver, it is closely related in style and technique to a published dish that bears a date corresponding to A.D. 1489 (68.76ab). A cylindrical mug of Turkish pottery from Iznik has a curious flat handle cut with sweeping curves at top and bottom. The decoration, in turquoise and cobalt blue with touches of red, shows a helter-skelter arrangement of sailing dhows among cypress-covered islands, on each of which is a

pavilion and a large bird completely out of scale with the rest of the composition. It dates from the last quarter of the 16th century (68.68).

Also purchased for the collections are the following:

# BRONZE

Japanese, Tumulus period, circa A.D. 6th century: Mirror with six bells (68.71). (68.71).

# LACQUER

Chinese, Sung dynasty, A.D. 10th–14th centuries: Dish with flattened foliate rim, cavetto fluted to match inside and out; deep chocolate brown with some lighter areas (68.67).

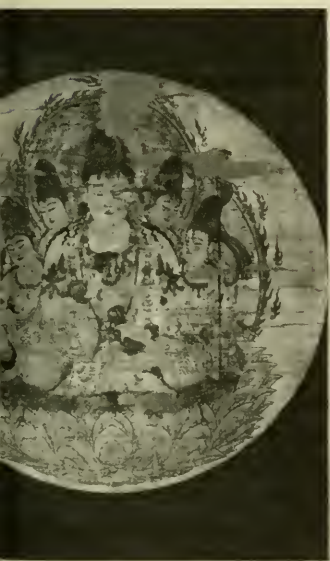
# PAINTING

Japanese, Namboku-chō-Ashikaga period, A.D. 14th century, Muromachi Suiboku school, attributed to Mokuan (died about 1348): Kannon seated on a rock; ink on silk panel (68.61).

Japanese, Ashikaga period, A.D. 14th–17th centuries, Kanō school, by Kanō Motohide, flourished early 16th century: Mongol hunting scenes, ink on paper (68.62); one of a pair of six-panel screens (68.63).

Japanese, Edo period, A.D. 17th–19th centuries, Ukiyoe school, by Katsushika Hokusai (1760–1849): Figures picnicking beneath an old pine tree; “Hyakunin Isshu Ubaga Etoki” series, poem by Fujiwara no Okikaze, Poem 34; ink on paper (68.64).

Japanese, Edo period, A.D. 17th–19th centuries, Shijo school, by Watanabe Kazan (1793–1841): Portrait of Satō Issai; ink and color on silk (68.66).



Painting, Japanese (early Kamakura period, A.D. 1185–1249, Buddhist school): Painting in ink and colors on silk with touches of gold, the Five Secret Bodhisattvas (*Gohimitsu Bosatsu*) of the Shingon Sect of Japanese Buddhism (68.75).



Pottery, Chinese (Ming Dynasty, Hsüan-te, A.D. 1426–1435): Stem bowl with cover, fine-grained white porcelain, transparent glaze, underglaze blue, floral scrolls between conventional borders, six-character Hsüan-te mark, horizontally from right to left in main band on bowl (68.77 a–b).

Japanese, Edo period, A.D. 17th–19th centuries, Nanga school, by Nakabayashi Chikutō (1776–1853): Landscapes, ink and slight color on paper (68.69); one of a pair of six-panel screens (68.70).

Japanese, Ashikaga period, A.D. 14th–17th centuries, Tosa school, by Tosa Hirochika (flourished 1457–1465): Horse training, black ink and light colors on paper, handscroll (68.72).

#### POTTERY

Chinese, Sung dynasty, A.D. 10th–13th centuries: Northern celadon bowl with slightly curved sides, wide mouth and small foot, grooved outside lip; kiln grit adheres inside foot; buff grey porcelaneous clay with olive green celadon glaze, carved lotus scroll in interior (68.65).

Chinese, Ming dynasty, A.D. early 15th century: Large celadon fish with flattened foliate rim and broad unglazed band inside foot; fine grained gray porcelain with thick, even, deep gray-green glaze; cavetto fluted inside and out (68.74).

Turkish, Iznik, circa A.D. 1540–1555. Dish with everted flattened rim and low foot with flat unglazed footrim; buff-colored faience clay with transparent glaze over white slip and painting in turquoise, cobalt blue and red with drawing in black; floral medallions and scrolling leaves on scale ground, trefoils around rim with blue blossoms, and black scrolls on white ground outside (69.1).

Turkish, Iznik, circa A.D. 1560–1570: Jug with pear-shaped body and curving handle; buff-colored faience clay with transparent glaze over white slip and painting in cobalt blue, red and green and drawing in black; horizontal bands of trefoils, blossoms, cloud collars, and overlapping petal band in green (69.2).



## STONE SCULPTURE

Indian, Kushan period, A.D. 2nd century: Nagaraja (Serpent King), lower torso of mottled red sandstone; from Mathura, Central India (69.3).

*Care of the Collections*

The technical laboratory has examined, cleaned, and repaired, as necessary, thirty-two Freer objects and has examined forty-nine under consideration for purchase. Also, nineteen objects from other museums and individuals have been examined or repaired. The laboratory examines objects by microscopic, microchemical, x-ray diffraction, ultraviolet light, wet-chemical analysis, and various other methods. During the year the technical laboratory has been used in consultant work for other galleries and museums.

Restorer Takashi Sugiura and his assistants, Makoto Souta and Kumi Kinoshita, have repaired, restored, or remounted forty-two Chinese and Japanese paintings and screens. Illustrator F. A. Haentschke has remounted forty-four Persian, Indian, and Turkish paintings.

Museum specialist Martin P. Amt has made 143 exhibition changes: 5 American, 72 Chinese, 39 Japanese, 17 Korean, and 10 Near Eastern. All the necessary equipment for these changes has been provided by the cabinet shop under the direction of building superintendent Russell C. Mielke, who also has maintained the building in its usual immaculate and sound condition.

Pottery, Turkish (Iznik, late 16th century A.D.): Tankard with angular handle, buff-colored soft clay, thin transparent glaze, polychrome design of sailing dhows, castles on rocks, birds, etc. (68.68).





Lacquer, Chinese (Ming Dynasty, late 15th century A.D.): Round covered box with design in carved dark brown lacquer against a ground of carved red lacquer, scene of a moon palace with figures in a garden, horizontal zones with separate scenes, fabulous beasts, and floral scrolls surrounding the main scene on both the cover and body of the box (68.76 a-b).

### *Curatorial Activities*

Director John A. Pope has continued his studies on the history of the early export trade in Chinese porcelain and also on the history of porcelain manufacture in Japan. In connection with the former, the papers read at the Manila Trade Pottery Seminar (18–25 March 1968) began to come in with the authors' additional commentaries, and the transcripts of the daily sessions were sent from Manila in February. This material is now being edited with a view to publication.

In October 1968, Pope represented the Freer Gallery of Art at the opening of the Toyokan, the new Museum of Far Eastern Art at the Tokyo National Museum, Japan. While in Japan he also spent further

time studying the kiln sites of Saga Prefecture on the island of Kyushu, where the history of Japanese porcelain began in the 17th century, A.D.

Pope has been appointed by the Board of Overseers of Harvard College, Harvard University, as a member of the committee to visit the Department of East Asian Civilizations. Pope has continued in his appointments by the University of Michigan as Research Professor of Oriental Art, College of Literature, Science and the Arts, and by the Trustees for Harvard University as a member of the Board of Advisors of Dumbarton Oaks Research Library and Collection. He has continued serving in honorary posts and duties assumed in previous year.

Assistant Director Harold P. Stern has organized and completed work on an exhibition entitled *Master Prints of Japan*, which was held at the art galleries of the University of California at Los Angeles under the sponsorship of the UCLA Art Council from 13 April to 25 May 1969. As one of the most comprehensive exhibitions ever undertaken in the field of the early Japanese woodblock, only the finest examples were shown. Stern wrote a book to accompany the show that was published by Harry N. Abrams, Inc., of New York. To select the examples for the exhibition and to write the book, he studied hundreds of prints in both public and private collections. The thoroughly illustrated volume serves as a general guide for scholars as well as laymen.

Plans for two volumes dedicated to the Chinese and Japanese art in the Freer Gallery have been initiated. Together with the other members of the Freer staff, Stern has worked on the selection and the editing of the text. In addition he has continued his research on Japanese paintings and drawings in European and British collections as an adjunct to a major project of a full catalog of Japanese paintings of the Ukiyoe school in the Freer Gallery of Art. The Gallery holdings in this area are among the largest and finest in existence. Because of great public interest in Japan, negotiations have been started on issuing as a separate volume the portion of this study relating to Hokusai.

During late October 1968, Stern participated in a symposium entitled "Challenge of the East" at Dana College, Blair, Nebraska. He has given many lectures during the year and has continued his work as a trustee and member of the Executive Committee of the Japan-America Society of Washington. He also has continued serving in honorary posts and duties assumed previously.

Thomas Lawton, associate curator of Chinese art, has prepared the descriptive texts for two volumes that illustrate selected examples from the Chinese and Japanese collections. He has continued to organize a Gallery handbook. Hin-cheung Lovell, assistant curator of Chinese art, and Lawton are engaged in research on the paintings in the collection. Special attention is being given to the Gallery's large collection

of Che School paintings; a catalog and special exhibit of these paintings are planned. In May and June 1969, Lawton spent six weeks studying public and private collections of Chinese art in Europe. He has accepted the invitation of the National Palace Museum in Taiwan to serve as vice-executive secretary of the International Conference of Chinese Painting to be held at the National Palace Museum in June 1970. He also has been appointed an honorary lecturer in the Department of the History of Art at the University of Michigan and has continued serving in the honorary posts and duties assumed previously.

W. Thomas Chase, head conservator of the technical laboratory, has continued to assist Rutherford J. Gettens, research consultant, in the preparation of manuscript and proof for the forthcoming publication on technical studies of Chinese bronze ceremonial vessels in the Freer and of a manuscript on two Chinese bronze weapons with meteoritic iron blades. Chase has continued the investigation of Chinese bronze belt-hooks for a projected publication.

During 1969 Chase has held the post of a member of the Executive Council, Washington Region Conservation Guild, and has continued serving in the honorary posts and duties assumed in previous years.

Rutherford J. Gettens, research consultant for the Freer technical laboratory, has begun work on a systematic and intensive study of the technical aspects of the large collection (nearly 400) of Japanese paintings of the Ukiyoe school housed in the Freer. Each painting is first subjected to a condition study, then samples of pigment, mediums, and support materials are taken for identification purposes. Elisabeth West FitzHugh, formerly an analytical chemist with the laboratory, is assisting Gettens. This work is done in cooperation with Harold P. Stern, assistant director of the Freer Gallery of Art, who plans to publish a catalog of the Freer Ukiyoe collection.

Joseph M. Upton, formerly research assistant at the Center for Middle Eastern Studies, Harvard University, is under contract with the Freer and is engaged in translating from German and cataloging and organizing the material Professor Ernst E. Herzfeld presented to the Smithsonian Institution for the Freer Gallery of Art on his retirement from the Institute for Advanced Study, Princeton University, in 1946. Professor Herzfeld's archives consist of his working materials accumulated during a lifetime of study of the cultures of the Near East and their environment from prehistoric times to the recent past. With these materials maintained at the Freer, Upton's endeavors will make the records usable and available to scholars. The archives constitute one of the few extant comprehensive bodies of basic source material for the study of the history, art, religion, geography, and languages of the Near East.

Josephine Hadley Knapp, research assistant, is engaged in pottery



study and research and in arranging and cataloging the study collection of Far Eastern pottery, which consists chiefly of shards from kiln sites and other sources. The large collection includes a wide range of examples of export wares from approximately the 10th century A.D. to modern times, wares that have been found in many regions of the world from the Pacific islands and Asia to Africa and the Americas. She was formerly assistant in the Department of Far Eastern Art and a staff lecturer at the Metropolitan Museum of Art.

### *Staff Changes*

W. Thomas Chase was appointed head conservator of the technical laboratory in July 1968.

Josephine Hadley Knapp was appointed research assistant in July 1968.

Thomas Lawton was appointed associate curator of Chinese art in August 1968, and Hin-cheung Lovell reported for duty as assistant curator of Chinese art in December 1968.

Under contract with the Freer, Joseph M. Upton is translating and organizing Professor Ernst E. Herzfeld's archives, and Mrs. Elisabeth West FitzHugh is assisting Rutherford J. Gettens in the study of the technical aspects of the Japanese paintings of the Ukiyoe school at the Freer.

Morris Rossabi completed his one-year predoctoral research internship at the end of June 1969.

### *Library*

Library acquisitions this year include 369 volumes, 743 photographs, and 2,317 slides.

A total of 570 scholars, students, and visitors have used the library for research.

As in the past, the generous gifts from the Kevorkian Foundation and the Ellen Bayard Weedon Foundation have allowed the purchase of additional titles.

From the Kevorkian Foundation grant:

*Archäologische Mitteilungen Aus Iran*. Berlin, 1929-38.

Herzfeld, E. *The Persian Empire*. Wiesbaden, 1968.

Baudier, M. *The History of the Imperial Estate of the Grand Seigneurs*. London, 1635.

From the Weedon Foundation grant:

*Ming-mo ssu-seng hsüan-chi: Pa-ta-shan-jen, Shih-t'ao, Shih-ch'i, Chien-chiang.*  
Hong Kong, 1968.

*Ukiyoe.* Nihon Keizai Shimbun Sha: Tokyo, 1969.

*Fukushoku-shi Zue.* Inokuma Kaneshige: Osaka, 1969.

## *Public Services*

During the past year the Gallery was closed on Mondays from 21 October 1968 to 7 April 1969, as well as on Christmas Day. With the resumption of a regular seven-day-week schedule, the hours have been changed from 9:00 A.M.-4:30 P.M. to 10:00 A.M.-5:30 P.M. The total number of visitors for the year was 179,374. The highest monthly attendance was 25,983 during April. There have been 2,664 visitors who came to the office to consult with staff members, to obtain general information, to submit objects and inscriptions for examination and translation, to obtain permission to photograph or sketch in the Gallery, to use the library, or to examine objects in storage. Staff members have examined 4,782 objects and 972 photographs, and have translated 1,011 Oriental inscriptions for individuals and institutions; objects in storage have been shown to 643 persons. By appointment 60 groups, totaling 1,192 persons, have been given docent service in the galleries by staff members; thirteen groups totaling 173 persons have been given docent service in the storages. Among the visitors have been 280 distinguished scholars in Far and Near Eastern art (128 from other nations) or persons holding official positions in their own countries who came to study objects, museum practices, and administration.

The Sixteenth Annual Series of Illustrated Lectures on Oriental Art, held in the auditorium, have included:

"Wang Hui's Metamorphosis, A Problem in Chinese Painting." Professor Wen Fong, Princeton University, 8 October 1968.

"Decorative Taste in Japanese Pottery." Usher P. Coolidge, formerly at Fogg Museum of Art, 12 November 1968.

"China's Imperial Art Patrons." Thomas Lawton, Freer Gallery of Art, 14 January 1969.

"The Art of the Sātāvāhana Period, 2nd Century B.C. to 3rd Century A.D." Wayne Begley, University of Iowa, 11 February 1969.

"Mughal Jades." John Irwin, Victoria and Albert Museum, 20 February 1969.

"Mount Sinai: A Crossroads of Cultures." Professor Kurt Weitzmann, Princeton University, 11 March 1969.

"Chinese Sources of Early Timurid Painting." Dr. Ernst Grube, Columbia University, 8 April 1969.

The auditorium has been used by ten organizations for twenty meetings with a total of 2,389 persons attending.

The photographic laboratory, under the supervision of Raymond Schwartz, has processed a total of 22,778 items during this past year, including negatives, photographs, color slides, color sheet films, and polaroid prints. These have included both Freer Gallery objects and objects submitted from other sources.

The sales desk has sold 124,476 items consisting of 4,784 publications and 119,692 reproductions (including postcards, stationery, slides, transparencies, photographs, prints, and reproductions in the round). During the year an additional five reproductions in the round and three new jigsaw puzzles have been offered for sale.

### *Staff Publications and Papers*

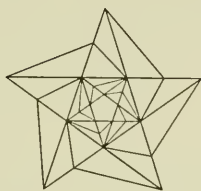
- Ars Orientalis* (1968), volume 7, 12 articles, 179 pages, 81 plates, text illustrations. Smithsonian Institution Publication 4759.
- CHASE, W. THOMAS. "The Technical Examination of Two Sasanian Silver Plates." *Ars Orientalis* (1968), volume 7, pages 75-93.
- . "Further Notes on the Technical Examination of Two Sasanian Silver Plates." Second Annual Sasanian Silver Conference at Case Western Reserve University, Cleveland, Ohio, 6 March 1969.
- . "Spectrographic Analysis of Sasanian Silver." Second Annual Sasanian Silver Conference at Case Western Reserve University, Cleveland, Ohio, 7 March 1969.
- LAWTON, THOMAS. Review: *A Short History of Chinese Art* by Michael Sullivan. *Artibus Asiae* (1968), volume 30, numbers 2/3, pages 262-263.
- . "Early Chinese Landscape Painting." George Washington University, Washington, D.C., 19 February 1969.
- POPE, JOHN A. "Oriental Influence in Early America." Williamsburg Antiques Forum, Colonial Williamsburg, Virginia, 7 February 1969.
- . "The Collections of the Freer Gallery of Art." Friends of the American Museum in Britain, Freer Auditorium, 14 February 1969.
- . "New Light on Ri Sampei." American Oriental Society, New York City, 25 March 1969.
- Stern, Harold P. *Master Prints of Japan*. New York City: Harry N. Abrams, Inc., 1969.
- . "Challenge of the East—Characteristics of Japanese Art." Dana College, Blair, Nebraska, 22 October 1968.
- . "Popular Painting of Tokugawa Japan." Joslyn Art Museum, Omaha, Nebraska, 24 October 1968.
- . "Masterpieces of the Japanese Woodcut." Art Council, University of California at Los Angeles, 15 April 1969.





# National Collection of Fine Arts

DAVID W. SCOTT, *Director\**



THIS HAS BEEN THE FIRST YEAR FOR NCFA since the opening of its spacious new quarters in the former Patent Office Building. Each day the staff has glowed with pride and delight in the new spaces, and, at the same time, has been shadowed by new problems of communication and organization. Old friends in the collection of paintings took on new life in new surroundings and were supplemented by generous gifts and loans.

Outstanding among the ten special exhibitions at NCFA during the first new year have been the exhibition of the works of Charles Sheeler, an artist who enjoyed the warmth of popular and critical response to his work, and the American entry in the *Venice 34* international exhibition, which was chosen to demonstrate the continuing vitality of the figurative tradition in recent American art.

The NCFA Print Department selected thirty-five prints from its permanent collection for an exhibition of WPA prints done at the New York City Graphic Arts Workshop during the period of 1935 to 1943.

The International Art Program of NCFA, in its efforts to present abroad a full picture of American achievements in the visual arts, has covered a variety of exhibitions, from *The Disappearance and Reappearance of the Image* (which drew 35,000 viewers in Bucharest in 16 days) through *Creative Printmaking in Action*, a unique print workshop traveling in Pakistan, Iran, Lebanon, Jordan, and Turkey, to *The New Vein*, now in Latin America, showing the works of young, relatively unknown artists.

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\*Resigned 31 May 1969. Robert Tyler Davis appointed acting director 1 June 1969.



Alexander Calder's *The Spiral* in the great courtyard.

New programs inaugurated at NCFA during its first year include: *The Creative Screen*, art films and films on art (shown four times a month, this series has had an audience of 4,000 since the beginning of the program in October 1968); a graduate seminar on themes in 19th-century American art with the second semester on neoclassic American sculpture, given by Professor William Gerdtz; the Art Information Guide program; Indoctrination for USIA cultural attachés in American art; a lecture series; docent tours; and a grant to *Art Quarterly*.

The Department of 18th- and 19th-century Painting and Sculpture has continued research on its cataloging project.

A Junior Museum was opened 1 May 1969. Here children are introduced to the art galleries through special sculpture that is enchanting to their age group.

The Renwick Committee has been set up as an interdepartmental committee of Smithsonian staff to facilitate drawing on the entire resources of the Institution to provide exhibitions and activities for the Renwick Gallery. Robert Tyler Davis has been appointed chairman of the committee. The members are: Carl Fox, Richard H. Howland, Richard Virgo, J. Jefferson Miller II, Christian Rohlffing, Lisa Suter Taylor, William Trousdale, Wilcomb E. Washburn, and C. Malcolm

Watkins. Ex-officio members are: Charles Blitzer, Frank A. Taylor, and Donald R. McClelland.

The exterior restoration of the Renwick Gallery has been completed insofar as money has been appropriated. Plans are being made for completion of interior facilities with the help of Hugh Jacobsen, Washington architect, and William Pahlman, New York interior designer. If additional money becomes available, it is hoped that the Gallery will open in the winter of 1970.

NCFA celebrated its first anniversary in the new building on 3 and 4 May 1969 with an open house for the neighborhood and friends of the Museum. Posters, fliers, and news releases advertised the weekend anniversary, and four workshops were set up in the courtyard by artists Clifford Chieffo, Un'ichi Hiratsuka, Lloyd McNeill and Lou Stovall, and Jack Perlmutter. Movies were shown every half hour, and music

(Left) *Madonna and Child* by Peter Paul Rubens (Gellatly collection). (Right) X-ray of *Madonna and Child* shows the Madonna's right hand was first painted under the Child's right arm, and part of the drapery was painted out.





*Alexander Archipenko: NCFA exhibition, 11 July–18 August 1968.*

was furnished by the District of Columbia Youth Symphony Orchestra, the University of Maryland Trio, and the Tommy Gwaltney Quintet.

In September 1968 Mr. Robert Tyler Davis came to NCFA to be assistant director. Trained at Harvard, where he earned both his AB and MA, Mr. Davis has had many years of museum experience, having been director at the Portland, Oregon, museum and the Montreal Museum of Fine Arts. He organized the James Deering estate "Vizcaya" at Miami, Florida, as the Dade County Art Museum. He has also been professor of fine arts at McGill University and at the University of Miami. Since his arrival here, Mr. Davis has organized a curatorial committee with weekly meetings for exchange of information and discussion of problems, and has guided several other projects.

Dr. Scott resigned as director, effective 31 May 1969, and Mr. Davis was named acting director as of 1 June.

### *Smithsonian Art Commission*

Meetings of the Smithsonian Art Commission were held in December 1968 and in May 1969. One recommendation for the Regents to consider is that the Commission's name be changed to the National Collection of Fine Arts Commission. Members heard a report from a committee



set up in its own group on the role of the NCFA. The committee of distinguished professionals reaffirmed the belief that the collections of the NCFA should be exclusively American and that the program should emphasize research, making use of senior fellows invited for periods of one to five years, and interrelating the research with exhibition and teaching functions. The report commented on the major contributions to the collections from private collectors, foundations, and artists. These contributions should continue to be encouraged and supplemented with funds for purchase from private sources.

## *The Collections*

Gifts and transfers received during the year include:

<i>Artist</i>	<i>Title</i>	<i>Donor</i>
PAINTINGS		
Warren Brandt	<i>The Dining Room</i>	Grace Borgenicht Gallery
Jimmy Ernst	<i>Nightnoon</i>	Mr. and Mrs. Jimmy Ernst
Michael Goldberg	<i>Landscape</i>	Bernard Linn
Anne Goldthwaite	<i>Cabin in Alabama</i>	Miss Lucy Goldthwaite
Gyorgy Kepes	<i>Monument</i>	Eric F. Green
George Luks	<i>Morning Light</i>	Mr. and Mrs. Louis Sosland
Maurice Prendergast	<i>Park Scene, Trees</i>	Mrs. Eugenie Prendergast
PRINTS AND DRAWINGS		
Romaine Brooks	35 drawings	The artist
Werner Drewes	59 woodcuts	The artist
—	84 lithographs	Atelier Mourlot
SCULPTURE		
Alexander Calder	<i>The Spiral</i>	The artist

A special collection of sketches, books, notebooks, engravings by Marguerite and William Zorach, and plaster casts by William Zorach, has been received as a gift of the Collection of Tessim Zorach.

Among purchases made the past year are:

<i>Artist</i>	<i>Title</i>
PAINTINGS	
James Hamilton	<i>Rip van Winkle, The Legend of Sleepy Hollow</i>
Stanton Macdonald-Wright	<i>Raigo</i>
Benjamin West	<i>Helen Brought to Paris</i>
SCULPTURE	
William Randolph Barbee	<i>Fisher Girl</i>

The Registrar reports as follows:

ACCESSIONS. 42 paintings, 17 sculptures, 749 prints and drawings, and 138 miscellaneous.



*Alexander Archipenko*: NCFA exhibition, 11 July–18 August 1968.

LOANS TO THE COLLECTION. 404 works to the National Collection of Fine Arts and 127 works returned to their lenders.

OUTGOING LOANS. To government offices; 506 lent, 278 returned; to other institutions: 68 lent, 108 returned.

SPECIAL EXHIBITIONS AT NCFA. RECEIVED: *An American Collection*, 129; *Lila Katzen, Light Floors*, 41; *WPA Print Exhibit*, 35; *The Graphic Art of Winslow Homer*, 114; *Rico Lebrun*, 207; *The American Poster*, 121; *Yasuo Kuniyoshi*, 85; *The Art of Tibet*, 116; *Les Levine TV Sculpture*, 1; *Henry Ossawa Tanner*, 79. RETURNED: *Alexander Archipenko*, 118; *Charles Sheeler*, 167; *An American Collection*, 129; *WPA Print Exhibit*, 35; *Lila Katzen, Light Floors*, 41; *Venice 34*, 70; *The Graphic Art of Winslow Homer*, 114; *Rico Lebrun*, 207; *Charles Sheeler*, 123; *European Painters Today*, 82; *The American Poster*, 121.

The lending program, from July through December 1968, organized a number of special exhibits for the White House and other federal agencies. An inventory of the collection on loan (more than 1000 works of art) was completed prior to the change in federal administration. The associate curator organized an exhibition from the Barney collection of the work of Edwin Scott (1863–1929), which was exhibited at the Central Intelligence Agency in October 1968, and he organized an exhibition of paintings by the Ceylonese artist Justin P. Daraniyagala, which opened at the Smithsonian in January 1969. Eighty-three works of art have been presented during the year for expert consultation.



*Charles Sheeler: NCFA exhibition, 10 October–24 November 1968.*

*European Painters Today: NCFA exhibition, 8 April–1 June 1969.*



Since January three special exhibitions have been arranged at the White House, and numerous loans have been made to principal governmental offices.

The Conservation Laboratory has made a study of documentation techniques. Color photomicrography, infrared photography, and other aspects of photo-documentation have been explored. An investigation of infrared luminescence and infrared color photography has been begun as a further aid in documentation of the condition of art objects and in selecting pigments for analysis.

### *Exhibitions at the Museum*

#### *Alexander Archipenko*

11 July – 18 August 1968

A retrospective exhibition including 67 sculptures, 29 drawings, and 22 prints; organized by the Art Galleries of the University of California at Los Angeles.

#### *An American Collection: The Roy R. Neuberger Collection*

15 August – 25 September 1968

A selection of 126 paintings and sculptures, primarily by contemporary American artists, from one of the largest and most important private collections in the United States; organized by the Museum of Art, Rhode Island School of Design.

#### *WPA Prints 1935–1943*

1 October – 21 December 1968

An exhibition of 35 prints selected from NCFA's permanent collection by Jacob Kainen, curator of prints and drawings.

#### *Charles Sheeler*

10 October – 24 November 1968

A major memorial retrospective exhibition organized by NCFA; shown also at the Philadelphia Museum of Art and at the Whitney Museum of American Art in New York City. The 135 paintings and drawings shown were selected by Harry Lowe and Abigail Booth, curator and assistant curator of exhibits, respectively; the 35 photographs by Sheeler also included in the exhibition were selected by Charles Millard, former director of the Washington Gallery of Modern Art. A major catalog publication accompanied the exhibition.

#### *The Figurative Tradition in Recent American Art*

19 December 1968 – 2 February 1969

The exhibition presented by the United States at the 34th International Art Exhibition, Venice, the *Biennale* of the summer of 1968; selected by Norman Geske, director of the University Art Galleries, University of Nebraska, Lincoln; organized by NCFA's International Art Program.





*The Disappearance and Reappearance of the Image: IAP exhibition, Sala Dalles, Bucharest, Romania, January 1969.*

*The New Vein: IAP exhibition on tour of major museums in Latin America.*



*The Graphic Art of Winslow Homer*

9 January – 23 February 1969

A catalogue raisonné in exhibition form of Homer's work in printmaking media; photographs of his paintings related to the prints also were shown; organized by the Museum of Graphic Art, New York City.

*Rico Lebrun*

30 January – 16 March 1969

A retrospective exhibition including 45 paintings, 135 drawings, and 27 sculptures; organized by the Los Angeles County Museum.

*European Painters Today*

9 April – 1 June 1969

Eighty-five paintings by forty-nine contemporary, European-based artists, selected by an international jury of museum directors; sponsored by the Mead Paper Corporation.

*The American Poster*

25 April – 15 June 1969

A historical survey of the art of the poster in America comprised of 106 items; selected by Margaret Cogswell, deputy chief of the International Art Program; organized by the American Federation of Arts.

*Yasuo Kuniyoshi*

9 May – 29 June 1969

A retrospective exhibition including 43 paintings and 46 prints and drawings; organized by the University Gallery, University of Florida at Gainesville.

*International Art Program*

On 27 January 1969, in the Bucharest daily *Informatia*, Romania's leading art critic wrote:

The American exhibit is a blend of prestigious achievement and questing experiments. They [the artists] look for new premises and methods of expression in the borderland between art and life, and also between art and non-art. They open doors which could lead far, enriching and giving new patterns to existence.

The critic, Petru Comarnescu, was commenting on an exhibition of American painting since 1945, *The Disappearance and Reappearance of the Image*, which drew 35,000 viewers in Bucharest during a sixteen-day showing early this year. The exhibition, organized by the International Art Program, contains one hundred works by 19 artists, a retrospective of the vitality and creativity of recent American painting. For the Romanian audience, the opportunity to view the work of such artists

*Archipenko—International Visionary:* Opening of exhibition at Musée Rodin, Paris, 11 March 1969. Curator of Exhibits Harry Lowe and Ambassador Sargent Shriver holding Archipenko catalog.



Printmaker Michael Ponce de Leon and student in workshop, IAP Project 67-17, in Karachi, Pakistan.



as Jackson Pollack, Jasper Johns, Barnett Newman, Roy Lichtenstein, and Helen Frankenthaler was unique and significant. The exhibition was shown subsequently in Cluj and Timisoara, Romania, and in Bratislava and Prague, Czechoslovakia. Its final appearance will be in Brussels in October 1969.

The International Art Program has sought to broaden the perspective and increase the impact of its exhibitions through the use of supplemental programing. Traveling curators who accompany the large exhibitions conduct lecture discussion programs in connection with the exhibition and exchange ideas, in private conversation and through symposia, with local artists and museum personnel. Programs of experimental films have accompanied exhibitions of contemporary art, and well-designed presentations of historical memorabilia have been used in connection with others. By helping the foreign audience appreciate not only the works of art but the context in which they are produced and their relationship with earlier and later periods, such supplementary programs contribute significantly to a full understanding of the content and meaning of the exhibitions.

Another new program concept is demonstrated by *Creative Print-making in Action*, a unique print workshop now in the Middle East. This workshop has been conceived as a means of exploring with foreign artists the recently developed possibilities of an art form with which many are not familiar. The aim is the creating of a working environment where artists are stimulated to experiment and where a genuine exchange of ideas is the inevitable result. The workshop, now in its second year of activity, has been held in Pakistan, Iran, Lebanon, Jordan, and is now ready to move into Turkey.

One of IAP's chief undertakings during this year has been the planning and reorganizing of the American exhibition for the X São Paulo Bienal, scheduled to be shown in Washington in February 1970. This exhibition is an exploration of new trends in art and technology and is conceived as an artistic entity in itself rather than as a gathering of individual art works. Professor Gyorgy Kepes, the Commissioner for the Exhibition, has said:

We hope to go beyond the limitations of the private studios and turn the total environment, both social and physical, into our common workshop. Our new scale of interest moves us away from isolated creative acts toward interdependent creative actions, aiming to bring greater integrity and quality to our man-made landscape and to our social-cultural behavior.

In its efforts to present a full picture abroad of American achievements in the visual arts, IAP continues to stress the showing of works of young, relatively unknown artists. This has been done in both editions of



the exhibition *The New Vein* (now circulating in Europe and Latin America) and will also be the case in an exhibition of small sculptures that IAP is now organizing for the Near East.

### *Curatorial and Other Staff Activities*

The Department of 18th- and 19th-century Painting and Sculpture has completed files for the miniature collection, the review and recataloging of European painting collections, and new files for pre-20th-century American and European painting and sculpture collections.

The principal work of the Contemporary Art Department during the past year has been the preparation of the Milton Avery exhibition, which opened 12 December 1968, the choosing of 140 paintings, drawings, and prints, and the writing of the introduction to the catalog. This is to be the major exhibition of the forthcoming season in the modern American field. The Mary Cassatt catalogue raisonné has been completed and has been submitted to the Smithsonian Institution Press for publication. The curator, Adelyn D. Breeskin, and her assistant, Jan K. Muhlert, have juried about six art exhibitions both in and out of the city and have given many lectures. Among the lectures given by the curator have been a series of six for the Smithsonian Associates, monthly talks on Contemporary American art to the Department of State Foreign Service wives, three lectures to the Art Club of Greenwich, Connecticut, two lectures in Omaha, Nebraska, two in Indianapolis, and one at Martha's Vineyard. She also advised on the preparations of the Henry O. Tanner exhibition that opened 23 July 1968.

The curator of prints and drawings, Jacob Kainen, has continued his research on American prints and drawings and on the work of Stanley William Hayter and his influence on 20th-century printmaking. Mr. Kainen has juried the Art Show at the National Institute of Health and an exhibition for the Print Club of Philadelphia. He has lectured in the "Masters in Depth" Smithsonian Associates Lecture Series, has participated in a symposium on art collecting at Winston-Salem, North Carolina, and has spoken at the opening of the Gorky exhibition at the University of Maryland on "Memories of Arshile Gorky." Mr. Kainen also has attended the meetings of the Directors and Executive Committee of the Print Council of America. He has written the foreword for the forthcoming publication of *John Sloan's Prints* by Peter Morse and an introduction to the catalog for the *Werner Drewes Woodcuts* exhibition. The Drewes exhibition was selected by research assistant Caril D. Dulcan, who also compiled material for the catalog.



Artist Lloyd McNeill and assistant Lou Stovall in workshop during activities celebrating NCFA's first anniversary (photo by Michael Robbins).

Activities of the curator of exhibits and staff have included exhibitions by Harry Lowe and Abigail Booth: *Charles Sheeler* at the National Collection of Fine Arts, the Philadelphia Museum of Art, the Whitney Museum of American Art from 10 October 1968 through 27 April 1969. By Val Lewton: one-man show of his paintings, Towson State College, Towson, Maryland; one-man show of his paintings, Woodrow Wilson High School, Washington, D.C. Other exhibitions designed by Harry Lowe have included: *Alexander Archipenko*, for the Rodin Museum, Paris, and *The Nelson A. Rockefeller Collection of Mexican Folk Art*, for the Museum of Primitive Art, New York City. Lectures by Harry Lowe: "Collecting: A Philosophy," repeated with variations five times; luncheon-seminar series on collecting, sponsored by Smithsonian Associates (held in six sections); "Destruction as an Art Movement," Auburn University Arts Festival, Auburn, Alabama. He has planned and led a Smithsonian Associates Art Tour to New York City. Abigail Booth has given a talk, "The NCFA—History, Development, and Current Direction," to the Art League of Northern Virginia, Alexandria, Virginia. Jurying by Harry Lowe has included: Mid-States Art Show, Evansville (Indiana) Museum of Arts and Sciences; 1968 Area Artists Exhibition, Roanoke (Virginia) Fine Arts Center; Festival of States

Jack Perlmutter begins his demonstration during open house, 3-4 May 1969, in the courtyard of NCFA (photo by Michael Robbins).



Art Show, St. Petersburg, Florida; and Latin American Arts, Carroll Reece Museum, East Tennessee State University, Johnson City, Tennessee. Val Lewton has juried the city of Alexandria's Outdoor Art Fair. Harry Lowe attended the College Art Association annual meeting, Boston; and Abigail Booth attended the College Art Association annual meeting, Boston, and the American Association of Museums annual meeting, San Francisco.

Donald McClelland, former associate curator of the Lending Program, is now associated with the Renwick Gallery, where he is concerned with the Gallery's development. He has given the following lectures: "What is American in American Art," to the Smithsonian Information Guides, 18 July 1968; "Washington, the New Art Scene," to the International Platform Association, 23 July 1968; "American Prints," to the Docent Training Seminar, 27 September 1968; "The Arts in America 1860-1960," to the Mississippi Art Association, Jackson, Mississippi, 6 October 1969; "Washington, the New Art Scene," at Millsaps College, Jackson, Mississippi, 6 October 1968; "Washington and the Smithsonian Institution," at Trinity College, Washington, D.C., 10 December 1968; "The Arts in American 1850-1950," a series of eight lectures at Catholic University of America, Washington, D.C., February and March 1969; and "Washington, the New Art Scene," at the City Art Gallery, York, England, 26 April 1969. He juried The International Platform Associ-

ation Art Exhibit, Washington, D.C., July 1968; The Mississippi Art Association Area Exhibition 7 October 1968; and the Fairfax County Art Association, 15 November 1968. He attended the College Art Association, Boston, 31 January and 1 February 1969 and the Department of Agriculture Graduate School Fine Arts board meeting, 14 March 1969.

Jan Keene Muhlert, assistant in the Department of Contemporary Art and Lending Program advisor, has taught a ten-week course, "Understanding Contemporary American Art," for Smithsonian Associates and has juried shows for the Academy of Arts, Easton, Maryland ("Annual Art Festival"), George Washington University, Washington, D.C. ("Spring Art Festival"), and the Job Corps, Washington, D.C. ("First National Job Corps Art Competition"). She has concentrated her research activities on works done in the 1930s under the Works Progress Administration and, in preparation for a future exhibition, is studying the large collection of paintings, watercolors, and prints by William H. Johnson. Since January 1969, Mrs. Muhlert has been responsible for the Lending Program, organizing three special exhibitions in the White House and arranging numerous loans to principal governmental offices.

The Art Information Guide program, an innovation of the Office of Academic Programs, completed its first year on 6 May 1969 under the direction of Pat Chieffo. Students from every major university in the United States have been encouraged to apply and have been carefully selected to participate in this unique program. The function of the program is to introduce art students to museum work and to prepare them to function as information guides so that they may aid the public in its quest for knowledge on American art.

During the summer program at the National Collection, the guides are expected to receive as well as to give information. Seminars of extremely high caliber are arranged for them, but they also must do thesis-quality research on their own. The guides carry information-request slips, which they supply to visitors when they are unable to answer a question about any of the paintings. They must then research the question, type a reply, and mail it to the questioner. The Art Information Guide program during its first fiscal year has established for our Museum the image of a friendly place that welcomes and assists visitors. The program has aided as well as trained young scholars and it has become an excellent means by which public and guides can seek both education and art.

The Editorial Office has done the initial editing of the Mary Cassatt catalogue raisonné, has edited the Werner Drewes and the Henry O. Tanner exhibition catalogs, and has updated both the gallery plan giveaway and the story of the building for reprinting. Drafting of cata-



log prefaces, quarterly reports, and the NCFA section of *Smithsonian Year 1969* have been completed, and editorial assistance has been given for articles to be published in *Américas*, *Antiques*, *Art Quarterly*, *Arts*, and *The Living Wilderness*. Technical assistance has been given in securing printing of invitations and posters and in arranging for the use of NCFA prints in the Labor Department's monthly *Labor Review*. The Editorial Office also has engaged in various miscellaneous projects including the initiating and writing of *Artyfacts*, a weekly information sheet for the NCFA staff, the designing of an organization chart, the devising and supervising of coverage by junior staff of the second floor galleries in the absence of guards, the gathering of all publications throughout the building into locked storage with a system to control dissemination, and the supplying of copies of all past catalogs for NCFA archives.

## Research

The Department of 18th- and 19th-century Painting and Sculpture has completed its review and recataloging of the European painting collections, has completed research on nine paintings by Thomas Dewing and on the cataloging of the Blakelocks, and has continued work on the Ryders and on the William T. Evans and Hiram Powers correspondence.

In the Department of Contemporary Art, research has continued on three artists of the earlier part of this century whose works will be exhibited at a future date: W. H. Johnson, Romaine Brooks, and H. Lyman Sayen.

The Department of Prints and Drawings has continued research on American prints and drawings, particularly on the work of Stanley William Hayter and his influence on 20th-century printmaking. New research is being done on innovative prints produced with various forms of plastic.

Four graduate seminar reports prepared by students are on file at NCFA: *The Effect of the Civil War on American Sculpture* by Judith Sobol (George Washington University), *William Rimmer* by Ellen Myette (GWU), *Images of Lincoln in Sculpture* by Joyce De Palma (GWU), and *Critical Attitudes Toward Neo-classical Sculpture* by Jeffrey Brown (University of Maryland).

The Library's project to update the Library of Congress Fine Arts classification schedule, "Class N," has continued. The Librarian enrolled in a two-week Institute on Modern Archives Management.

## Staff Publications

- BOOTH, ABIGAIL, editor. Catalog of the exhibition, biographical notes, bibliography, and exhibitions list. In *Charles Sheeler*. 156 pages, 170 illustrations. Washington, D.C.: National Collection of Fine Arts and the Smithsonian Institution Press, 1968.
- BRESKIN, ADELYN D. Introduction. In *Mary Cassatt among the Impressionists*. Omaha, Nebraska: Joslyn Art Museum, 1969.
- KAINEN, JACOB. Foreword. In *Andrew Stasik*. Catalog for the exhibition. Prague, Czechoslovakia, 1968; San Juan, Puerto Rico, 1968.
- . Foreword. In reprint of *The Art of Graveing and Etching, 1662*, by William Faithorne. New York City, 1969.
- . *WPA Graphics Art Project in New York City*. National Council on the Arts. New York City, 1969.
- . Introduction. In *Photography in Printmaking*. Associated American Artists Catalogue. New York City, 1968.
- . Foreword. In *Moritz Daniel Oppenheim*. Portfolio of reproductions, A. Rothman Fine Arts. New York City, 1969.
- . Introduction. In *Paintings of Fran Kleinholz*. Miami: University of Miami Press, 1968.
- . Introduction. In *Richard Upton*. Catalog for an exhibition. Saratoga Springs, New York: Skidmore College, 1969.
- LOWE, HARRY. Introduction to the exhibition. In *Charles Sheeler*. 156 pages, 170 illustrations. Washington, D.C.: National Collection of Fine Arts and the Smithsonian Institution Press, 1968.
- MCCLELLAND, DONALD. Catalog listing and commentary. In *The Art of Justin Daraniyagala*. Washington, D.C.: Smithsonian Institution Traveling Exhibition Service, 1968.
- . *Comments about the Artist Edwin Scott*. For the Barney Exhibition. Washington, D.C.: Central Intelligence Agency, 1968.
- . "Perspective Soudanaise." *Topic* (1968), United States Information Agency, number 30.
- SCOTT, DAVID W. "The National Collection of Fine Arts." *Antiques* (November 1968), volume 94, number 5.
- . Foreword. In *Charles Sheeler*. 156 pages, 170 illustrations. Washington, D.C.: National Collection of Fine Arts and The Smithsonian Institution Press, 1968.

Publications prepared under the auspices of the National Collection of Fine Arts are as follows:

CHARLES SHEELER. Foreword by David W. Scott; introduction to the exhibition by Harry Lowe; catalog of the exhibition and biographical notes by Abigail Booth essays by Martin Friedman, Bartlett Hayes, and Charles Milard. 156 pages, 170 illustrations. Washington, D.C.: National Collection of Fine Arts and Smithsonian Institution Press, 1968.

Entries written for publication in the Funk and Wagnall's *Standard Reference Encyclopedia*, the *Institute of Contemporary Art* concert program, *Smithsonian Research Opportunities*, and the *International Directory of Art*.

Six Christmas cards and nine 4 x 6-inch postcards, illustrated with reproductions from NCA's permanent collection.

# National Portrait Gallery

CHARLES NAGEL, *Director\**



“**A**NNUIT COEPTIS” OR “HE HAS FAVORED OUR UNDERTAKING” might aptly be applied to 1968, the year of fruition for the National Portrait Gallery. For the year 1962, when the Congressional Act creating the Gallery was passed, or 1964, when the Commission was formed, the director appointed, and the business of the Gallery begun, gave evidence of little more than the preliminary creakings of machinery that eventually produced the event of greater significance: the actual opening of the Gallery to the public.

This is not to underestimate the value of the earlier years or the wisdom of those who gave generously of their time and knowledge in the pursuit of the goal: the creation of a National Portrait Gallery worthy to house the likenesses of America's great. Without the seasoned counsel of the Commission, during the sometimes tedious but more often excitingly experimental sessions—with the Gallery still in only a planning state—its eventual consummation could never have taken place.

## *Exhibitions*

To celebrate properly the propitious occasion of its formal opening, the permanent collections of the youthful Gallery obviously were lacking both in size and quality. It was therefore decided by a special *ad hoc* committee on the opening exhibitions to gather together the most dis-

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\*Retired 30 June 1969.

tinguished likenesses available of great Americans in all walks of life, whether from public or private collections.

The response to requests for loans was phenomenally generous, ranging from Lord Primrose's famous "Lansdowne" portrait of Washington by Gilbert Stuart for the presidential series to the distinguished and hitherto almost unknown likeness of Joseph Smith by an anonymous artist, a unique treasure lent for the more general show by the Reorganized Church of Jesus Christ of Latter Day Saints.

The title adopted for the main exhibition was *This New Man—A Discourse in Portraits*. Both title and central theme were taken from Michel-Guillaume Jean de Crèvecoeur's *Letters from an American Farmer*, wherein he inquired: "What then is the American, this new man?"

To illustrate the thesis, 133 items were borrowed, of which five were genre pictures, and with these were shown 36 portraits from the Gallery. Many media were represented: oil on canvas, ivory, and wood; chalk on paper and ivory; charcoal on paper; pastel on paperboard; pencil and ink cartoons; daguerreotypes; photographs; and sculptures in marble, bronze, and plaster.

Established artists, both domestic and foreign, with a few of lesser reputation were called upon to illustrate the theme. All portraits shown complied with the conditions of the permanent collection: that the sitter be deceased at least ten years.

A comprehensive exhibition was presented to the public in a tasteful and professional installation by exhibits curator Riddick Vann and his staff. Critical response to the exhibition naturally varied. Any disappointments—and there were disappointments—came from an apparent lack of understanding of what was being attempted. This was a theme show in which the sitter was deemed to be of the greatest importance. The portraits of those who had made major contributions to the history and culture of the country were presented in categories other than a time sequence. This made for a spirited exhibition with comparisons that were frequently most stimulating. It was by no means an art show and, when reviewed as such, a false impression was created. If a critic, however, became interested in the sitters rather than the artists, as happened fortunately in several important instances, the resulting comments were both knowledgeable and cogent.

The staff had embarked on this undertaking fully aware of the risks involved but in the firm belief that this was the sort of exhibition the National Portrait Gallery should initiate. On the whole, newspaper, magazine, television, and radio coverage of the National Portrait Gallery opening and the accompanying exhibitions were both extensive and favorable. The concept of such a gallery for the United States has been





*President Franklin Delano Roosevelt. With sketches for group portrait made at Yalta, 1945, by Douglas Chandor (1897–1953) (NPG 68.49).*

indorsed without exception by the communications media. Particular praise was given the Congress for saving the magnificent Old Patent Office Building from destruction and to the Smithsonian Institution for converting it into a handsome home for two of its museums: the National Portrait Gallery and the National Collection of Fine Arts.

Two spirited catalogs, *This New Man* and *Presidential Portraits*, prepared by the assistant director and the Historian's Department, accompanied the two exhibitions and will long outlast the all-too-brief visit of the likenesses they described.



**President James Madison. Attributed to Chester Harding (1792–1866) (NPG 68.50).**

The formal opening was preceded on 4 and 5 October 1968 by a successful symposium, "The American, This New Man," with the following participants: Daniel J. Boorstin, professor of American History, University of Chicago, and director-designate of the National Museum of History and Technology; Marcus F. Cunliffe, professor of American Studies, University of Sussex, England; and Margaret Mead, curator of Ethnology, American Museum of Natural History. Secretary Ripley introduced the first session and Benjamin Townsend, assistant director of the Gallery, served in the capacity of mediator. For this event, the Gallery is indebted to the imaginative generosity of Time, Inc.

The opening ceremonies, with addresses by Secretary Ripley and Mayor Washington, were held in the courtyard of the Fine Arts and Portrait Galleries Building on a cool and clear Saturday evening, 5 October 1968, followed by an opening for the Smithsonian Associates the next day. The public opening took place on Monday, 7 October. Preceding the opening ceremonies out-of-town guests were entertained at private dinners organized by a committee of volunteers under the chairmanship of Mrs. Robert Kintner.

Two more special exhibitions have been featured during the year. The first, entitled *A Nineteenth-Century Gallery of Distinguished Americans*, opened 20 February 1969. It sought to honor a pioneer portrait painter and engraver of Philadelphia, James Barton Longacre (1794–1869), for his important work in the publication, from 1834 to 1879, of a four-

*President John Quincy Adams.*  
By George Caleb Bingham  
(1811-1879) (NPG 69.20).



volume work entitled *A National Portrait Gallery of Distinguished Americans*. In this exhibition, conceived wholly by the curator Mr. Stewart, who was also the author of the accompanying catalog, an effort was made to assemble not only the engravings of Longacre but also source materials of him and others used for those engravings. The resulting exhibition has been a fascinating study of how one of the earliest gatherings of likenesses of those judged great in the second quarter of the nineteenth century was undertaken and brought to a fruition that elicited popular acclaim.

The lending of a large amount of original material by Dr. Andrew Longacre and members of the Longacre family, descendants of the artist, have given the exhibition its particular charm and interest. Many of the engravings shown have come from the extensive print collections transferred to the Gallery as gifts from the Metropolitan Museum of Art's Joseph Verner Reed Collection and from the Robbins Print Collection, Arlington, Massachusetts. In this same exhibition, a bronze version of the bust of Lyndon Baines Johnson by Jimilu Mason also was shown as a loan from the artist.

On 12 May 1969 the portrait of President Johnson by Peter Hurd was placed in the presidential alcove and given its first Washington showing. The reaction of the public to this generous gift to the Gallery by the artist was warm and enthusiastic.

The second special exhibition, opening 22 May 1969, has been a



*Mathew Pratt* (1734–1805). Self-portrait painted in studio of Benjamin West, 1764. (NPG 69.35).

showing of many of the original works of art used through the years on the covers of *Time* magazine. Worldwide in readership, *Time* is one of the few American publications that consistently uses for its covers, not the colored photograph brought to a unique perfection in our time yet still factual rather than interpretive, but drawings, paintings, and caricatures of the famous figures of our era. A group of these drawings, paintings, and sculptures related to figures prominent in American life comprise this highly successful and popular show. The Gallery is grateful to *Time* not only for delving into its archives to make these pictures available, but also for supplying the catalog and hosting the opening festivities.

The National Portrait Gallery provided facilities for the ceremony held by the Post Office Department on 4 November 1968 in connection with the issuance of a stamp based on an NPG portrait of Chief Joseph of the Nez Percé Indians by Cyrenius Hall. The stamp bore the legend "National Portrait Gallery" in honor of the recently opened museum. Several collateral descendants of the chief attended and added to the picturesque quality of the occasion. In the course of the year, a benefit dance for the Washington Hospital Center and the 75th Jubilee meeting of the Columbian Women of George Washington University have been held at the Gallery.

For the nine months from 4 October 1968 to 30 June 1969 attendance has been 52,061, apart from the special events discussed above.



*John Philip Sousa.* By Harry Franklin Waltman (1871-1951). (Gift of the Sousa Corporation) (NPG 69.24).



## *Organization*

The National Portrait Gallery Commission began the year with the following members:

John Nicholas Brown, chairman, Catherine Drinker Bowen, Julian P. Boyd, Lewis Deschler, Edgar P. Richardson, David E. Finley, Wilmarth Sheldon Lewis, Richard H. Shryock, and Frederick P. Todd. *Ex officio* members: the Secretary of the Smithsonian Institution, S. Dillon Ripley; the director of the National Gallery of Art, John Walker; and the Chancellor of the Smithsonian Institution, Earl Warren, Chief Justice of the United States.

In the course of the year the resignations of the following members from the Commission have been accepted with regret: Julian P. Boyd, Richard H. Shryock, and Frederick P. Todd, whose work with the Commission came during the critical formative period; they will be greatly missed, for without their seasoned advice the Gallery could scarcely have begun to function as a museum. Jules D. Prown, curator of the Garvan and Related Collections of American Art at Yale; Andrew Oliver, New York attorney and authority on early American portraiture; and Whitfield J. Bell, Jr., librarian of the American Philosophical Society at Philadelphia, have been appointed members of the Commission and are welcome additions to its deliberations. During the year, meetings have been held three times.



*Otto Kahn. By Jo Davidson (1883-1952). (Gift of Mrs. John Barry Ryan) (NPG 68.44).*

Two committees set up by the Commission are: The Acquisitions Committee: Edgar P. Richardson, chairman, David E. Finley, Wilmarth Sheldon Lewis, and Julian P. Boyd; ex-officio: Charles Nagel and Robert G. Stewart. The Ad Hoc Committee on the Opening Exhibition: Edgar P. Richardson, chairman; Edward H. Dwight, director of the Munson-Williams-Proctor Institute of Utica; ex officio: Charles Nagel, Daniel J. Reed, Robert G. Stewart, and Virginia Purdy.

### *Personnel*

Daniel J. Reed, historian, who returned January 1969 from a year's leave of absence as deputy director of the National Advisory Commission on Libraries, after a few months was appointed assistant archivist for Presidential Libraries in the National Archives. His experience, knowledge, and exuberant personality are sorely missed on the staff. J. Benjamin Townsend, assistant director, whose work on the opening

exhibitions and particularly on the two catalogs *This New Man* and *Presidential Portraits* has been invaluable, left immediately after the Gallery was opened to return to his teaching post in the University of the State of New York at Buffalo. In the brief time he was here, Mr. Townsend brought to the Gallery a fresh point of view; the loss of his knowledge and sympathetic personality leaves a real gap in day-to-day deliberations. Thomas Girard, who with good humor, tact, and efficiency performed as registrar the gigantic task of moving and insuring all loans for the opening exhibitions, left after the opening of the Gallery to take up similar duties in the Joseph H. Hirshhorn collection in New York City. He has been replaced in this important post by Jon Danning Freshour, formerly research assistant. Christiana Berryman, secretary to the administrative officer, resigned her post in fall 1968 and has been replaced by Barbara Faison. Also, Lewis McInnis, Kenneth Despertt, Adrienne Meier, and Mary Virginia Langston have resigned. Helen Romberger has joined the staff as secretary to the Conservation and Photographic Laboratories. Finally, the Curatorial Department has suffered a great loss in the departure to the Archives Bureau of Mrs. Violet Richardson, who had efficiently and pleasantly presided over its affairs in a manner that will make her greatly missed. She has been replaced by Mrs. Doris Rauch.

A tragic motor accident late in August 1968 was responsible for the death of Thomas Winslow, library technician. One of the most promising young members of the staff, he had served only a few weeks subsequent to his appointment though he had been with the Gallery previously as a temporary employee. No one had exhibited more élan and promise in the performance of his duties.

Many gaps in the staff need to be filled, but these appointments await the director's successor, Marvin S. Sadik, previously director of the University of Connecticut Museum of Art at Storrs. Mr. Sadik is a graduate with honors from Harvard, where he also did his graduate work. He received his initial museum training as assistant to Francis Henry Taylor at Worcester. Immediately before going to Storrs, Mr. Sadik was director of the Bowdoin College Museum of Art in Brunswick, Maine. In his previous posts he has become known for a series of spirited exhibitions. He is the author of several distinguished catalogs, particularly one of the Bowdoin collection of family portraits at that college. He is young, experienced, venturesome, and, best of all, really interested in portraiture. The Gallery may look forward to an outstanding regime under his directorship.

For its initial year of operation, the Gallery, with no formal educational program because of austerity, has been fortunate from February to May 1969 in having, under the chairmanship of Mrs. Paul Johnston,

a singularly gifted and faithful group of volunteer docents. Derived from the Ladies Committee of the Associates, these ladies have addressed some 835 people in 185 public tours. Other volunteers have rendered invaluable service at the reception desk and in the Gallery shop. Contact with these groups has been ably coordinated by Miss Sandra Sharpe of the staff, who herself has substituted in several capacities when the need arose.

#### VOLUNTEERS

##### *Docents*

Mrs. David Acheson  
 Mrs. Daniel E. Bergin  
 Mrs. Crenshaw Briggs  
 Mrs. Joseph V. Charyk  
 Mrs. J. A. de Ganahl  
 Mrs. William C. Grayson  
 Mrs. Charles Guggenheim  
 Mrs. Richard Helms  
 Mrs. Paul Ignatius  
 Mrs. S. Paul Johnston, chairman  
 Mrs. Robert D. van Roijen  
 Mrs. T. Ames Wheeler, vice chairman

##### *Reception Desk*

Mrs. F. J. Crilley  
 Maria Franco  
 Mrs. Ruth Graham

##### *Gallery Shop*

Mildred Archer  
 Mrs. Austin Lowrey

Assisting Mrs. Stephenson as volunteers in the print archives have been Miss Julia Loewe, Mrs. Charles Nagel, and Mrs. Stuart Symington. Thanks to these ladies, a total of 38,261 portrait prints and photographs have been sorted and accessioned.

In the course of the year, the director has served as a member of the Smithsonian Academic Appointments Board, on the Educational Panel, and on the committee to select an Exceptional Service Award Medal. He has been a member of the Mt. Vernon Ladies Association's Advisory Board, a trustee of the Yale Associates in Fine Arts, a member of the American Association of Museums, and a member of the Art Museum Directors Association.

On television, he has appeared with Jean Smith on NBC's "Today Show" and on WRC's "A Moment With" Deena Clark, while over the radio he has participated in interviews on the Gallery over USIA's "Voice of America," WTTG's "Panorama," and on WNYC with Ruth Bowman.

He also has lectured on the Gallery at the City Art Museum of Saint Louis; the Museum of Fine Arts, Boston; the Friends of Raynham Hall, Oyster Bay; the Washington Club; the Contemporary Club of Baltimore; the Colony Club, New York; and Berkeley College, Yale University.



Robert G. Stewart, curator, has continued to teach the museology program in conjunction with the Art Department of George Washington University.

Mr. Stewart and the director have addressed in the Office of Academic Programs a group of summer students inquiring into the history and purposes of museum exhibits: "The Art Gallery—Its History and Foundation."

Monroe Fabian of the Curator's Department, has attended "Visual Arts in American Culture, 1725-1790," a seminar at the Henry Francis du Pont Winterthur Museum, 8-26 July 1968. He has delivered lectures to the Zonta Club of Washington, the Cosmopolitan Club of Washington, and the Southhold Historical Society.

At the beginning of the year the staff was occupied in the transportation of more than 200 objects from individuals and institutions for the opening exhibition of the Gallery. In addition, transportation has been arranged for two other exhibitions: *A Nineteenth-Century Gallery of Distinguished Americans* and *Portraits of American Newsmakers*.

Mrs. Purdy, keeper of the Catalogue, gave a paper at the annual convention of the American Association for State and Local History in a session entitled "Automation in Pursuit of History." She has spoken to the area chapters for both the Reference Division of the American Library Association and the American Studies Association about the developing *Catalogue of American Portraits*. She also has spoken on "Portraits as Historical Documents" at a membership meeting of the Colonial Dames of America in Chicago, Illinois.

Mr. Walker, the librarian, attended an institute on "The Introduction to Modern Archives Management," held at the National Archives, 2-13 June 1969. The following week (16-20 June) he served on the faculty of an Institute on Art Librarianship that was held at the State University of New York at Buffalo, where he presented a paper on his work with the Library of Congress in revising the L.C. classification schedule for books on the fine arts, Class N.

Mrs. Aleita Hogenson, reference librarian, attended the annual conference of the American Library Association at Atlantic City, New Jersey, 23-27 June 1969. Mrs. Shirley Harren, technical information specialist, attended the Special Libraries Association's annual meeting in Montreal, Canada, 1-6 June 1969.

### *History Department and Catalogue of American Portraits*

Because the vacancy in the position of historian has not been filled and Mrs. Virginia C. Purdy, formerly assistant historian, has been made

keeper of the Catalogue of American Portraits (CAP), the Gallery has had no permanent professional staff in its History Department for the greater part of this year.

The work of the Department has been carried on by two temporary research assistants under Mrs. Purdy's supervision. They have completed the research and writing still needed on the catalog *This New Man*, and one of them, Elizabeth T. Heck, has made an outstanding contribution to the opening exhibition by assuming responsibility for locating and arranging to borrow the associative objects that gave an additional dimension to the exhibition.

Mrs. Beverly Cox has selected the sitters and supervised the historical arrangement of the exhibition of portraits from the permanent collection that was hung in the second floor galleries in January 1969. She also has taken charge of the Gallery's biographical file and has participated in book selection for the library. Both of these assistants have researched and written biographical material for exhibition captions for the permanent collection and the Longacre exhibitions as well as for the use of the Acquisitions Committee in making decisions on additions to the collection.

The permanent staff of the Catalogue of American Portraits has consisted of the aforementioned keeper and two research assistants, Mrs. Mona Dearborn in art history and Miss Dorothy Brewer in American history. In addition there have been two temporary catalogers for part of the year.

Working closely with the Information Systems Division, the CAP staff has completed a pilot project to develop a format to prepare portrait information for automatic-data processing at the same time it is being entered into the manual file of the CAP without sacrificing accuracy, careful documentation, and completeness in the manual file. The next steps will be the editing and committing to paper tape of all current and incoming records (some 25,000 at present) and the programming for indexing and eventual publication.

Portrait surveys or cataloging projects have been undertaken in the past year in cooperation with the CAP by some fifteen organizations of national importance. Much of this activity has originated with the organizations involved because of their interest in the Catalogue.

Mrs. Genevieve Stephenson serves in the dual role of reference librarian for the Catalogue of American Portraits and picture librarian for the Gallery's picture collection, which contains 38,261 prints and photographs. Twenty-two scholars have used the manual file of the CAP and the picture collection in the first five months of 1969, and ninety-eight reference requests have been answered by the staff by phone or by correspondence during the year. The picture collection has been augmented

by 227 photographs transferred from Armed Forces History in the Division of Military History and approximately 4000 prints from glass-plate negatives of portraits taken between about 1912 and 1945 by Harris & Ewing, photographers in Washington, D.C. Harris & Ewing has lent the Gallery its microfilm and records for the period, and Miss Brewer has extracted from it data pertinent to the portraits of which the museum holds prints. About 600 of the glass-plate negatives have been retained.

## *Library*

The chief visual enhancement of the library this past year has been the installation of antique gold carpeting extending the entire length of the main floor center. Not only handsome, it is also a practical addition that covers the much patched original marble flooring and cuts down immeasurably on the noise. The carpet was laid in time for the opening of the National Portrait Gallery.

During the year the library acquired and is housing in the southeast section of the fourth floor stack area the files of the Prevention of Deterioration Center, which represents a ten-year project conducted by Dr. Carl J. Wessel and sponsored by the National Research Council. Since these files are of general interest to the Smithsonian, they may eventually be housed elsewhere in the Institution. On the top floor of the library, there are files of material of New Deal Art Projects operating between 1933 and 1943 and the Holger Cahill files, which consist of papers and photographs from the Washington office of the late director of the WPA federal art project. This material has been assembled and organized by Dr. Francis V. O'Connor, who has also written a handbook to facilitate the use of the files.

Many professionals have visited the library during the year including members of Winterthur's Graduate Program, the Woodlawn Conference under the National Trust for Historic Preservation, the Reference Services Division of the Maryland branch of the American Library Association, a seminar group from the Fogg Art Museum, and individuals such as Mrs. Fredo Goldman, art reference librarian of the Johannesburg Public Library; Dr. Jan Kříž of the Institute of History of Art, Prague; and Miss Helen Lowenthal of the Victorian Society of London.

Handicapped with lack of staff, Mr. Walker and his assistants have continued to give first-rate service to the two museums and to the public.

A quick survey of countable activity in the library shows a total of 2,050 visitors who used the library without reference assistance, 2,830 requests for reference assistance, 2,159 loans to staff and other Smith-

sonian bureaus, and 580 books borrowed from the Library of Congress.

With a small acquisitions budget, the library is especially grateful for donations to the collections. The largest single gift for the year is that of Mrs. Adelyn Breeskin's personal library.

Six publication exchange mailings, consisting of seven NCFA and five NPG titles, have been sent to 265 institutions, domestic and foreign.

### *Conclusion and a Personal Word from the Retiring Director*

To sum up the present situation of the Gallery, the words of Secretary Ripley on the occasion of its opening may well be kept in mind:

At first glance, the courage of the Board of Regents of the Smithsonian Institution in accepting the task of setting up a National Portrait Gallery can be measured only by mega-scale: mega-watts, mega-meters, or mega-tons. To found a portrait gallery in the 1960s—when American portraiture has already reached the zenith in price and the nadir in supply, when museums and halls of legislature of this country already possess most of the available portraits and sculpture of famous personages and are little likely to release them to a johnny-come-lately—seems an act of bravery indeed.

The positive nature of the act of the Regents is further evoked by the composition of the National Portrait Gallery Commission. Scholars are preponderant on that Commission, and it is, therefore, an earnest of policy and plans to come. It is quite obvious that this National Portrait Gallery, in the very act of being created when it was, has already set its sights on being a different National Portrait Gallery. Scholarly it must be, concentrating on a dimension in historical biography and iconography largely left uncharted by the great historical and biographical source books of this nation. The opportunity is here, if it can be correctly measured, for setting forth on a series of profound and seminal catalogs and historical studies in the field of likenesses of American personages never before marshalled or planned as a whole. Few tasks in American historical scholarship could be more challenging. The Gallery should be a center, as well, for original biographical studies by those historians, who might just happen to be interested in human beings rather than social institutions.

If the National Portrait Gallery is to live up to its bold challenges, it must become one of the most exciting environments for scholars and the public alike in our Capital City.

During these formative years, the writer, as a former art museum man, occasionally found himself sailing in uncharted waters. With the aid of a learned Commission, and a small but exceptionally bright and intelligent staff, however, the navigation during the Gallery's first five years has proved equal to the demands made upon it. Certainly those on the bridge never doubted an eventual landing at the appointed haven.

These initial years have tested many of the possibilities of our building for the purposes of a museum. These will undoubtedly change and be



modified as the Gallery expands and takes on new concepts and objectives.

Imaginative and skilled leadership seems assured and, with this to count upon, plus five years of experience, the future of the Gallery will no doubt be secure.

Much has been said and written about the early mention of establishing a National Portrait Gallery. One such reference appears in *The Plough Boy*, an Albany, New York, agricultural journal edited by Solomon Southwick. Here under the nom de plume of "Henry Home-spun, Jr.," Southwick, in the issue of 4 March 1820, urges the establishment of "a Gallery of National Portraits," wherein "the men of New Hampshire, Massachusetts, and Rhode Island may hold converse with the spirits of their Langdons, their Franklins, their Greenes; and, here the Carolinian and Virginian may come to talk with the shade of Laurens of the mazes of diplomacy and that of Washington of the art of war."

To have become, almost 150 years later, the first director of such a National Portrait Gallery has been for the writer an important, final professional task, and, as well, a great and memorable privilege, happily shared with a distinguished and understanding group of colleagues. In departing he salutes alike the Gallery, now launched in shipshape fashion, and its future filled with promise. *Ave at que vale!*

### *Staff Publications and Papers*

NAGEL, CHARLES. "The National Portrait Gallery." *Antiques* (November 1968), volume 94, number 5, pages 726-729.

———. "The National Portrait Gallery of the Smithsonian Institution." Museum Association of Great Britain, *Museum Journal* (March 1969), volume 68, number 4, pages 156-159.

PURDY, VIRGINIA, and DANIEL J. REED. *Presidential Portraits*. Edited and foreword by J. Benjamin Townsend. Smithsonian Publication 4748. 75 pages, 37 illustrations. Washington, D.C.: Smithsonian Institution Press, 1968.

STEWART, ROBERT G. "James Herring's Portrait of Noah Webster." *Smithsonian Journal of History* (fall 1967), volume 2, number 3, pages 70-72.

———. *A Nineteenth-Century Gallery of Distinguished Americans*. Foreword by Charles Nagel. 95 pages, 166 illustrations. Smithsonian Publication 4762. Washington, D.C.: Smithsonian Institution Press, 1969.

*This New Man—A Discourse in Portraits*. Edited by J. Benjamin Townsend; foreword by S. Dillon Ripley; introduction by Charles Nagel; essay by Oscar Handlin; text by History Department, National Portrait Gallery, 217 pages, 162 illustrations. Smithsonian Publication 4752. Washington, D.C.: Smithsonian Institution Press, 1968.

A group of nine postcards, color reproductions of paintings in the Gallery's collection, published by Clarke & Way, Inc., for sale at the Gallery Shop.

## Loans to National Portrait Gallery

1 July 1968–30 June 1969

Paintings for *This New Man*, opening exhibition (total 134)

<i>Subject</i>	<i>Artist</i>	<i>Owner</i>
Adams, Samuel	John Singleton Copley	City of Boston
Addams, Jane	George deForest Brush	Jane Addams' Hull House, University of Illinois
Amherst, Jeffrey	Joseph Blackburn	Mrs. Frederick R. Pratt
Asbury, Francis	Charles Peale Polk	Methodist Historical Society
Astor, John Jacob	John Wesley Jarvis	Mrs. Peter A. Jay
Audubon, John James	G. P. A. Healy	Museum of Science, Boston
Barnum, Phineas T.	Thomas Ball	Tufts University
Barton, Clara	J. E. Purdy	Library of Congress
Belasco, David	Everett Shinn	Museum of the City of New York
Bellows, George	Robert Henri	National Academy of Design, New York City
Belmont, August	Unknown	August Belmont
Berkeley, Sir William	Sir Peter Lely	Maurice du Pont Lee
Boone, Daniel	Chester Harding	Massachusetts Historical Society
Bowditch, Nathaniel	Charles Osgood	Peabody Museum, Salem
Brady, Mathew B.	Charles Loring Elliott	The Metropolitan Mu- seum of Art
Brant, Joseph	Ezra Ames	New York State Historical Association
Brown, Charles Brockden	William Dunlap	Mr. and Mrs. F. Woodson Hancock
Bryan, William Jennings	Joseph Keppler	Library of Congress
Bryan, William Jennings	Irving R. Wiles	Department of State
Bryant, William Cullen	Frank Buchser	Kunstmuseum, Basel, Switzerland
Bulfinch, Charles	Mather Brown	Fogg Art Museum
Burr, Aaron	John Vanderlyn	Yale University Art Gallery
Calhoun, John C.	G. P. A. Healy	The Virginia Museum of Fine Arts
Calvert, Charles	Godfrey Kneller	The Enoch Pratt Free Library
Carnegie, Andrew	Anders Zorn	Museum of Art, Carnegie Institute
Carroll, John	Gilbert Stuart	Georgetown University
Catlin, George	William Fisk	National Collection of Fine Arts
Channing, William Ellery	Washington Allston	Museum of Fine Arts, Boston

<i>Subject</i>	<i>Artist</i>	<i>Owner</i>
Clark, William	John Wesley Jarvis	Missouri Historical Society
Cody, Buffalo Bill	Stacy	Library of Congress
Colden, Cadwallader	Matthew Pratt	New York Chamber of Commerce
Cooper, James Fenimore	John Wesley Jarvis	Yale University Art Gallery
Copley, John Singleton <i>The County Election</i>	Self-portrait George Caleb Bingham	Private collection City Art Museum of St. Louis
Cushman, Charlotte	Thomas Sully	Library Company of Philadelphia
Custer, George Armstrong	Mathew Brady	Library of Congress
Davis, Jefferson	John Elder	The North Carolina Museum of Art
Decatur, Stephen	Gilbert Stuart	Jonathan Bryan
Dewey, John	Jacob Epstein	Mrs. John Dewey
Dix, Dorothea Lynde	Samuel Bell Waugh	St. Elizabeths Hospital
Douglass, Frederick	J. W. Hurn	Library of Congress
Douglass, Frederick	Unknown	Rhode Island Historical Society
Eakins, Thomas	Self-portrait	National Academy of Design, New York City
Edwards, Jonathan	Joseph Badger	Yale University Art Gallery
<i>Exhuming the First American Mastodon</i>	Charles Willson Peale	The Peale Museum
Field, Marshall	Léon-Joseph Florentin Bonnat	Field Enterprises, Inc.
Forrest, Edwin	David Johnson	National Gallery of Art
Franklin, Benjamin	Mason Chamberlin	Philadelphia Museum of Art
Frémont, John Charles	Charles Loring Elliott	The Brooklyn Museum
Fulton, Robert	Benjamin West	New York State Historical Association
Gallatin, Albert	Gilbert Stuart	The Metropolitan Museum of Art
Garrison, William Lloyd	Nathaniel Jocelyn	Mr. and Mrs. Garrison Norton
Gibbons, James Cardinal	Florence MacKubin	Walters Art Gallery
Gompers, Samuel	Moses Dykaar	National Collection of Fine Arts
Gould, Jay	Attributed to Eastman Johnson	National Trust for Historic Preservation
Greene, Nathanael	Charles Willson Peale	Montclair Art Museum
Hancock, John	John Singleton Copley	City of Boston
Hanna, Mark	Anders Zorn	The Western Reserve Historical Society
Harlow, Jean	Studio Still	The Museum of Modern Art

<i>Subject</i>	<i>Artist</i>	<i>Owner</i>
Hearst, William Randolph	Orrin Peck	The Hearst Corporation
Hicks, Edward	Thomas Hicks	A. Aldrich Rockefeller Folk Art Collection
Hill, James J. Homage to Eakins	Henri Caro-Delvaile Raphael Soyer	G. Richard Slade Joseph H. Hirshhorn Foundation
Hopkins, Harry L.	Reuben Nakian	The Museum of Modern Art
Houston, Sam	Henry Dexter	Texas Library and His- torical Commission
Hughes, Charles Evan <i>In the Land of Promise; Castle Gardens</i>	Philip de Laszlo Charles F. Ulrich	Chauncey L. Waddell Corcoran Gallery of Art
James, William Jones, John Paul	Ellen Emmet Rand Charles Willson Peale	Fogg Art Museum Independence National Historical Park Col- lection
Kósciuszko, Tadeusz Andrzej Bonawentura Lafayette, Marquis de	Benjamin West Charles Willson Peale	Allen Memorial Art Museum Washington and Lee University
La Guardia, Fiorello <i>The Last Moments of John Brown</i>	Unknown Thomas Hovenden	Brown Brothers The Metropolitan Muse- um of Art
Lee, Richard	Attributed to Sir Peter Lely	Mrs. Cazenove Lee
Lee, Robert E.	Frank Buchser	Kunstmuseum, Berne, Switzerland
Lewis, Meriwether	Charles B. J. F. de Saint-Mémin	Missouri Historical Society
Longfellow, Henry Wadsworth	James Buchanan Read	Mrs. Thomas Curtis
Mather, Increase	Jan Van Der Spriett	Massachusetts Historical Society
Maury, Matthew	George W. L. Ladd	The Mariners Museum, Newport News
Mayo, Charles Horace	Louis Betts	Mayo Foundation
Mayo, William James	Louis Betts	Mayo Foundation
Mellon, Andrew	Oswald Birley	National Gallery of Art
Melville, Herman	Asa W. Twitchell	The Berkshire Athenaeum
Mencken, H. L.	Nikol Schattenstein	The Enoch Pratt Free Library
Meyer, Adolf	Hildegard Woodward	Mrs. Julia L. Asher
Michelson, Albert	Ralph Clarkson	Harper Memorial Library
Millikan, Robert	Holger and Helen W. Jensen	California Institute of Technology
Morse, Samuel F. B.	Self-portrait	Addison Gallery of American Art
Mott, Lucretia Coffin	Joseph Kyle	Mrs. Alan Valentine



<i>Subject</i>	<i>Artist</i>	<i>Owner</i>
Muhlenberg, Frederick Augustus Conrad <i>The Oregon Trail</i>	Joseph Wright  Albert Bierstadt	Mrs. George Brooke III  The Butler Institute of American Art
Osceola	George Catlin	National Collection of Fine Arts
Paine, Thomas Palmer, Mrs. Potter Peale, Charles Willson	John Wesley Jarvis Guerrino Guardabassi Self-portrait	National Gallery of Art Potter Palmer, Jr. The Pennsylvania Academy of the Fine Arts
Perry, Matthew C.	Unidentified Japanese artist	Library of Congress
Perry, Oliver Hazard	John Wesley Jarvis	The Detroit Institute of Arts
Poe, Edgar Allan	W. S. Hartshorn	American Antiquarian Society, Worcester
Priestley, Joseph	Rembrandt Peale	The New-York Historical Society
Pulitzer, Joseph Raleigh, Sir Walter	John Singer Sargent Unknown	Joseph Pulitzer, Jr. National Portrait Gallery, London
Revere, Paul	John Singleton Copley	Museum of Fine Arts, Boston
Rittenhouse, David Rockefeller, John D.	Charles Willson Peale Paul Manship	University of Pennsylvania National Collection of Fine Arts
Rush, Benjamin	Thomas Sully	Mr. and Mrs. Benjamin Rush
Russell, Lillian Ruth, Babe	Adolfo Muller-Ury Unknown	Jessica Dragonette Underwood & Under- wood Newphotos, Inc.
Ryder, Albert Pinkham Saint-Gaudens, Augustus	Self-portrait Kenyon Cox	Private collection The Metropolitan Museum of Art
Schurz, Carl	Arthur von Ferraris	National Carl Schurz Association, Inc.
Seward, William H.	Frank Buchser	Kunstmuseum, Basel, Switzerland
Sherman, Roger	Ralph Earl	Yale University Art Gallery
Sherman, William Tecumseh	Frank Buchser	Swiss Confederation
Sitting Bull Smith, Joseph	D. F. Barry Unknown	Library of Congress Reorganized Church of Jesus Christ of Latter Day Saints
Sousa, John Philip Stein, Gertrude	Harry Franklin Waltman Jacques Lipchitz	Mrs. Helen Sousa Abert The Baltimore Museum of Art

<i>Subject</i>	<i>Artist</i>	<i>Owner</i>
Sullivan, John L.	J. M. Mora	Library of Congress
Sullivan, Louis H.	Frank A. Werner	Chicago Historical Society
Sumner, Charles	William Morris Hunt	The Metropolitan Museum of Art
Sutter, John A.	Frank Buchser	Museum der Stadt Solothurn, Solothurn, Switzerland
Thomas, Theodore	Leopold Syffert	The Orchestral Association, Chicago
Thoreau, Henry David	Benjamin D. Maxham	The Thoreau Society; Concord Free Public Library
Thorpe, Jim	Unknown	Wide World Photos, Inc.
Twain, Mark	Charles N. Flaggy	The Metropolitan Museum of Art
Tyler, Royall	Unknown	The Honorable William R. Tyler
Valentino, Rudolph	Edward Steichen	Edward Steichen
<i>Washington Irving and His Friends at Sunnyside</i>	Christian Schussele	Sleepy Hollow Restorations
Whistler, James Abbott McNeil	William Merritt Chase	The Metropolitan Museum of Art
White, William	Gilbert Stuart	The Pennsylvania Academy of the Fine Arts
Whitman, Walt	Thomas Eakins	The Pennsylvania Academy of the Fine Arts
Whitney, Eli	Samuel F. B. Morse	Yale University Art Gallery
Wise, Isaac Mayer	Moses Jacob Ezekiel	Hebrew Union College

Portraits for *Presidential Portraits*, opening exhibition (total 17)

<i>Subject</i>	<i>Artist</i>	<i>Owner</i>
Adams, John	Mather Brown	Library of the Boston Athenaeum
Adams, John Quincy	Charles R. Leslie	Mr. and Mrs. Robert Homans
Cleveland, Grover	Anders Zorn	Richard Cleveland
Coolidge, Calvin	Ercole Cartotto	Phi Gamma Delta Fraternity, Washington, D.C.
Hayes, Rutherford B.	William Carl Browne	The Union League of Philadelphia
Jefferson, Thomas	Mather Brown	Charles F. Adams
Johnson, Andrew	Frank Buchser	Kunstmuseum, Basel, Switzerland
Madison, James	Gilbert Stuart	T. J. Coolidge, Jr.
Monroe, James	Thomas Sully	West Point Museum
Polk, James K.	Miner K. Kellogg	Cincinnati Art Museum
Roosevelt, Franklin D.	Douglas Chandor	Mrs. Douglas Chandor

<i>Subject</i>	<i>Artist</i>	<i>Owner</i>
Roosevelt, Theodore	Philip de Laszlo	The American Museum of Natural History, New York City
Taylor, Zachary	Attributed to Rembrandt Peale	Mrs. Thomas M. Waller
Washington, George	Jean Antoine Houdon	The Pierpont Morgan Library, New York City
Washington, George	John Ramage	Mrs. Andrew Van Pelt
Washington, George	Gilbert Stuart	Lord Primrose, D. I.
Washington, George	Gilbert Stuart	National Gallery of Art

Portraits for *A Nineteenth-Century Gallery of Distinguished Americans* (total 68)

<i>Subject</i>	<i>Artist</i>	<i>Owner</i>
Adams, Abigail	Gilbert Stuart	National Gallery of Art
Ames, Fisher	Gilbert Stuart	The Honorable Henry Cabot Lodge
Baldwin, Abraham	Robert Fulton	Andrew Longacre
Barney, Joshua	Jean Baptiste Isabey	Daughters of the American Revolution Museum
Biddle, Nicholas	James B. Longacre	Andrew Longacre
Calhoun, John Caldwell	James B. Longacre	Andrew Longacre
Carroll, Charles	Attributed to Chester Harding	Mrs. Philip H. Clarke
Carroll, Charles	Chester Harding	National Gallery of Art
Cass, Lewis	James B. Longacre	Andrew Longacre
Clay, Henry	William James Hubbard	University of Virginia Museum of Fine Arts
Clay, Henry	James B. Longacre	Andrew Longacre
Crawford, William Harris	John Wesley Jarvis	The Pennsylvania Academy of Fine Arts
Dickinson, John	James B. Longacre	Andrew Longacre
Gist, Mordecai	Luther Terry	Maryland Historical Society
Henry, Patrick	James B. Longacre	Andrew Longacre
Henry, Patrick	Lawrence Sully	Amherst College
Hosack, David	Thomas Sully	John Hampton Garnes
Irving, Washington	Charles Robert Leslie	Mrs. E. DuPont Irving
Jackson, Andrew	James B. Longacre	Mrs. William Hacker
Jackson, Andrew	James B. Longacre	Andrew Longacre
Jay, John	Gilbert Stuart and John Trumbull	John Clarkson Jay
Johnston, Josiah Stoddard	Charles Bird King	Redwood Library and Athenaeum
Kenton, Simon	R. W. Morgan	Mrs. Phillip Holt Lowry
Laurens, Henry	William G. Armstrong	Andrew Longacre
Lee, Henry	Gilbert Stuart	Carter Lee Refo
Livingston, Edward	James B. Longacre	Andrew Longacre
Longacre, James Barton (as a young man)	James B. Longacre	Mrs. Milton Cornell

<i>Subject</i>	<i>Artist</i>	<i>Owner</i>
McKean, Thomas	Gilbert Stuart	Mrs. Edward Wardell
McMackin, Eliza Williams	James B. Longacre	Andrew Longacre
Madison, Mrs. James	Joseph Wood	Virginia Historical Society
Marion, Francis	Attributed to James B. Longacre	Andrew Longacre
Martin, Luther	Henry Hoppner Meyer	Andrew Longacre
Martin, Luther	Unknown	Court House, Baltimore, Maryland
Ogden, Aaron	Asher Brown Durand	The New-York Historical Society
Penn, Admiral	James B. Longacre	Mrs. Milton Cornell
Perry, Oliver Hazard	J. W. Jarvis	Art Commission, City of New York
Pickens, Andrew	Unknown	Francis Pickens Miller
Poinsett, Joel Roberts	James B. Longacre	Library Company of Philadelphia
Ramsay, David	Charles Frazer	Andrew Longacre
Ramsay, David	James B. Longacre	Mrs. William Hacker
Rice, Daniel	Unknown photographer	Andrew Longacre
Stone, Thomas	James B. Longacre	Andrew Longacre
Summerfield, John (oil)	James B. Longacre	Andrew Longacre
Summerfield, John (drawing)	James B. Longacre	Andrew Longacre
Sumter, Thomas	William G. Armstrong after Rembrandt Peale	Andrew Longacre
Unknown Gentleman, I	James B. Longacre	Andrew Longacre
Unknown Gentleman, II	James B. Longacre	Andrew Longacre
Unknown Gentleman, III	James B. Longacre	Andrew Longacre
Unknown Gentleman, IV	James B. Longacre	Andrew Longacre
Unknown Gentleman, V	James B. Longacre	Andrew Longacre
Unknown Gentleman, VI	James B. Longacre	Andrew Longacre
Unknown Gentleman, VIII	James B. Longacre	Andrew Longacre
Unknown Gentleman, IX	James B. Longacre	Andrew Longacre
Unknown Gentleman, X	James B. Longacre	Andrew Longacre
Washington, William Augustine	James B. Longacre	Andrew Longacre
Washington, William Augustine	Charles Willson Peale	Independence National Historical Park
Webster, Daniel	James B. Longacre	Andrew Longacre
Webster, Daniel	James B. Longacre	Andrew Longacre
White, William	James B. Longacre	Andrew Longacre
Wilson, James	James B. Longacre	Andrew Longacre
Wilson, James	Unknown	National Collection of Fine Arts
Wirt, William	James B. Longacre	Andrew Longacre
Witherspoon, John	James B. Longacre	Andrew Longacre
Woodburt, Levi	James B. Longacre	Andrew Longacre



<i>Subject</i>	<i>Artist</i>	<i>Owner</i>
Wythe, George	James B. Longacre	Andrew Longacre
<i>Addendum</i>		
Adams, John	James B. Longacre	Andrew Longacre
Boone, Daniel	James B. Longacre	Andrew Longacre
Gerry, Enbridge	James B. Longacre	Andrew Longacre

Portraits for *Portraits of American Newsmakers* (total 86)  
 (All owned by Time-Life, Inc., who sponsored the exhibition)

<i>Subject</i>	<i>Artist</i>
Abrams, Creighton	Louis Glanzman
Bacall, Lauren	Boris Chaliapin
Baez, Joan	Russell Hoban
Baldwin, James	Boris Chaliapin
Bernstein, Leonard	Henry Koerner
Black, Hugo	Robert Vickrey
Brooke, Edward	Henry Koerner
Buckley, William	David Levine
Bundy, McGeorge	Robert Vickrey
Carson, Johnny	Robert Berks
Cerf, Bennett	Pietro Annigoni
Child, Julia	Boris Chaliapin
Dennis, Sandy	Boris Chaliapin
Dirksen, Everett	Robert Vickrey
Eisenhower, Dwight D.	Ernest Hamlin Baker
Eisenhower and Nixon	James Chapin
Faulkner, William	Robert Vickrey
Finch, Robert	Vincent Perez
Franklin, Aretha	Boris Chaliapin
Fulbright, William	Robert Vickrey
Fuller, R. Buckminster	Boris Artzybasheff
Galbraith, John Kenneth	Gerald Scarfe
Gardner, John	Boris Chaliapin
Gleason, Jackie	Russell Hoban
Goldwater, Barry	Bernard Safran
Harriman, Averell	Boris Chaliapin
Harris, Julie	Henry Koerner
Hefner, Hugh	Marisol
Hope, Bob	Marisol
Hopper, Edward	James Chapin
Hull, Bobby	LeRoy Neiman
Humphrey, Hubert H.	Louis Glanzman
Javits, Jacob	Robert Vickrey
Johnson, Lady Bird	Boris Artzybasheff
Johnson, Lyndon	Pietro Annigoni
Kennedy, Edward M.	René Bouché
Kennedy, Ethel	Jan De Ruth
Kennedy, Jacqueline	Boris Chaliapin
Kennedy, John F.	Pietro Annigoni
Kennedy, Robert F.	Roy Lichtenstein

<i>Subject</i>	<i>Artist</i>
Kennedy, Robert F.	Louis Glanzman
Kerr, Jean	René Bouché
King, Martin Luther, Jr.	Robert Vickrey
Kissinger, Henry	Louis Glanzman
Lindsay, John	Henry Koerner
Lodge, Henry Cabot	Robert Vickrey
Lombardi, Vince	Boris Chaliapin
Lowell, Robert	Sidney Nolan
Luce, Henry R.	Robert Vickrey
Mansfield, Mike	Boris Chaliapin
McCarthy, Eugene	David Stone Martin
McLain, Denny	Robert Heindel
Merrick, David	David Stone Martin
Monk, Thelonius	Boris Chaliapin
Mosbacher, Emil Jr.	Charles Lundgren
Moynihan, Daniel P.	Boris Chaliapin
Nixon, Pat	Robert Vickrey
Nixon, Richard M.	Boris Chaliapin
Novak, Kim	Robert Vickrey
Oswald, Lee Harvey	Boris Artzybasheff
Parseghian, Ara	Boris Chaliapin
Reagan, Ronald	Marion Pike
Rockefeller, Nelson	Henry Koerner
Rockefeller, Winthrop	Peter Hurd
Rogers, William	Boris Chaliapin
Romney, George	Boris Chaliapin
Roosevelt, Theodore	Aaron Bohrod
Rowan and Martin	Gerald Scarfe
Schlesinger, Arthur, Jr.	Boris Chaliapin
Scranton, William	Robert Vickrey
Shriver, Sargent	Ben Shahn
Simon, Norton	Bernard Safran
Sinatra, Frank	Aaron Bohrod
Stevenson, Adlai	James Chapin
Streisand, Barbra	Henry Koerner
Tillinghast, Charles, Jr.	Peter Hurd
Truman, Harry S	Boris Chaliapin
Updike, John	Robert Vickrey
Wallace, George and Curtis Lemay	Robert Grossman
Warren, Earl	Ernest Hamlin Baker
Westmoreland, William C.	Robert Berks
Wilkins, Roy	Henry Koerner
Williams, Tennessee	Bernard Safran
Wyeth, Andrew	Henriette Wyeth Hurd
Young, Whitney	Boris Chaliapin

## Other Portraits on Loan to the Collection

1 July 1968–30 June 1969

<i>Subject</i>	<i>Artist</i>	<i>Owner</i>
Addams, Jane	Unknown	William R. Glennon
Johnson, Lyndon Baines	Jimilu Mason	Jimilu Mason

## Loans from National Portrait Gallery to Other Institutions

1 July 1968–30 June 1969

<i>Subject</i>	<i>Artist</i>	<i>Borrower</i>
Anderson, Marian	Laura Wheeler Waring	Burlington County Community Action Program
Audubon, James J.	Unknown	National Museum of History and Technology
Barrow, Joe Louis	Betsy Graves	Burlington County Community Action Program
Barnett, Claude	Betsy Graves	Burlington County Community Action Program
Barthe, Richard	Betsy Graves	Burlington County Community Action Program
Bethune, Mary McLeod	Betsy Graves	Burlington County Community Action Program
Bolin, Jane M.	Betsy Graves	Burlington County Community Action Program
Bontemps, Arna	Betsy Graves	Burlington County Community Action Program
Bunche, Ralph	Betsy Graves	Burlington County Community Action Program
Burleigh, Harry T.	Betsy Graves	Burlington County Community Action Program
Campbell, William A	Betsy Graves	Burlington County Community Action Program
Carson, Rachel	Una Hanbury	National Museum of History and Technology
Douglas, Aaron	Betsy Graves	Burlington County Community Action Program

<i>Subject</i>	<i>Artist</i>	<i>Borrower</i>
DuBois, W. E. B.	Betsy Graves	Burlington County Community Action Program
Ericsson, John	Arvid Nyholm	National Museum of History and Technology
Fauset, Jessie R.	Betsy Graves	Burlington County Community Action Program
Gershwin, George	Self-portrait	National Museum of History and Technology
Granger, Lester	Betsy Graves	Burlington County Community Action Program
Hastie, William H.	Betsy Graves	Burlington County Community Action Program
Houston, Charles H.	Betsy Graves	Burlington County Community Action Program
Ives, Herbert E	Chester W. Slack	National Museum of History and Technology
Jefferson, Thomas	Michael Sokolniki after Tadeusz Kosciuszko	National Museum of History and Technology
Johnson, Charles S.	Betsy Graves	Burlington County Community Action Program
Johnson, Mordecai	Betsy Graves	Burlington County Community Action Program
Jones, John Paul	J. E. Haid	National Museum of History and Technology
Keller, Helen	Jo Davidson	National Museum of History and Technology
Lawless, Theodore	Betsy Graves	Burlington County Community Action Program
McClellan, George	Julian Scott	National Museum of History and Technology
Mulzac, Hugh H.	Betsy Graves	Burlington County Community Action Program
Patterson, Frederick D.	Betsy Graves	Burlington County Community Action Program
Randolph, Asa Phillip	Betsy Graves	Burlington County Community Action Program
Robeson, Paul	Betsy Graves	Burlington County Community Action Program



<i>Subject</i>	<i>Artist</i>	<i>Borrower</i>
Sampson, Edith	Betsy Graves	Burlington County Community Action Program
Schoenberg, Arnold	Muriel Turnoff	National Museum of History and Technology
Sims, William Sowden	Irving Ramsay	National Museum of History and Technology
Temple, Ruth	Betsy Graves	Burlington County Community Action Program
<i>The Signing of the Treaty of Versailles</i>	John C. Johansen	National Museum of History and Technology
Thurman, Howard	Betsy Graves	Burlington County Community Action Program
Williams, Paul	Betsy Graves	Burlington County Community Action Program
White, Walter	Betsy Graves	Burlington County Community Action Program

## Portraits Added to Permanent Collection

1 July 1968–30 June 1969

<i>Subject</i>	<i>Artist</i>	<i>Donor or fund</i>
Adams, John Quincy	George Caleb Bingham	Purchase
Arthur, Chester A.	Matthew Wilson	Transfer, Harry S. Truman Library
Bell, Alexander Graham	Moses Dykaar	Transfer, NCFA
Black, Hugo L.	Oscar Berger	Gift, Oscar Berger
Brennan, William J.	Oscar Berger	Gift, Oscar Berger
Bromfield, Louis	Zoss Melik	Purchase
Brown, John	J. C. de Blezer	Gift, Alfred Volkenberg
Chase, William Merritt	William Merritt Chase	Purchase
Clark, "Champ" (James Beauchamp)	Michael Jacobs	Gift, Kimball Clark
Debs, Eugene	Louis Mayer	Purchase
Duveneck, Frank	William Merritt Chase	Purchase
Douglas, Stephen Arnold	Joseph Ternbach	Gift, Joseph Ternbach
Douglas, William O.	Oscar Berger	Gift, Oscar Berger
Draper, Ruth	Mary Foote	Gift, Mr. and Mrs. Franz Oppenheimer
Everett, Edward	Hiram Powers	Gift, Mrs. Charles C. Glover, Jr.
Farragut, David Glasgow	Attributed to William Swain	Transfer, NMHT, Smith- sonian
Fortas, Abe	Oscar Berger	Gift, Oscar Berger
Frankfurter, Felix	Oscar Berger	Gift, Oscar Berger

<i>Subject</i>	<i>Artist</i>	<i>Donor or fund</i>
Franklin, Benjamin	Johann Martin Will after C. N. Cochin	Purchase
Frost, Robert	Jose Buscaglia	Gift, Banco Credito y Ahorro Ponceno, San Juan, Puerto Rico
Frost, Robert	Walker Hancock	Gift, Walker Hancock
Fulton, Robert	Jean-Antoine Houdon	Purchase
Gilbert, Cass	R. B. Brandegee	Purchase
Hart, Moss	Zoss Melik	Purchase
Hampden (Doughtery), Walter	William Glackens	Gift, Sansom Foundation
Harlan, John M.	Oscar Berger	Gift, Oscar Berger
Hemingway, Ernest	Zoss Melik	Purchase
Hill, James J.	Muller-Ury	Gift, Jerome Hill
Hough, William Jarvis	J. Brayton Wilcox	Gift, Mrs. Violet Sheperd
Irving, Washington	Daniel Huntington	Purchase
Jackson, Andrew	James Barton Longacre	Gift, Swedish Colonial Society
Johnson, Andrew	Thomas Nast	Purchase
Kahn, Otto	Jo Davidson	Gift, Mrs. John Barry Ryan
Kane, Elisha Kent	Attributed to Giuseppe Fagnini	Purchase
Kaufman, George	Zoss Melik	Purchase
Lewis, Sinclair	Zoss Melik	Purchase
Lindbergh, Charles A.	J. Stubbs	Gift, George O'Connor
Loomis, Eben Jenks	Edwin Burrage Child	Bequest, Mrs. Millicent Bingham
McKinley, William	August Benziger	Gift, Marieli Benziger
Madison, James	Attributed to Chester Harding	Purchase
Marshall, Thurgood	Oscar Berger	Gift, Oscar Berger
Mayo, William James and Charles Horace	An original composition (after two oil paintings by Louis Betts) by Charles J. Fox	Gift, The Mayo Founda- tion
Meyer, Adolph	Hildegard Woodward	Gift, Mrs. Julia Asher
Nagel, Charles	Anders Zorn	Gift, Charles Nagel, Jr.
Nathan, George Jean	Zoss Melik	Purchase
Pratt, Matthew	Matthew Pratt	Purchase
Roosevelt, Franklin D.	Douglas Chandor	Purchase
Sheridan's Ride	Thomas Buchanan Read	Transfer, NMHT, Smith- sonian
Sherman, John	Henry Ulke	Gift, Mrs. Louis A. Bolin
Shreve, Henry Miller	Unknown	Purchase
Sloan, John with Dolly Sloan, Robert Henri and Linda Henri	John Sloan	Purchase
Sousa, John Philip	Harry Franklin Waltman	Gift, The Sousa Corpora- tion

<i>Subject</i>	<i>Artist</i>	<i>Donor or fund</i>
Sousa, Mrs. John Philip	Harry Franklin Waltman	Gift, The Sousa Corporation
Stewart, Potter	Oscar Berger	Gift, Oscar Berger
Strong, Benjamin	Gari Melchers	Gift, General Phillip B. Strong
Sumner, Charles	Edgar Parker	Purchase
Tarkington, Newton Booth	Walker Hancock	Gift, Walker Hancock
Taylor, Frederick Winslow	Samuel Murray	Gift, Stevens Institute of Technology
Warren, John Collins	Francis Alexander	Purchase
Warren, Earl	Oscar Berger	Gift, Oscar Berger
White, Byron R.	Oscar Berger	Gift, Oscar Berger
Whitney, William C.	Unknown	Gift, Michael Straight
Wilson, Edith Bolling Galt	Emil Alexay	Gift, Alan Urdang
Wollcott, Alexander	Zoss Melik	Purchase

## Decorative Arts Added to the Collections

1 July 1968–30 June 1969

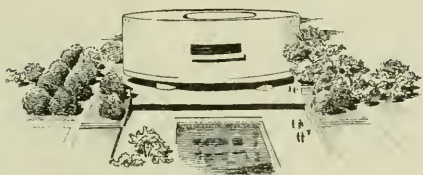
<i>Object</i>	<i>Donor</i>
Pair of Ming vases	Victor Proetz Fund
Pair of eighteenth-century Holland Delft tobacco jars	Victor Proetz Fund
One nineteenth-century tole flower holder	Victor Proetz Fund
Pair of Japanese wood chests	Victor Proetz Fund
Pair of nineteenth-century hurricane shades	Victor Proetz Fund
Pair of nineteenth-century Chinese flower pots	Victor Proetz Fund
One eighteenth-century oval, Chinese platter	Gift of Mrs. Alcott F. Elwell
One eighteenth-century Chinese plate, floral design	Gift of Mrs. Alcott F. Elwell
Pair of carved Adam torchères	Gift of J. Bruce Bredin





# Joseph H. Hirshhorn Museum and Sculpture Garden

ABRAM LERNER, *Director*



IN 1968-1969 THE JOSEPH H. HIRSHHORN MUSEUM, under Director Abram Lerner, has continued to move toward the realization of its primary goals: the development of plans for the opening of the new Museum on the Mall, the acquisition of new paintings and sculptures, and the maintenance of its services to scholars and institutions involved in the history of modern American and European art.

On 8 January 1969 President Lyndon B. Johnson and Joseph H. Hirshhorn broke ground for the Joseph H. Hirshhorn Museum and Sculpture Garden. President Johnson, Mr. Hirshhorn, Secretary Ripley, Chief Justice Earl Warren addressed the distinguished guests, who included Gordon Bunshaft of Skidmore, Owings and Merrill, architects of the new Museum, the Smithsonian Institution Board of Regents, Congressional leaders, and prominent members of the government and the art world. Director Abram Lerner, assistant curator Cynthia J. Jaffee, historian Frances R. Shapiro, and registrar Thomas J. Girard represented the Hirshhorn Museum at the historic event.

In his remarks at the ground-breaking ceremony, Mr. Hirshhorn said in part:

I have spent the greater part of my life with art, with artists, and as a collector of art. When I began to collect, it was considered absurd to believe that American art could ever achieve international significance, that it could ever become a vital art.

It was an honor for me to give my art collection to the people of the United States. I think it is a small repayment for what this great nation has done for me and others who have come to this country as immigrants.



*Triptych - Inspired by T. S. Eliot's Poem "Sweeney Agonistes."* By Francis Bacon (English, born Dublin, 1909-). Oil and pastel on canvas, each (3) 78 × 58 inches. 1967.



*Portrait of Philippe Soupault.* By Robert Delaunay (French, 1885–1941). Oil on paper, 51 × 76½ inches. 1922.



*Le Questionnat.* By Yves Tanguy (French, 1900–1955). Oil on canvas, 23 × 32 inches. 1937.

*Whip Out.* By Jules Olitski (American, 1926–). Aluminum with acrylic air-drying lacquer, 5 × 21 × 12 feet. 1968.

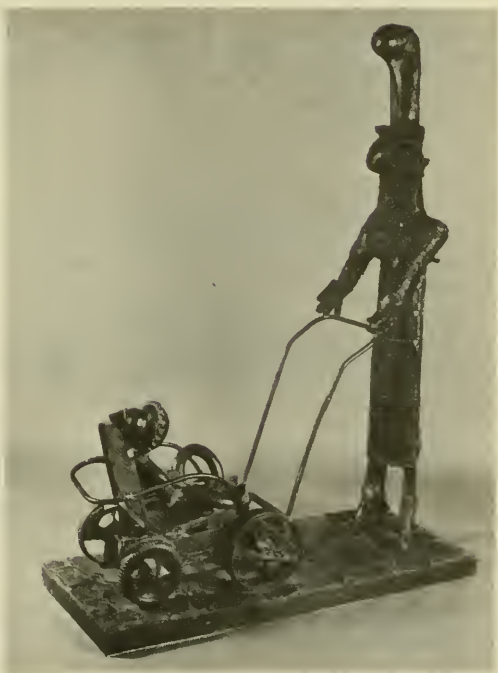




*Sabine Houdon.* By Jean-Antoine Houdon (French, 1741–1828). Marble, 24 inches high. 1791.



*Woman with Baby Carriage.* By Pablo Picasso (Spanish, 1881–). Bronze, 80 inches high. 1950.



## *The Collection*

In 1969 Mr. Hirshhorn's enthusiasm and generosity again led to the addition of over five hundred new paintings and sculptures to the superlative collection of fine art he has donated to the United States for the benefit of the people.

The more than twenty-five hundred sculptures in the Hirshhorn Collection range historically from antiquity to the works of today's young creators. Its fine representation of African art is highlighted by a superb group of Benin bronzes. Of its renowned European and American sculptures of the nineteenth and twentieth centuries, one hundred forty monumental works are located at the Hirshhorn Sculpture Garden, Greenwich, Connecticut, where they were viewed in 1969 by participants in twenty-four benefit tours for educational, cultural, and philanthropic organizations. Among the outstanding sculptures acquired in 1969 are:

<i>Artist</i>	<i>Title</i>
Benin (Nigeria)	<i>Head of an Oba</i>
Calder, Alexander	<i>Mobile-Fleche</i>
Carpeaux, Jean-Baptiste	<i>Bust of Anna Foucart de Valenciennes</i>
Giacometti, Alberto	<i>Femme 1929</i>
Houdon, Jean-Antoine	<i>Sabine Houdon</i>
Magritte, Rene	<i>La Folie des Grands</i>
Matisse, Henri	<i>Jeanette III</i>
Moore, Henry	<i>3-Piece Sculpture: Vertebrae</i>
Nicholson, Ben	<i>White Relief, First Version, 1938</i>
Olitski, Jules	<i>Whip-Out</i>
Picasso, Pablo	<i>Woman with Baby Carriage</i>
Schoffer, Nicholas	<i>Spatiodynamique 17</i>

The Collection's paintings focus on the 20th century. From the works of precursors such as Thomas Eakins and Winslow Homer to the canvases of today, the course of painting in America is covered in depth. Complementing the American section is a strong selection of paintings by modern European masters and young contemporaries. Notable paintings added to the Collection in 1969 include:

<i>Artist</i>	<i>Title</i>
Albers, Joseph	<i>Four Xs in Red</i>
Anuszkiewicz, Richard	<i>Spectra Squared</i>
Bacon, Francis	<i>Triptych 1967: Inspired by T. S. Eliot's poem "Sweeney Agonistes"</i>
Bluemner, Oscar	<i>Morning Light (Dover Hills, October 1916)</i>
Delaunay, Robert	<i>Portrait of Philippe Soupault</i>
Glarner, Fritz	<i>Relational Painting-Tondo #20</i>
Leger, Ferdinand	<i>Nu Sur Fond Rouge</i>
Newman, Barnett	<i>The Covenant</i>

<i>Artist</i>	<i>Title</i>
Noland, Kenneth	<i>Via Breeze</i>
Pascin, Jules	"Salon" at Marseilles
Reinhardt, Ad	<i>Number 88</i>
Still, Clyfford	Untitled, 1953
Tanguy, Yves	<i>Le Questionnat</i>

The Hirshhorn Collection is a major source for museums and art historians preparing retrospective exhibitions, biographies, or catalogue raisonnés of 20th-century artists. In 1969 numerous requests for research information, loans, and photographs have continued to be received and acknowledged by the staff. Visiting scholars, artists, and officials are received at the Collection office and warehouse in New York City. Despite the necessarily curtailed loan program, two hundred works from the Collection have been loaned to museums and galleries throughout the world. The following loans are representative:

<i>Artists</i>	<i>Works on loan</i>	<i>To exhibition</i>
Balthus	2 paintings	Balthus Retrospective: Tate Gallery, London
Bissier, Jules	2 paintings	Bissier Retrospective: San Francisco Museum of Art; Phillips Gallery, Washington; Carnegie Institute, Pittsburgh; Dallas Museum of Fine Arts; Guggenheim Museum, New York City
Broderson, Morris	12 paintings	Broderson Retrospective: Fine Arts Gallery of San Diego
Eakins, Thomas	2 sculptures	"The Sculpture of Thomas Eakins": Corcoran Gallery, Washington
Levine, David	4 paintings	Levine Exhibition: California Palace of the Legion of Honor, San Francisco
Sheeler, Charles	1 painting	Sheeler Retrospective: National Collection of Fine Arts, Smithsonian Institution; Philadelphia Museum; Whitney Museum, New York City
Smith, David	4 sculptures	Smith Retrospective: Guggenheim Museum, New York City
Soyer, Raphael	1 painting	Opening Exhibition: National Portrait Gallery, Smithsonian Institution
Appel; LeBrocqy; Rivers; Meadows	4 paintings; sculptures	Opening Exhibition: Gimpel & Weitzenhofer, New York City
Hopper; Kline; Marin	4 paintings	"From El Greco to Pollock": Baltimore Museum of Art
de Moulpied; Snelson; di Suvero	3 sculptures	"1968 Annual Exhibition of Contemporary American Sculpture": Whitney Museum, New York City



Ground-breaking ceremony, 8 January 1969: (left to right) Chief Justice Warren, Secretary Ripley, Mr. Hirshhorn, President Johnson. (Photo by Jack Rottier, National Park Service.)

### *The Museum*

On 17 May 1966, the President requested that Congress enact legislation to authorize acceptance of the Hirshhorn Collection as a gift to the United States. By the Act of 7 November 1966 (P.L. 89-788, 89th Cong., S. 3389), Congress provided a site on the Mall—bounded by 7th and 9th Streets SW, Independence Avenue, and Madison Drive—and provided statutory authority for the appropriation of construction and operating funds.

On 12 July 1968, the 90th Congress provided contract authority as well as an initial appropriation of \$2,000,000 for construction. The ground-breaking ceremony was held on 8 January 1969. Construction of the Joseph H. Hirshhorn Museum and Sculpture Garden is expected to commence next year.



# Cooper-Hewitt Museum of Decorative Arts and Design

RICHARD P. WUNDER, *Director*

**I**MMEDIATELY FOLLOWING the take-over of the Cooper Union Museum by the Smithsonian on 1 July 1968, the Museum's name was changed to Cooper-Hewitt Museum of Design, thus honoring Peter Cooper, founder of the Cooper Union for the Advancement of Science and Art, and his granddaughters, the Misses Sarah, Eleanor, and Amy Hewitt, who were the Museum's founders in 1897. An Advisory Board was established, bylaws drawn up, and members chosen from the Committee To Save the Cooper Union Museum, headed by Henry Francis du Pont and other interested persons. Following Mr. du Pont's death, Mrs. Jacob M. Kaplan, the Board's vice-chairman, was appointed to fill the vacant chairmanship. Members of the Advisory Board are as follows:

Henry Francis du Pont, chairman\*  
Mrs. Jacob M. Kaplan, chairman elect  
John B. Trevor, Jr., vice-chairman  
Mrs. Howard J. Sachs, secretary  
Mrs. Vincent Astor  
William A. M. Burden  
Mrs. Freda Diamond  
Albert Edelman  
William Katzenbach  
William C. Pahlmann  
Mrs. Bliss Parkinson  
Harvey Smith  
Mrs. Calvin Stillman  
Charles van Ravensway  
Frederick P. Victoria  
Alexander O. Viotor  
S. Dillon Ripley, *ex officio*

During the year four full meetings and an equal number of *ad hoc* meetings were held. At the April 1969 meeting the name Cooper-Hewitt Museum of Decorative Arts and Design was approved.

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\*Died 11 April 1969.



"Please Be Seated," luncheon preview, benefit for the Cooper-Hewitt Museum of Design, sponsored by the New York Chapter of the National Home Fashions League Foundation, Inc., Hotel Pierre Grand Ballroom, New York City, 13 November 1968. Left to right: S. Dillon Ripley, guest speaker; Henry Francis du Pont; Miss Jean Budde, vice president, National Home Fashions League; and William Katzenbach.



Installation of "A Treasury of Design" exhibition mounted by the Cooper-Hewitt Museum of Design, in New York, showing a Shaker rocker and a "director's" chair designed by John Fitz Gildons; in the background, a Swedish tapestry by Märta Fjeterström; and overhead, a French glass sunray chandelier.

In addition to work performed by staff members, the Museum has been fortunate to have the services of four faithful volunteers—Donald Gurney, Mrs. E. Elizabeth Page, Hubbell Pierce, and Mrs. Morton J. Seifter—who put in a total of 870 hours of work during the year. Special projects worked on by volunteers have included tabulating and checking of box and storage lists in the Department of Drawings and Prints and that of Textiles, affixing accession numbers and measuring of textiles, assisting at the reception desk and with record-keeping in the office of the Registrar, and maintaining and posting of mailing lists and donors lists. Through the dependability of its volunteer services, the Museum has been able to go forward with its housekeeping chores.

Objects added to the Museum's collections have totaled 5,108, of which 4,707 have been received as gifts from 117 donors and 401 have been purchases. Three objects considered unrelated to the Museum's immediate needs have been eliminated from the collections by public auction sale. This growth of the collections represents more than twice the number of gifts received the previous year, though from nine fewer donors. Significant among those gifts received are:

*Decorative arts**Donor*

Inlaid marble and gilt bronze inkstand belonging to Mark Twain's parents-in-law	Anonymous
Glass bottle by Ariel Bar-Tel	America-Israel Cultural Foundation
Nineteenth-century Chinese spinach jade table screen	Dr. and Mrs. Lewis Balamuth
Architectural fragment by Louis Sullivan	Davis Brody and Associates
Eighteenth-century South Ger- man ceramic stove	Miss Katharine Cornell
3 nineteenth-century American leather-covered boxes	Mrs. Paul G. Darrott
Miniature labeled bandbox	Miss Elizabeth Dennison
Eighteenth-century French bidet, stamped Baudin	Mrs. W. G. Dunnington, Jr.
Nineteenth-century American bentwood rocking chair	George G. Fino
English Regency card table	Maurice M. Freidman
Eighteenth-century English plant stand; Ming Dynasty vase with eighteenth-century French bronze mounts; table designed by Elsie de Wolfe	Mr. and Mrs. Rodman A. Heeren
13 Philippine Moro culture boxes; pair of eighteenth-cen- tury French doors; 15 Far Eastern porcelain and metal objects	Mr. and Mrs. Maxime Hermanos

<i>Decorative arts</i>	<i>Donor</i>
Japanese lacquer desk and 2 Chinese glass paintings	Mrs. Revell Hoover
3 ceramic bowls, New York, 1941	International Business Machines Corporation
Contemporary American steel and glass table, director's chair, bookcase, and screen	Interpublic Group of Companies, Inc.
3 side chairs and writing desk designed by Frank Lloyd Wright for the Imperial Hotel, Tokyo	Tetsuzo Inumara
Glass necklace by René Lalique	Jacques Jugeat
Bronze cat by Antoine Louis Barye	Orrin W. June
American Shaker rocking chair; tortoise-shell box	Mrs. Jacob M. Kaplan
7 lengths of wallpaper; 150 casts of ancient seals	Mrs. Germaine Little
20 pieces of Chinese porcelain and jade	Paul Mannheim
Seed picture; 3 constructions by Karl Mann	Karl Mann
Eighteenth-century French rock crystal chandelier	Frits Markus
5-piece suite of art nouveau furniture	Mrs. Peter J. Perry
47 pieces of twentieth-century furniture	James M. Osborn
Twentieth-century Italian glass vase by Venini	Christian Rohlfing
21 pieces of French furniture (circa 1935) designed by Jean-Michel Frank	Mr. and Mrs. Forsythe Scherfese
35 pieces of miscellaneous Indian, English, Spanish and Canadian furniture, tiles and metalwork; 272 samples of wallpaper	Harvey Smith
Eighteenth-century Japanese folding screen	Mrs. Calvin Stillman
Eighteenth-century French Nevers figurine	Frederick P. Victoria
26 pieces of French eighteenth-century furniture	Bequest of Mary Hayward Weir
Chinese lacquer chest; lamp by Tiffany and Co.; 6 English Georgian wine rinsers	Mr. and Mrs. Arthur Wiesenberger



<i>Drawings and prints</i>	<i>Donor</i>
Costume design, <i>Les Amies de don Juan</i> , by W. Gyarmathy	Anonymous
335 drawings by Harriet Blackstone	Miss Stell Andersen
43 drawings for unexecuted engravings by Antonio Tempesta	Bernard Black and H. W. Nadeau
Study for a mural by Kenyon Cox	Allyn Cox
Drawing, <i>If the Soap Falls Out of the Bathtub</i> , by Rube Goldberg	Rube Goldberg
2 wood engravings after Winslow Homer	Ben Goldstein
2 figure drawings by Hokusai; drawing by Johann Christian Schoeller	Mrs. Jacob M. Kaplan
395 French and American twentieth-century designs for wallpaper	Mrs. Germaine Little
Collage, <i>Renissance Façades</i> , by Hubbell Pierce	Hubbell Pierce
10 watercolor renderings by Otto E. Gaertner	Mrs. Henry Rogers Pyne
27 designs for American wallpaper; 84 designs for French nineteenth-century wallpaper	Harvey Smith
12 etchings by Gerald K. Geerlings	Allen T. Terrell
Autograph manuscript, <i>Le Loup-garou, ou l'Hoste de Lemnos</i> , France, 1707; 32 etchings by Edouard Chimot (1928)	Bequest of Mary Hayward Weir
30 drawings by Ulfert Wilke	Mr. and Mrs. Arthur Wiesenberger
34 drawings by and 360 photographs of the work of Ezra Winter	Estate of Mrs. Ezra Winter

<i>Textiles</i>	<i>Donor</i>
52 samples of Near Eastern carpets	Anonymous
French eighteenth-century bed-cover	Miss Alice B. Beer
Loom, weaving materials, and notebooks by Ethel Chase	Estate of Ethel Chase
40 pieces of nineteenth-century Danish folk costumes	Miss Ida-Gro Dahlerup
3 Peruvian pre-Columbian textiles	Harry Dennis, Jr.
Eighteenth-century Chinese embroidered headboard	Mrs. Anne M. Ford

<i>Textiles</i>	<i>Donor</i>
6 eighteenth- and nineteenth-century English cottons; sixteenth-century Italian damask; 3 English and Italian embroideries and 13 other textiles	Mrs. Benjamin Ginsburg
Seventeenth-century Brussels tapestry	Mrs. William Ford Goulding
Sketch for an embroidered wall panel for the Ford Foundation Building, by Sheila Hicks	Miss Sheila Hicks
587 samples of American early twentieth-century fabrics	Mrs. Germaine Little
Eighteenth-century French ecclesiastical cope	Mrs. Robert Reichenbach
19 Central European costume decorations	Miss Agnes Sakho
182 miscellaneous textiles	Harvey Smith
2 Near Eastern carpets	Mrs. Edward Stern
11 contemporary African textiles	Mrs. Calvin Stillman
37 African and Asian textiles, mid-twentieth century	Alan L. Wolfe

Donors of objects to the Museum are as follows:

Anonymous (2)  
 Mrs. Daniel Putnam Adams  
 Advisory Board of the Cooper-Hewitt Museum of Design  
 American Institute of Interior Designers  
 America-Israel Cultural Foundation  
 Miss Stell Andersen  
 Mrs. Anne Arbuckle  
 Dr. and Mrs. Lewis Balamuth  
 Miss Muriel F. Barnes  
 Miss Alice B. Beer  
 Dr. Gertrude Bilhuber  
 Bernard Black  
 Estate of Mrs. Berthilde D. Bullowa  
 Mrs. Xenia Cage  
 Estate of Miss Ethel Chase  
 Clarence House Fabrics  
 Miss Lois Clarke  
 Miss Katherine Cornell  
 Peter Cotton  
 Allyn Cox  
 Mrs. Edna J. Curran  
 Miss Ida-Gro Dahlerup  
 Mrs. Paul G. Darrott

Davis Brody and Associates, Architects  
Mrs. Mildred J. Davis  
Mrs. M. Walter Daub  
Harry Dennis, Jr.  
Miss Elizabeth Dennison  
Jack Denst Designs, Inc.  
Doyle, Dane, Bernbach, Inc.  
Mrs. W. G. Dunnington, Jr.  
George G. Fino  
Miss Eliane Flach  
Mrs. Anne McDonnell Ford  
Maurice M. Friedman  
Dr. George V. Gallenkamp  
Mrs. Benjamin Ginsburg  
Rube Goldberg  
Ben Goldstein  
Countess Alvise Gozzi  
Graf Wallpapers, Inc.  
Mrs. William Ford Goulding  
Mr. and Mrs. Rodman A. Heeren  
Mr. and Mrs. Maxime Hermanos  
Mrs. David Herselle  
Mrs. Thomas Hess  
Mr. and Mrs. R. W. Hickman  
Miss Sheila Hicks  
Mrs. Harry L. Holland, Jr.  
Mrs. Revell Hoover  
International Business Machines Corpora-  
tion  
Interpublic Group of Companies, Inc.  
Tetsuzo Inumaru  
Mrs. Deane F. Johnson  
Mrs. Orrin F. Judd  
Jacques Jugeat  
Orrin Wickersham June  
William Justema  
Mrs. Jacob M. Kaplan  
William Katzenbach  
Miss Amy R. Knox  
LaVerne International  
Derek Lee  
Mrs. C. W. Lester  
Mrs. Germaine Little  
Mrs. Willard E. Loeb  
Louis W. Bowen, Inc.  
McCann-Erickson  
Paul Manheim  
Karl Mann Associates  
Frits Markus  
Miss Marian Miller  
Bob Mitchell Designs

Mrs. Katherine S. Morrison  
Hugues-W. Nadeau  
National Collection of Fine Arts, Smithsonian Institution  
James M. Osborn  
Mrs. Cary T. Peebles  
Mrs. Peter J. Perry  
Piazza Prints, Inc.  
Hubbell Pierce  
Anthony Putnam  
Mrs. Henry Rogers Pyne, in memory of  
her father, Otto Edward Philip  
Gaertner  
Viggo Bech Rambusch  
Miss Marion Rasnick  
Mrs. Robert Reichenbach  
Mrs. Addie Reinberger  
Mrs. Joseph E. Renier  
Mrs. Harold Roberts  
Christian Rohlfing  
Mrs. Minna Rosenblatt  
Miss Agnes Sakho  
Mr. and Mrs. Forsythe Scherfese  
Mrs. Helen Segal  
Mrs. Morton J. Seifter  
Randolph Shaffer, Jr., in memory of  
Frederick S. Coe, Jr.  
Miss Paula Simmons  
Harvey Smith  
Thomas Smith, Inc.  
Mrs. J. S. Stein  
Mrs. Edward Stern  
Mrs. Calvin Stillman  
Allen T. Terrell, in memory of Clarence  
John Marsman  
Miss Janet Thorpe  
Ambassador and Mrs. Fumihiko Togo  
U.S. Department of the Interior, National Park Service  
United Wallpaper Co.  
Arnold Van Fossen  
Frederick P. Victoria  
Jan Vidra  
Dr. Karl Vogel  
L. J. Wallace  
Bequest of Mary Hayward Weir  
Mr. and Mrs. Arthur Wiesenberger  
Donald N. Wilber  
Miss Jessie G. Willing  
Estate of Mrs. Ezra Winter  
Alan L. Wolfe  
Woodson Wallpapers, Inc.



Donors to the Museum Library are as follows:

Miss Edith E. Adams  
Albright-Knox Art Gallery  
American Heritage Publishing Co., Inc.  
Andrew Dickson White Museum of Art  
The Asia Society, Inc.  
Miss Alice B. Beer  
Bowdoin College Museum of Art  
Miss Martha Casamajor  
Estate of Miss Ethel Chase  
Christie, Manson and Woods  
CIBA Limited, Basle  
Colonial Williamsburg, Inc.  
Country Beautiful  
Cristal Lalique Paris  
Mrs. Mervyn Davies  
Dayton Art Institute  
Mrs. Elaine E. Dee  
Doubleday and Company  
Dover Publications, Inc.  
Mrs. Catherine L. Frangiamore  
Miss Margaret B. Freeman  
Moses F. Gantz  
M. M. Geffen  
Harcourt, Brace & World, Inc.  
Hearthside Press  
Houston Museum of Fine Arts  
International Business Machines Corporation  
Instituto de Investigaciones Estéticas,  
Mexico  
Isaac Delgado Museum of Art  
Istituto di Storia dell'Arte, Pisa  
Jewish Museum, New York City  
William Justema  
Kunstgewerbemuseum, Cologne  
Kunstindustrimuseet, Oslo  
Mrs. Germaine Little  
Los Angeles County Museum  
Donald D. MacMillan  
Merrimack Valley Textile Museum  
Musée d'Arts Décoratifs, Saumur  
National Collection of Fine Arts, Smithsonian Institution  
New Haven Colony Historical Society  
Miss Patricia Nimocks  
Österreichisches Museum für Angewandte  
Kunst  
Mrs. Merriweather Post  
Reinhold Book Corporation  
Harold Ritman

Royal Academy of Arts, London  
 Mrs. Howard J. Sachs  
 Max Saltzman  
 Janos Scholz  
 Charles Scribner's Sons  
 Shelley Marks Company  
 Harvey Smith  
 Smithsonian Institution  
 Solomon R. Guggenheim Museum  
 Milton F. Sondag, Jr.  
 Miss Janet D. Thorpe  
 Iwan Tirtaamidjaja  
 University of Kansas Museum of Art  
 Wadsworth Atheneum  
 Leo Wallerstein  
 Bequest of Mary Hayward Weir  
 Whitworth Art Gallery  
 Richard P. Wunder  
 York Typesetting Company

The release of funds designated for the purchase of objects—frozen over the five-year period of indecision regarding the Museum's future—has permitted the acquisition of a number of important objects for the collections as well as general reference books for the Library. Noteworthy purchases include:

*Decorative Arts*

French 20th-century glass chandelier in the form of a sunray  
 Kinetic light sculpture by Chuck Prentise (1968)  
 Composition in mercury, by Ronald Mallory (1969)  
 Pair of Italian porcelain bowls by Richard-Ginori (1924)  
 4 glass vases by René Lalique (circa 1925)  
 Glass vase by G. Argy-Rousseau (circa 1925)  
 Glass bowl by Décorchemont (circa 1925)  
 Lamp with isinglass shade, glass base (circa 1925)  
 Ceramic inkwell by Rookwood Pottery Co. (1903)  
 181 pieces of 19th-century Italian jewelry by Carlo Giuliano and Augusto Castellani  
 Cased glass vase by Daum (circa 1900)  
 Wooden library steps by Charles C. Burke (1969)  
 Blown glass vase by Julian Wolff (1969)  
 Silver and plique-à-jour enamel bowl by Claire H. Strauss (1969)  
 Silver and cloisonné enamel box by Hilda Kraus (1969)  
 2 enameled copper vases by C. Fauré (circa 1925)  
 Pâte-de-verre dish by Henri Cros (circa 1895)  
 Colored Orrefors glass dish by Sven Palmqvist (circa 1946)  
 Oak cabinet with art nouveau metal hinges and mounts  
 16th-century Italian ivory inlaid walnut *cassone*

*Drawing and Prints*

157 nineteenth-century American designs for printed cottons  
 Japanese block print of two actors, by Kunisada

Detail of a painted and mordant-dyed cotton coverlet, Madras, India, first half of the 18th century. (Cooper-Hewitt Museum purchase.)



2 costume designs by Storie

2 animated cartoons for the film, *The Yellow Submarine*

### *Drawings and Prints*

Woodcut, *Print 13*, by Akira Matsumoto

### *Textiles*

12 eighteenth-century Indian painted and mordant-dyed cottons (bed hangings, bedcovers, and fragments)

Seventeenth-century Spanish embroidery

French Empire embroidered flounce

Guatemalan head cloth

English eighteenth-century silk

2 Italian eighteenth-century bizarre silk fragments

Tenth-century Persian silk twill

English eighteenth-century copperplate printed cotton

Lace construction, *Do Not Rip Up My Little Universe*, by Luba Krejci, 1964

Twentieth-century Ghanaese stamped cotton hanging

Sixteenth-century Turkish velvet

Sixteenth-century Persian velvet

Recognizing the need for further development within certain areas in the collections and in anticipation of featuring Museum material in special exhibitions planned for the future, a considerable proportion of the available purchase funds have thus been utilized. The acquisition of twelve rare examples of painted cottons produced in India in the 18th century for the English and continental market makes this Museum's



Lamp-worked glass figurine, Nevers, France, mid-18th century. (Given to the Cooper-Hewitt Museum by Frederick P. Victoria.)

holdings one of the most complete in this area in the United States. It is anticipated that much of this material will be included in a special exhibition in process of being mounted jointly by the Royal Ontario Museum, in Toronto, and the Victoria and Albert Museum, in London, and shared, hopefully, with the Cooper-Hewitt Museum. In anticipation of the Museum's sponsoring a major exhibition of contemporary glass design, which will include key historical pieces as well, the Museum has been at pains to develop its glass collection with the purchase of French glass produced in the 1920s by a variety of designers and manufacturers, the name of René Lalique being the most familiar today. By good fortune, the American agent for the Lalique factory, Jacques Jugeat, has shown his interest in the Museum by donating a unique carved glass necklace by Lalique, and in addition has promised the gift of a number of other important pieces of French glass. In observance





(a) Gold brooch with carved sapphire cameo, framed by sapphires, diamonds, ruby and emerald chips, and a pendant sapphire drop weighing 13.5 carats, by Augusto Castellani, Rome, Italy, second half of the 19th century. (Cooper-Hewitt Museum purchase.) (b) Brooch of gold filigree and agates, by Augusto Castellani, Rome, Italy, second half of the 19th century. (Cooper-Hewitt Museum purchase.) (c) Pendant of enameled gold set with pearls, rose diamonds, and a star ruby, by Carlo Giuliano, England, second half of the 19th century. (Cooper-Hewitt Museum purchase.)

of the Museum's opening in its new quarters, in 1972, a spectacular jewelry exhibition is planned. This exhibition will focus upon an extraordinary group of 181 pieces by the 19th-century Italian designers, Carlo Giuliano and Augusto Castellani, which the Museum was fortunate to acquire *en bloc*. Nowhere else can the work of these two eminent designers be studied in such variety or depth.

In addition to utilizing its own purchase funds for the acquisition of objects, three significant purchases have been made from other sources. The Advisory Board has made possible the purchase of a large and imaginative lace construction by the contemporary Czechoslovakian designer, Luba Krejci. With funds contributed by friends of the late Louisa Bellinger, a lifelong friend of the Museum and an eminent scholar in textile weaves, the Museum has acquired a rare 16th-century Persian velvet of pale green and gold hues that possesses all the beauty and subtlety of a Moghul miniature. From the celebrated Demidoff collection, the last remaining portion of which was auctioned off in Florence, Italy, in April 1969, an important Italian 16th-century *cassone* inlaid in ivory has been purchased through funds raised at a special benefit sponsored by the American Institute of Interior Designers.

Eliminations from the collections of material considered as being no longer pertinent to the Museum's needs have been two paintings, views of Venice, by Luca Carlevaris (bequest of Annie Schemerhorn Kane),

sold at public auction by Sotheby and Company, London, and a French 18th-century tall case clock (anonymous gift), sold at public auction by Astor Galleries, New York. The Adrian Van Muffling collection of early aviation photographs has been transferred to the Air and Space Museum; 277 folders of clippings relating to the printing and paper trades and nine bound volumes of *Numismatic Notes* have been transferred to the library of the Museum of History and Technology; and approximately 16,000 World War I cartoons clipped from newspapers and periodicals have been transferred to the Division of Political History, Museum of History and Technology, Smithsonian Institution.

In preparation for the move and eventual reinstallation of the collections, an intensive repair and restoration program is under way. A total of 72 objects have been sent off premises for repair and a great many more are scheduled in the ensuing year.

Cataloging has been completed on 823 objects in the collections, but with the acceleration in new acquisitions, it is apparent that, unless additional staff is provided, the cataloging of objects, which establishes factual information and assures its increased usefulness to the public, will fall behind schedule. This is a prime curatorial activity and responsibility that must be emphasized.

During the year the Library has been enriched by the addition of 547 books, of which 354 have come through gifts from sixty-five donors, and 193 through purchase. The most important single gift has been that of 124 general reference books, largely in the field of French 18th-century art, and 57 rare books, from the bequest of Mary Hayward Weir. The rare books from the Weir estate include a number of fine bindings from the libraries of Cardinal Mazarin, Anne of Austria, the duc d'Orleans and others, as well as illustrated works by Arthur Rackham, Kate Greenaway, and W. Russell Flint. Significant purchases include Walter and Smith's *A Guide to Workers in Metal*, 4 volumes, Philadelphia, 1846; *Kokuho, National Treasures of Japan*, 6 volumes in twelve parts, Tokyo, 1963-67; and *Textiles in the Shosoin*, 2 volumes, Tokyo, 1963. The last-named item has been acquired through funds generously contributed by Mrs. Vincent Astor.

Six exhibitions have been held within the Museum during the year. Three, carried over from the previous year, are *Early 20th Century Posters*, a selection from the Philip Sills gift; *Paintings by Winslow Homer* from the Museum's collection; and *Sketches by Frederic Edwin Church*, seventy-six items from the Museum's extensive holdings. New exhibitions include: *A Treasury of Design, 1963-1968* (24 October-22 March 1968-1969), in which 134 objects selected from among several hundred acquired by the Museum during the five-year period of

indecision has given recognition to its supporters during these difficult days and, at the same time, has pointed up the need by a design museum of diverse sorts of objects ranging from African beadwork necklaces to Matisse lithographs to contemporary Indian silks; *Counterchange and New Color* 26 April–24 May 1969), arranged by the New York Guild of Handweavers, has striven to give new dimension and design possibilities to basic weaves; and *Contemporary Japanese Posters* (9 June–29 August 1969), provided by the Japan Society, Inc., has comprised fifty-one posters by twenty-six Japanese artists and constitutes the first New York showing of this exhibition, many items of which have been shown originally in the Japan Pavilion of Expo 67 in Montreal.

One off-premises exhibition, made up exclusively of items from the collections, has featured the original designs for the interior decoration of the Royal Pavilion at Brighton, England, assembled for and shown at



Side chair with needlepoint embroidered silk upholstery, possibly Austrian, circa 1907. (Given to the Cooper-Hewitt Museum by Mrs. Peter J. Perry.)

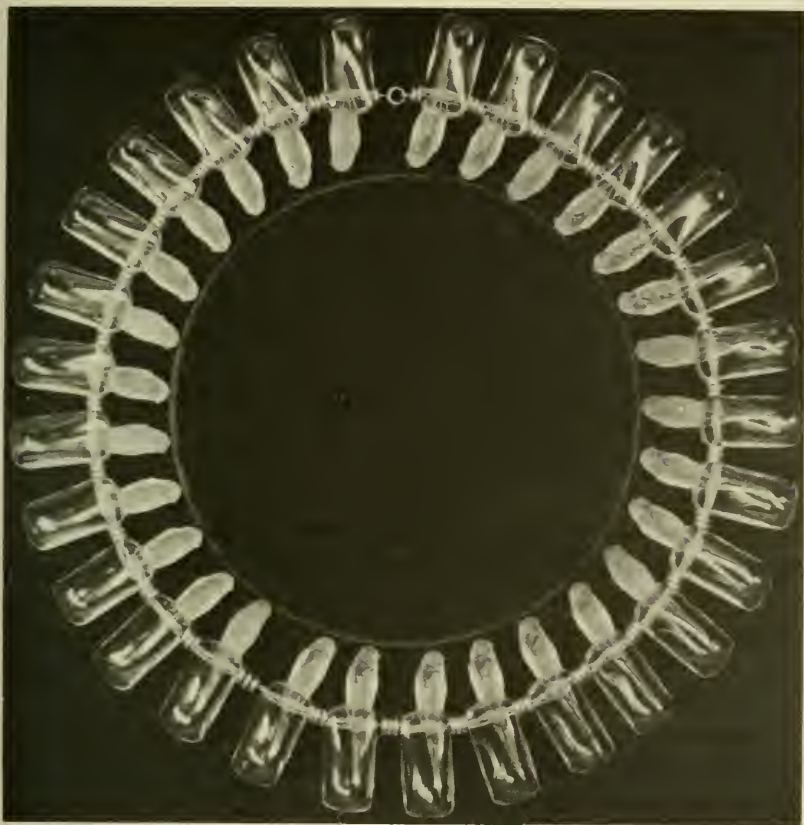
the Art Museum of Princeton University from 15 April 1968 to 11 March 1969.

A total of 111 objects have been lent to the following twenty-two institutions:

<i>Name of institution</i>	<i>Number of objects lent</i>
Northern Arizona University Art Gallery, Flagstaff, Arizona	1
Museum of Fine Arts, St. Petersburg, Florida	1
Parrish Art Museum, Southampton, Long Island, New York	2
Pen and Brush Club, New York City	1
Museum of Contemporary Crafts, New York City	2
Museum of Graphic Art, New York City, Traveling Exhibition	4
The Jewish Museum, New York City	4
Webb House, Wethersfield, Connecticut (to illustrate lecture by Erica Wilson Kagan)	4
Textile Museum, Washington, D.C.	2
The Grolier Club, New York City	5
American Federation of Arts, New York City	3
Arizona Costume Institute, Phoenix Museum of Art, Phoenix, Arizona	6
Carpenter Center for the Visual Arts, Harvard University, Cambridge, Massachusetts	5
Rose Art Museum, Brandeis University, Waltham, Massachusetts	1
Worcester Art Museum, Worcester, Massachusetts	3
University of Michigan Museum of Art, Ann Arbor, Michigan	4
Finch College Museum of Art, New York City	2
Princeton University Art Museum, Princeton, New Jersey	38
The Lighthouse, Amateur Needlework of Today, Inc., New York City	3
Hallmarks Cards, Inc., New York City	10
Museum Section: Guild Hall, East Hampton, Long Island, New York	6
Parke-Bernet Galleries, New York City	4

The Museum has played host to a number of schools, organizations, and special groups, including the Japanese Sword Society, the New York Guild of Handweavers, New York University, Traphagen School of Fashion, New York School of Interior Design, Parsons School of Design, and ten other special groups. With the New York University Division of Continuing Education, the Museum has continued to cooperate by providing a special series of twelve lectures during the University's fall semester entitled "Textiles and Interior Design." As part of the course, two field trips have been arranged to textile and carpet design studios. The cost of the course has been underwritten in part by the Resources Council, Inc., and has been subscribed to by stylists, interior and general designers, and technicians, as well as by persons from other museums sharing an interest in the manufacture and use of textiles. Three of the lectures have been given by Museum staff members, the remainder provided by outside authorities on specified subjects.





Necklace of glass carved in the shape of lovebirds on a silver link chain, designed by René Lalique, France, circa 1920. (Given to the Cooper-Hewitt Museum by Jacques Jugeat.)

Special events held outside the Museum have included two benefit luncheons, the proceeds of which have been turned over to the Museum. The occasion for one, sponsored by the National Home Fashions League and held at the Hotel Pierre on 13 November 1968, was a preview of "Please Be Seated," an exhibition of contemporary chairs organized and circulated by the Decorative Arts Program of the American Federation of Arts in collaboration with the Museum. Secretary Ripley was the guest speaker. The other benefit luncheon was given at the Plaza Hotel on 20 March 1969 by the American Institute of Interior Designers.

During the year the Museum has been visited by 6,908 persons, a marked decrease from that of the previous year when the attendance figures had been greatly increased both by the Mary Cassatt graphics exhibition and by the presence of the Four Winds Museum Theatre



group, which gave a number of scheduled performances in the Museum's furniture galleries. In analyzing the attendance figures, it should be noted that 1,604, or somewhat more than one fourth of the visitors, have received special attention and services by staff in the Library and the departmental study rooms. Attendance figures by quarter (July–September, October–December, January–March, April–June) are as follows:

	<i>1st</i>	<i>2nd</i>	<i>3rd</i>	<i>4th</i>	<i>Total</i>
Library	145	209	233	169	756
Decorative Arts (and Wallpaper)	17	62	227	18	*324
Drawings and Prints	12	120	95	65	292
Textiles	43	39	75	75	232
<hr/>					
Total consultations	217	430	630	327	1,604
Total unattended visitors	1,146	1,416	1,231	1,511	5,304
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Total attendance	1,363	1,846	1,861	1,838	6,908

\*Includes 250 individuals personally conducted through the Museum by a curatorial staff member.

Two special publications have been issued by the Museum: a six-page catalog, in mimeographed form, of the contemporary Japanese poster exhibition; and a folder describing the Museum's collections, history, and goals. In addition, special bibliographies have been prepared in conjunction with the "Textiles and Interior Design" course. Individual staff publications are as follows:

DEE, ELAINE E., *Views of Florence and Tuscany by Giuseppe Zocchi 1711–1767*. 33 pages, 77 plates. Washington, D.C.: International Exhibitions Foundations, 1968.

THORPE, JANET. "Damascening," "Patina," "Thomas Chippendale." 3 pages in *Grolier's Encyclopedia International*. New edition. New York: Grolier Society, 1968.

Staff activities are too numerous and varied to mention in detail. The Museum has been represented at seven professional conferences:

Pennsbury Manor Fall Antiques Seminar, Morrisville, Pennsylvania

Computer Conference, Metropolitan Museum of Art

Williamsburg Antiques Forum, Colonial Williamsburg, Virginia

New York State Council on the Arts, Museum Training Program on Registration Methods, Museum of Modern Art, New York City

Special Libraries Association Annual Conference, Montreal, Canada

Third Annual National Fund-Raising Conference, Statler Hilton Hotel, New York City

Fifteenth Annual Winterthur Conference on Museum operation and connoisseurship, Winterthur, Delaware

The director delivered a public lecture, "Challenges in Historic Preservation," before the Tennessee Federation of Historic Houses, Nashville, Tennessee, 15 November 1968; took part in a public report panel on the Survey of the Albany Institute of History and Art, sponsored by the New York State Council on the Arts, in Albany, New York, 11 November; as a member of a committee of private citizens formed to save from demolition the Hudson County (New Jersey) Courthouse building, appeared before the Senate Appropriations Committee of the New Jersey State Legislature, at Trenton, New Jersey, 12 March 1969; and made a 15-minute TV tape on the Museum and its collections for the program "Surveying the Art Scene" on Channel 6, 21 May 1969. He also has served in the capacity of director of the Drawing Society, on the Board of Directors of the Museum of Graphic Arts, Inc., on the Advisory Committee of the Museum of American Folk Art, on that of the Archives of American Art, on the Consultative Committee of the *Art Quarterly* and on the Advisory Committee of the Resources Council, Inc. Within the Smithsonian he has served on the Editorial Policy Committee of the Smithsonian Institution Press and on the Editorial Board of the *Smithsonian Journal of History*.

Mrs. Blackwelder has served as national chairman of the Membership Committee of the Special Libraries Association, Museum Division.

Improvements made to the Museum's physical appearance and utility have been the construction of three administrative offices in the room that formerly served as a textile display gallery (the display area has been reinstalled in the north portion of the center gallery, heretofore reserved for special exhibitions), and the closing in of a small portion of the Third Avenue hall to provide a place for maintenance staff to dress.

Following a long and arduous search for a future home for the Museum, a magnanimous offer has been made by the Carnegie Corporation whereby the historic Andrew Carnegie Mansion and adjoining Carnegie-Miller house that fronts onto Fifth Avenue from 90th to 91st Streets are destined to be turned over to the Smithsonian, rent free, at the termination of the lease of the present occupants, Columbia University's School of Social Research, 1 July 1970. With the opportunity to move to New York's "museum row," the Cooper-Hewitt Museum's collections and programs should receive even greater recognition. The Carnegie property will permit considerably greater expansion of its facilities for display and services offered to the design world in general. Anticipating the move to the new locale, the services of a competent architectural firm are being sought to effect the remodeling and changes necessary to adapt the existing structure to the Museum's collections and operation. At the same time, a professional fund raiser is being sought to administer the forthcoming fund-raising drive.

The administrator spoke over Station WNYC on the Museum's programs 1 July 1968; introduced "Unto Thee a Garden," presented by the Four Winds Museum Theatre at the Metropolitan Museum of Art 27 October; served on a jury for the Artist-Craftsmen of New York annual exhibition 10 April 1969. He also has served on the Board of Directors of the Four Winds Museum Theatre and on the Board of Advisors of the Museum of Illustration Art.

Mrs. Dee delivered a public lecture, "Pleasures and Palaces in 18th-Century Italy," at the Virginia Museum of Fine Arts in Richmond, 6 January 1969. She also has served on the National Exhibitions Committee of the American Federation of Arts.

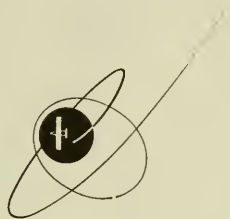
Miss Beer has given two public lectures, "Embroidery Designs in the Cooper-Hewitt Museum," at Old Sturbridge Village, Sturbridge, Massachusetts, 27 January 1969, and "17th- and 18th-Century Textiles Used in American Colonial Houses," at the Bowne House, Flushing, New York, 12 May. She also has served as a board member of the Embroiders' Guild.

At the request of the Secretariat of the Smithsonian, and with the sanction of the Advisory Board, the fund-raising firm of Bowen, Gurin, Barnes, and Roche, Inc. has been engaged to solicit the opinions of various persons and to prepare a survey report, outlining procedures recommended for initiating a capital fund-raising campaign for the Museum. The findings have been encouraging, on the whole, and it has been deemed advisable to increase the Museum's publicity by focusing upon its image, purposes, programs, and needs, and to engage at once the services of an individual experienced in fund raising. During the ensuing year, it is the Museum's intention to effect these recommendations.

Taken in retrospect, the year ending has been one of adjustment and challenge for everyone concerned with the Cooper-Hewitt Museum. An expression of deepest gratitude is due the members of the former Committee to Save the Museum for the financial support given that will assure continuance of the Museum's operation at least for the next two years. Thankful recognition is also owed the members of the Advisory Board for their untiring efforts in volunteering to assist with the formulating of a new image for the Museum, in bringing to it new friends, programs, ideas, and financial support. In the year ahead, the Museum must make every effort to project this new image on the New York scene as an important showcase of good design in everyday life.

# National Air and Space Museum

S. PAUL JOHNSTON, *Director*



FOR THIS MUSEUM—as well as for the country at large—the past twelve months will be remembered as “the Year of Apollo.” The spectacular success of the four manned flights, beginning 11 October 1968 and continuing with the close approach to the moon by Apollo 10 in May 1969, was climaxed of course by the actual landing on the moon of Apollo 11 on 20 July 1969.

Popular interest in these events has brought thousands of visitors to inspect the Saturn V rocket components, the Apollo 4 spaceship, and the full-scale engineering backup “Surveyor” and “Lunar Orbiter” vehicles exhibited in the South Hall of the Arts and Industries Building. These specimens have been displayed against a backdrop of space photography and space-oriented paintings and sculpture. During actual operations of the Apollo program, live television coverage was provided for visitors in the NASM Aerospace Art Galleries.

The importance of these displays was demonstrated in the use of both the North and South Halls as a prime communications center by the major TV and radio networks during the two-day coverage of the progress of Apollo 11 toward the moon.

The 1967 agreement between the National Air and Space Museum and NASA (National Air and Space Administration) already has paid substantial dividends and will continue to do so. It is hoped that the Smithsonian will be among the first to put samples of lunar material on public display. More than one hundred tons of rocket- and space-oriented specimens have been received at the Silver Hill facility, while hundreds of other items have been accessioned *in situ* at the several NASA centers and then put on loan to their original locations. This





The Navy flying-boat NC-4, which made the first transatlantic crossing by air in May 1919, is displayed on the Mall for the 50th Anniversary of its historic flight.

transaction relieves the manpower and space shortage problem at the NASM storage facilities but at the same time guarantees control over future disposition.

By June of 1969 a total of eighteen Mercury, ten Gemini, and two Apollo spacecraft, plus many space suits, rocket motors, and associated equipment has come into NASM inventories. Not all of these items have been flown. Some are test vehicles or backup hardware, but the Museum is acquiring an ever-increasing stock of equipment to implement its own display requirements and to satisfy requests from other museums for specimens to be loaned.

During the year, NASM Gemini spacecraft exhibits have been displayed in Europe (London, Luzerne, Barcelona, and Munich) and in the Far East (Japan and Australia). Major support planning is underway for exhibition in Expo 70 at Osaka, Japan, in cooperation with USIA and the United States Department of Commerce. The assistant director (Astronautics), Frederick C. Durant, is responsible for the planning and coordination of staff personnel. An important by-product



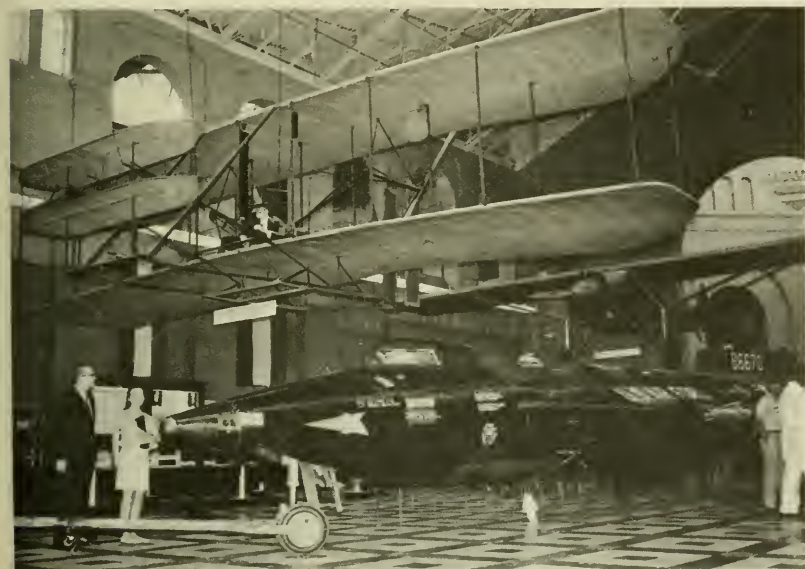
of these programs has been financial support for his travel far beyond the museum's own budgetary capabilities. It has thus been possible to maintain contacts with other museums and to attend and to participate in related scientific and technical meetings normally outside of the fiscal reach of NASM.

In cooperation with the Public Relations Office of NASA the Museum has provided space for public testing of NASA displays designed to be sent around the country and overseas as presentations to the general public of useful background material on space-related subjects.

On the "air" side of the house, several events of great public interest have taken place during the year that also have added significantly to NASM's inventories and historical research capabilities and that have strengthened relationships with other government agencies.

Fifty years ago (in May 1919) the United States Navy mounted an operation to fly aircraft across the Atlantic under its own power—a feat never before accomplished. A squadron of three- and four-engined Navy-Curtiss (NC) flying boats was activated on Long Island and launched across the ocean via Newfoundland and the Azores. One machine, the NC-4, made it all the way to Plymouth, England.

The experimental high-speed (over 4500 mph) and high-altitude (over 350,000 feet) X-15, presented by the United States Air Force, rests beneath the wings of the original Wright Brothers plane and the Spirit of St. Louis.



The original NC-4 has been in the custody of the National Air Museum for many years, most of the time in storage warehouses. At the request of the Chief of Naval Operations, the reconditioning of the aircraft, beginning in July 1968, was accelerated. By late April 1969 it was assembled (under a 24-hour naval guard) on a Mall site to the west of the original Smithsonian Building. The Secretary of the Navy and the Secretary of the Smithsonian participated in the unveiling ceremonies.

During the entire month of May the NC-4 attracted thousands of visitors. To most of them (now accustomed to daily transatlantic schedules) the remarkable exploit by the United States Navy in 1919 was a forgotten bit of aviation history. Early in June, because no building is available to provide year-round protection to the NC-4, the aircraft was disassembled and returned to storage. The cost of site preparation, maintenance, and restoration, together with all public relations activities associated with this display, has been borne by private subscription, and no federal money has been involved.

Also in the spring of 1969, the museum received a long-sought specimen from the United States Air Force, the Number 1 X-15, an experimental and high-speed research aircraft. This machine, which has flown higher (over 350,000 feet) and faster (over 4,500 miles per hour) than any other airborne vehicle, has been used by Air Force, Navy, and NASA pilots to explore the fringes of space. It was presented to the Museum by the Secretary of the Air Force. Installed in the North Hall, under the wings of the original Wright "Kitty Hawk" Flyer, it provides not only an astonishing contrast in design configuration and usage of materials for the period of 1903-1969, but it also defines the total spectrum of manned flight. It is unlikely that any future attempt will be made to design an airborne vehicle to exceed its performance.

An important policy decision, principally affecting the Museum's air activities, has been further implemented during the year: the placing of selected aircraft specimens on loan to qualified outside organizations for restoration and temporary display pending the availability of new facilities in Washington. A careful investigation of shop capability for preserving and restoring specimens to museum standards and the preparation of complete restoration specification for the specimens selected are the prerequisites of such loans. In addition, during the course of this work, inspection visits by NASM personnel are made to insure that standards are being met.

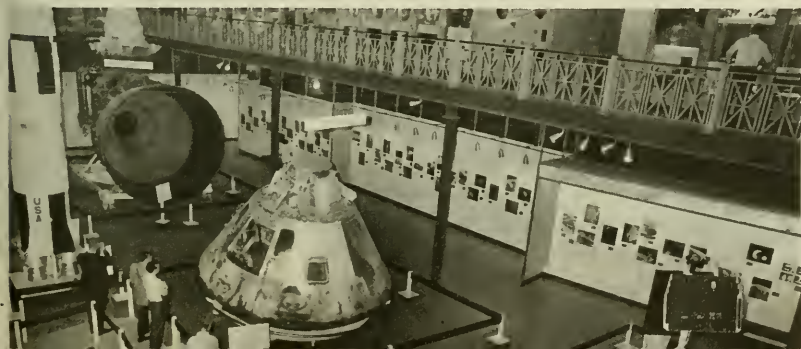
Under this program, one major specimen (Lockheed XC-35) is undergoing restoration in a commercial shop (supported by a Lockheed grant); two (Curtiss R3C-2 Racer and General Mitchell's SPAD-16) are at the Air Force Museum, Wright Patterson Air Force Base; three

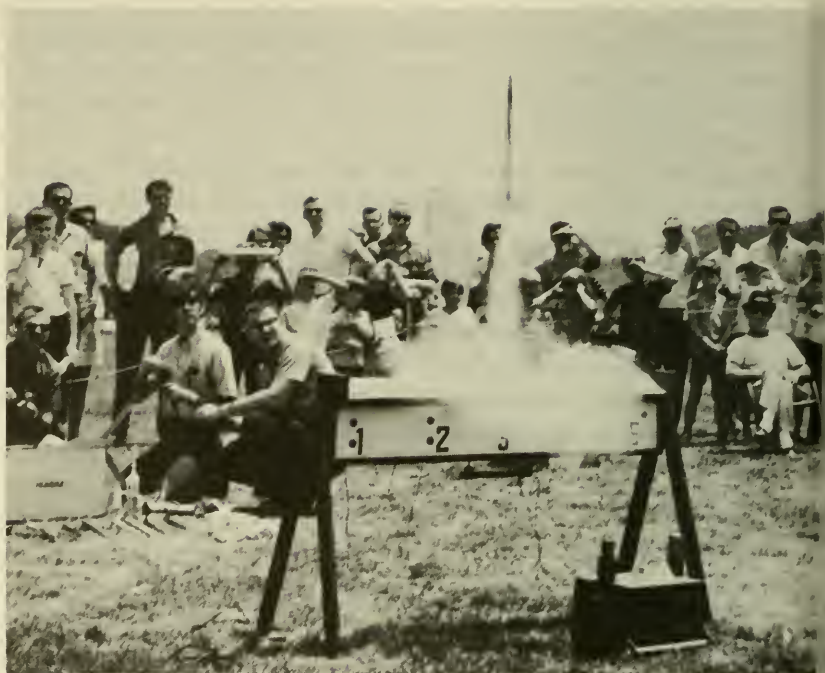
(Pfalz D-XII, SE-5, and Oscar II) are assigned to the Experimental Aircraft Association Museum; and one (Ryan FR-1) to the San Diego Aerospace Museum. The usual arrangement calls for restoration and a three-year exhibit period (renewable thereafter at one-year intervals) for each specimen.

Although the greater part of NASM manpower at Silver Hill has been occupied with the restoration, installation, and re-storage of the Navy NC-4 flying boat during the year, considerable progress has been made on Project Shoplift. The new Building 22 has been completed and is ready for occupancy, and the installation of additional steel racks in Buildings 8, 9, and 21 has greatly increased the total storage capacity. Although another twelve months will be needed before final arrangements are accomplished, the planned assignments of Building 20 as a staging and study area for restored aircraft, Building 21 for rocket and space-related material, and Building 22 for the storage (on pallets) of the most valuable aircraft specimens in the collection have made visible progress. The Preservation and Restoration Division has handled some 1,700 specimens whose total weight has been in excess of 150 tons.

Both the "air" and "space" components of the Museum have participated actively in a cooperative program with the Smithsonian Museum Shops that has proved sufficiently successful to warrant rescheduling for the summer of 1970. The A&I Building sales shop adopted a model-building (airplane and rocket) theme for the period of June through August 1969. Drawing on NASM's extensive inventory of models of all kinds, the shop built a backup static display, supplemented by a model-building workshop manned by volunteers, that has attracted individuals of all ages and has produced a phenomenal turnover in the sale of model kits and related items. To launch the operation, model airplane and model rocket contests under the supervision of nationally

**The Apollo Exhibit in the South Hall gives visitors an opportunity to examine full-scale space artifacts, including Apollo 4, Lunar Orbiter, Surveyor, Saturn rocket engines, and a 35-foot model of the complete Saturn V booster.**





The opening of a cooperative program between the Smithsonian Museum Shops and NASM was marked by a day of aircraft and rocket model contests on the Mall.





recognized organizations were held on the Mall. These contests generated a considerable degree of public attention.

Kites, as another form of aircraft, attracted much public notice. NASM historian emeritus Paul Garber organized, implemented, and managed the Third Annual Kite Carnival, under the auspices of the Smithsonian Associates, on the Mall. His fame in this activity spread around the country to such a degree that he was in great demand by late spring to assist other organizations in kite making and kite flying. He gave sixteen lectures on the subject and managed kite contests all the way from San Antonio, Texas, to Boston, Massachusetts.

Members of the professional and curatorial staffs have participated in technical and scientific meetings both in this country and abroad during the year. Frederick C. Durant chaired the second annual "History of Astronautics" sessions at the New York meeting of the International Astronautics Federation. Louis S. Casey attended ICOM



The facilities of the Historical Research Center have been augmented by carrels for visiting students with index files right at hand.





**Apollo 8 Colonel Frank Borman addresses a capacity audience in the North Hall following his appearance before Congress.**

meetings in Germany and Canada. Serving as chairman-organizer of the newly formed International Association of Transportation Museums, he has been elected a member of its board.

Robert B. Meyer, Jr. and Casey have been active for the second year in Project 400, a curriculum-enrichment program in the District of Columbia public school system. Their program includes fundamental flight theory and actual familiarization flights for students and instructors. Both men are active in local aeronautical and pilots' organizations.

Specialized research programs are in progress in the Aeronautics and the Astronautics Departments. Casey is continuing his work on the early history of Curtiss and has made notable progress in a computerized listing of all aircraft in the collections of the known air museums of the free world. Meyer is engaged also in compiling a similar list for aircraft power plants. His investigation of the early work of a relatively little-known inventor, Matthew Sellers, has brought to light valuable additions to our knowledge of developments in the first post-Wright years.

Durant has continued his investigations of 19th-century Congreve and Hale rockets. He is studying clues and origins of spin-stabilized Hale-type rockets apparently used in the Chattanooga, Tennessee, area during the Civil War. He also has reviewed and authored major articles on "Rockets and Guided Missiles" and "Space Exploration" for the

*Encyclopaedia Britannica*, "Principles of History of Space Exploration" for the *Encyclopedia Americana*, and encyclopedia yearbook articles on "Earth-Oriented Satellites" and "Astronautics—1968." ASTRO research files have been augmented by over 200 historical photographs, a fact that makes NASM's collection the largest single source of such reference material.

Apart from his special lectures on kites, Paul Garber has given, in cities all over the United States, 87 lectures on the history and development of flight. He is engaged also, under the auspices of the Navy Department, in video-taping a series of ten lectures covering aviation history. Copies of these tapes will be placed in NASM Research Center files.

During the year, Robert Meyer has given, in the United States and at museums in western Europe, twelve illustrated lectures on the history of aircraft power plant development.

The Historical Research Center (HRC) staff has served 2,092 visitors and researchers and has answered 5,306 telephones and letter requests.

Several outstanding collections have been received. Most prominent of these are the papers of Glenn H. Curtiss, gift from his son, and the Thomas Scott Baldwin photo albums and scrapbooks. Because of increased usage and added material, the reference area of HRC has been doubled in size.

Regular monthly meetings have been held in HRC by the Antique Airplane Association, the American Aviation Historical Society, and the International Plastic Modelers Society.

A program has been established with the Aero Club of Washington to obtain volunteer assistants to sort documentary material.

A meeting of the International Council of Museums was attended by several staff members. Attendees represented the air and space museums of the United States and Canada. Other meetings have included the Northeast Aero Historians, at which an information display on HRC was exhibited.

The weekly "lunch box seminars" have continued through the year. This program brings before the Smithsonian and NASM staff—plus neighboring, cooperating agencies that include the Department of Transportation, the National Aeronautical and Space Administration, and the Department of Defense—outside speakers discoursing informally on subjects pertinent to the interests of NASM. As a fallout from this program many artifacts and documents have been added to NASM collections.

A docents' training program in which all curatorial members of the staff participated has been established and includes nine docents who

Secretary Ripley and Dr. Blitzer are introduced to some of the problems of aircraft restoration by Curator Louis Casey.



have operated a scheduled program of tours (for elementary and secondary school students) through the Museum.

The investigation of the impact of the Guggenheim-founded aeronautical laboratories and schools on the subsequent development of air and space technology has been continued by Guggenheim fellow Alexis Doster. In conjunction with the project, visits have been made to the Guggenheim schools at the Californian Institute of Technology, Stanford University, the University of Washington, and the University of Michigan to assess their several contributions. Many tape-recorded interviews have been obtained from each of these visits.

The Oral History Project of HRC has continued its program of conducting tape-recorded interviews with pioneers in the development of aviation. A master oral history bank has been established. This depository is designed to preserve historical recordings. Under the present program, cooperating agencies furnish tape recordings to be copied into the master bank.

Additions to the collections received during the year have totaled 476 specimens in 169 separate accessions listed below. Those from government departments are entered in the records as transfers; others have been received as gifts.

Advanced Research Projects Agency: HIBEX flight vehicle (NASM 1962).

Aerojet-General Corporation: Chamber assemblies (NASM 1967); injectors, cover and header, brackets, and plate (NASM 1972).

Aeronca Company: Model aircraft, Aeronca C-3 (NASM 2084).

- Air Force, United States: From Air Force Systems Command: X-15 aircraft, United States Air Force No. 1 rocket-powered plane (NASM 2125). From Headquarters, Washington, D.C.: Aircraft, Bell UH-13J, first presidential helicopter, used by President Dwight D. Eisenhower (NASM 1968). From Morton Air Force Base, California: Atlas missile guidance pod (NASM 1965).
- Air Mail Pioneers: Painting, "Old 249" mailplane (NASM 1963).
- American Institute of Aeronautics and Astronautics: Aircraft model, Martin B-10 (NASM 2100).
- Army, United States: From Fort Eustis, Virginia: Aircraft parts, Hughes XV 9A (NASM 1981).
- Baugh, P. J.: Sailplane, Sisu 1-A, used by Alvin H. Parker to make the first sailplane that flew in excess of 600 miles (NASM 1960).
- Bensen Aircraft Corporation: Bensen gyrocopter, "Spirit of Kitty Hawk," which set a total of twelve world and national records for autogyros in speed, distance, and altitude (NASM 2122).
- Brussel-Smith, Bernard: Seventy-two block prints on aeronautical history (NASM 2121).
- California State Legislature: Resolutions Number 213 and Number 236 commending the Air Mail Pioneers and John W. Hackbarth for the reconstruction of the De Havilland 4B "Mailplane 249" (NASM 1980).
- Carter, S/Sgt. Robert E.: Astronaut signatures (NASM 1959).
- Cooper, Eddie: Two wheels of De Havilland mailplane type (NASM 2089).
- Curtiss Wright Corporation: Aircraft, Curtiss Wright X-100 (NASM 1969).
- Dean, Hilliard: Painting, "Space Exploration" (NASM 2112).
- Desatoff, John: Painting, "Gemini" (NASM 2119).
- Doughty, Stewart E.: Machine guns, Hotchkiss .303 and Vickers bipod (NASM 2127).
- Douglas Aircraft Company: Aircraft models, Douglas F5D and D 571/F4D (NASM 2094).
- General Services Administration: Three recognition aircraft models (NASM 2091); aircraft model, Grumman F85-F (NASM 2102).
- Hendricks, James: Paintings, "Detail Lunar Surface II" (NASM 2116), "Lunar Orbiter II" (NASM 2117).
- Hughes Aircraft Company: Space-probe model, Surveyor (NASM 2104).
- Johnson, Robert E.: Aircraft model, Curtiss 0-1 (NASM 2092).
- Lockheed Aircraft Corporation: Aircraft models, Lockheed L 2000 and supersonic transport (NASM 2093).
- Lockheed California Company: Aircraft model, Lockheed YF-12A (NASM 2096); three aircraft models of Lockheed supersonic transport (NASM 2097).
- McDonnell Aircraft Company: Paintings, "Orbital Workshop" and "Saturn IV Upper Stage" (NASM 2132).
- McDonnell Douglas Astronautics Company: Wind-tunnel model kit (NASM 2088).
- Metro-Goldwyn-Mayer, Inc.: Oil paintings from the movie "2001: A Space Odyssey" (NASM 1983).
- Mion, Pierre, and Norman Rockwell: Painting, "Lunar Takeoff" (NASM 2113).
- National Aeronautics and Space Administration: From Manned Spacecraft Center, Houston, Texas: Gemini adapter sections (NASM 1966-A); Mercury trainer couch, ejection seats, space suits, Gemini parachutes and shingles (NASM 1971); space suit of astronaut Frank Borman, Apollo 8 (NASM 2133).
- From McDonnell Douglas Corporation: Hatch-release mechanism (NASM



- 1964); miscellaneous hardware (NASM 1966); Gemini surplus property, including flight-plan and propellant quantity indicators, water-tank assembly, primary oxygen system, cabin and suit temperature indicators, and voice control center (NASM 1970); pressure tank, grip assembly, thrust chambers, inner-window glass, docking-bar and water-tank assemblies, stop clock, heat exchanger, cannister, rotometer, and thrust chambers (NASM 1978).
- National Gallery of Art: Paintings, "Moppets and the Moon," 68 watercolors by school children from Brevard City, Florida; Peoria, Illinois; and Washington, D.C. (NASM 2120).
- Navy, United States: From Naval Air Systems Command: Aircraft, McDonnell F4A "Sageburner" (NASM 2087).
- Peck, Edward: Model engine, Rogers 29 (NASM 2126).
- Puskas, John F.: Ceramic mosaic, "Nimbus I" (NASM 2118).
- Rhodes, Charles: Aircraft, ground effect machine (NASM 1982).
- Rindler, Robert, Sr.: Aircraft, 1922 Waco glider (NASM 2083).
- Rocket Development Corporation: Honeybee sounding rocket (NASM 1957).
- Rockwell, Norman: Paintings, "First Step on the Moon" (NASM 2114); "Astronaut" (NASM 2115).
- Rowe, Captain Basil L.: Hinkel Trophy, 1924 (NASM 2106); Curtiss Trophy, 1925 (NASM 2107); two 1926 Air Races plaques (NASM 2108); six 1924 and 1926 National Air Races medals (NASM 2109).
- Sellers, Matthew Bacon: Collection that includes aircraft engines, propellers, propeller blades, wing ribs, fuel tank, and airfoil specimens (NASM 2110).
- Smithsonian Institution: From Department of Armed Forces History: Fifteen aircraft guns of World War I (NASM 2086); aircraft model, Northrop YB 35 (NASM 2101).
- Topping, Incorporated: Helicopter model, Sikorsky HSS-2Z (NASM 2099).
- Treasury Department, United States: Spandau aircraft machine guns (NASM 1961).
- United Air Lines: Model aircraft, Vickers Viscount V-700 (NASM 2085); Rolls-Royce turbojet engine, propeller, and spinner (NASM 2111).
- Voorhees, T. C.: Engine, Curtiss Conqueror V-12 (NASM 2124).
- Wines, James P.: Naval aviator's wings (NASM 2082).

The Museum's Historical Research Center has been greatly enriched during the year with valuable research materials. The cooperation of the following persons and organizations is gratefully acknowledged:

- |                                      |   |
|--------------------------------------|---|
| Air Force Association                | Diehl, William  |
| Air Force, United States             | Durant, F. C., III  |
| Air Transport Association of America | Early Birds of Aviation, Inc.                               |
| Albright, Sydney J.                  | Fairchild Hiller Corp., Sherman Fairchild Technology Center |
| Allegheny Airlines                   | Farquhar, H. D.   |
| Avco Corporation                     | Field Enterprises Educational Corporation                   |
| Benas, Rose A.                       | Flight Safety Foundation, Inc.                              |
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| Curtiss Wright Corporation           |   |
| Custom Component Switches, Inc.      |   |



Heinen, Ken	Shank, Mrs. Robert F.
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Jsekoff, Michael	Stephens, James L.
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Navy, United States	Department of Transportation, Federal
Naval Aviation Safety Center, United	Aviation Agency Library
States	United Air Lines
New Horizons Publishers, Inc.	Villard, Henry S.
Rowe, Captain Basil L.	Walsh, Robert
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seum	Wigton, D. C.
Scott, Denham	



# National Armed Forces Museum Advisory Board

JOHN H. MAGRUDER III, *Director*



ON 15 JANUARY 1969, the Smithsonian Institution Board of Regents approved the submission of legislation to the Congress to provide for the establishment of a National Armed Forces Historical Museum Park and a study center to be designated the Dwight D. Eisenhower Center for Historical Research. This proposal was referred to General Eisenhower by the Chancellor and on 7 February 1969 the former president replied by letter, embracing the proposal but suggesting that no commitments be made involving expenditures of federal funds until such time as the new administration had an opportunity to assess its programs. On 3 February 1969, the Smithsonian's legislative proposal was submitted to the Bureau of the Budget, Executive Office of the President, for advice as to the relation of the proposal to the program of the Administration. Representative Frank T. Bow, on 14 April 1969, introduced House Bill H. R. 10001, incorporating the Regent's recommendations and seeking authority for the Board of Regents and the Secretary of the Interior to enter into an agreement for the joint use of certain lands in the Fort Foote area of Prince George's County, Maryland, as the site for the museum park. The site would include lands already under the jurisdiction of the Secretary of the Interior and lands to be acquired under authority of the Capper-Cramton Act of 1930 and Section 19 of the Federal-Aid Highway Act of 1968.

Subsequently—it appearing doubtful that the federal government would be able to acquire some of the anticipated park lands in the Fort Foote area as authorized under the Federal-Aid Highway Act of 1968—the Advisory Board staff, in close cooperation with the National Park Service, explored various alternatives with a view to rounding out the



Rear Admiral E. M. Eller, USN (Ret.), Director of Naval History, rings the engineroom gong of the U.S. monitor *Tecumseh* for the first time in 105 years. This gong was rung last the morning of 5 August 1864, when *Tecumseh* led Admiral Farragut's Gulf Squadron into Mobile Bay. *Tecumseh* fired the opening shot of the battle but was sunk by a Confederate torpedo (mine), prompting Farragut's immortal "Damn the torpedoes! Full ahead, Captain Drayton. Jewett, four bells!" Four bells referred to the traditional signal to the engineroom for full speed ahead. *Tecumseh's* gong was retrieved during the summer of 1968 while divers were examining the vessel's condition preliminary to raising her for permanent display in the proposed National Armed Forces Historical Museum Park. Observing Admiral Eller are (left to right) David Lloyd Kreeger, member, NAFMAB; Colonel J. H. Magruder III, Director, NAFMAB; William H. Perkins, Jr., member, NAFMAB; Admiral Eller, representing the Secretary of the Navy; Smithsonian Secretary Ripley; and John Nicholas Brown, Chairman, NAFMAB.

required acreage. At the suggestion of George B. Hartzog, Director, National Park Service, the Smithsonian is investigating the possibility of combining Fort Foote Park with another site under Department of the Interior jurisdiction—Jones Point Park, approximately 50.28 acres lying on the southern fringe of Alexandria, Virginia, across the Potomac and slightly upstream from Fort Foote.

In the fall of 1968 the staff supervised further engineering examination of the Civil War monitor USS *Tecumseh*, lying on the bottom of Mobile Bay, Alabama, where she was lost in battle in 1864. The results





This view of cadet living quarters in West Point's central barracks was made about 1879. Ninety years afterward, as the historic building crumbled under the wrecker's ball, a victim of the Military Academy's expansion program, the Advisory Board staff dismantled and removed one of its original rooms for reconstruction in the proposed National Armed Forces Historical Museum Park.

confirmed previous findings that *Tecumseh's* structural condition is such as to permit her being raised intact and restored for eventual display in the proposed National Armed Forces Historical Museum Park. Working in the area of the engine room, divers obtained a portion of a blower housing, pieces of cast-iron deck plate, and a section of the hull including wrought-iron exterior plating and a portion of a transverse frame. An analysis of these specimens by the Naval Research Laboratory—published in *NRL Memorandum Report 1987—Examination of the Corrosion and Salt Contamination of Structural Metal from the USS Tecumseh*, by H. R. Baker, R. N. Bolster, P. B. Leach, and C. R. Singletary, Surface Chemistry Branch, Chemistry Division (Washington, D.C.: Naval Research Laboratory, March 1969)—indicated that the wrought-iron hull is in unexpectedly good condition. The report suggested techniques for treating the hull to remove scale and inhibit corrosion.

During late April and early May 1969, as part of the *Tecumseh* project, Colonel Robert M. Calland, of the Advisory Board staff, in company with Robert M. Organ, Chief of the Conservation Analytical Laboratory, United States National Museum, conducted on-site

studies of significant ship restorations in Europe, notably, the Swedish sixteenth-century man-of-war *Vasa* at Stockholm, Viking ships at Copenhagen, Lord Nelson's flagship HMS *Victory* at Portsmouth, and the nineteenth-century merchantman *Cutty Sark* at Greenwich.

During November 1968, to mark the fiftieth anniversary of the World War I armistice, the Advisory Board sponsored a special exhibit of watercolor and oil paintings by a noted artist, the late Charles Hoffbauer (1875–1957), who served in the French army during the conflict. The exhibit, made possible by the generosity of the artist's widow, attracted much favorable comment while displayed in the National Museum of History and Technology.

Notable additions in fields such as ordnance, land vehicles, and aircraft have been made to the collections of military and naval objects being assembled by the Advisory Board staff for the proposed National Armed Forces Historical Museum Park—among them the last of the navy's flying boats, an early West Point barracks room, and a number of valuable artillery pieces.

On 12 July 1968, a giant SP-5B Martin Marlin (often called a P5M), last of a line of navy seaplanes spanning half a century, landed at Patuxent River Naval Air Station, Maryland, at the end of a sentimental farewell flight from North Island Naval Air Station, San Diego, California. Vice Admiral Thomas F. Connolly, Deputy Chief of Naval Operations for Air, presented the forty-ton craft to the Smithsonian Institution. Mr. John Nicholas Brown, Advisory Board chairman, noted in his acceptance speech that

"the passing of the flying boat from the naval service is akin to the retirement of the horse from the cavalry . . . . The float plane holds a special significance—an historical nostalgia—to the sea service which no wheeled aircraft can ever replace . . . . In ceremonies . . . at the commencement of this historic last flight, Admiral Karaberis [Commander, Fleet Air, San Diego] dedicated this P5M to the youth of America . . . . The words of Admiral Karaberis are especially appropriate to this plane's future with the Smithsonian."

In June 1969, a cadet room, complete with furnishings, was dismantled and removed by the Advisory Board staff from West Point's venerable central barracks, the home, during their cadet days, of such famous soldiers as Pershing, Patton, and MacArthur. The building, constructed during the period 1845–1851, is being torn down as part of the Military Academy's expansion program. The austere room, little changed throughout a century and more of constant use, will be reconstructed in the proposed Museum Park.

During August 1968 the ordnance collection was enriched by fifteen artillery pieces of the Civil War and World War I periods and other historic materials, transferred to the Smithsonian by Major General



In July 1968 the United States Navy's last flying boat, an SP-5B Martin Marlin, left the fleet and joined the Smithsonian Institution, destined for future exhibit in the proposed National Armed Forces Historical Museum Park. As seen above, the giant seaplane begins her run down the sea lane in San Diego Harbor, California, en route to transfer ceremonies at Patuxent River Naval Air Station, Maryland, closing an era in naval aviation which began in 1912.

Richard Snyder, the adjutant general of the commonwealth of Pennsylvania.

The American Military Institute in June 1969 deposited its library of some 15,000 items with the Advisory Board. This valuable collection of books, pamphlets, and periodicals on numerous aspects of military and naval historical and technical subjects will serve as the nucleus of the library of the proposed Dwight D. Eisenhower Center for Historical Research.

Colonel John H. Magruder III, director, National Armed Forces Museum Advisory Board, has been making an extensive study of Admiral D. G. Farragut's Gulf Squadron in operations on the Mississippi River during 1862 and 1863. Evidence has come to light indicating that it was the audacious Farragut who, in the early spring of 1863, finally influenced General Ulysses S. Grant to forsake the fruitless attacks on Vicksburg by way of the Yazoo River and to cross over the river below the Confederate stronghold to envelope it from the south and east. The decisive role played by the navy—both in Washington on the part of Secretary Gideon Welles and his able assistant, Gustavus Fox, and on the Mississippi by Farragut—has long been overlooked by historians. The discovery of hitherto unknown personal correspondence between Lieu-

tenant Colonel John L. Broome, USMC (Farragut's Senior Marine Officer), Welles, and Admiral Walke, points to a new understanding of the impact that Farragut may have had on Grant's operations and ultimate strategy in bringing this historic siege to a victorious end for the Union.

Major John M. Elliott, staff museum specialist, has conducted research in techniques and processes of reproduction-casting for museum purposes, lecturing on the subject at the aviation meeting of the International Congress of Museums in May 1969. He has continued work on a book about protective coatings and markings of United States naval aircraft from 1921 to the present.

Mr. James S. Hutchins, assistant director, has continued work on a book about the development of United States cavalry saddles and bridles, 1833-1916, and pursued his studies of the role of the armed forces in westward expansion and of the development of animal-drawn and animal-borne military transport and the field equipment of the individual soldier.

Mr. James J. Stokesberry, staff historian, has continued research into the strategic, economic, and sociological aspects of naval ship design and naval operations during the American Civil War period, as exemplified by the monitor *Tecumseh*.

### *Staff Publications and Papers*

ELLIOTT, JOHN M. "The Marine Corps' First Fighter Squadron." *Journal of the American Aviation Historical Society* (fall 1968), volume 13, number 3, pages 225-226.

HUTCHINS, JAMES S. "The Dodge Blanket Roll Support, 1892-1909." *Military Collector & Historian* (fall 1968), volume 20, number 3, pages 92-95.

MAGRUDER, JOHN H., III. "The Eagle, Globe, and Anchor." *Marine Corps Gazette* (November 1968), volume 52, number 11, pages 38-45.

STOKESBERRY, JAMES J. "USS *Tecumseh*: Treasure in Mobile Bay." *U.S. Naval Institute Proceedings* (August 1968), volume 94, number 8, pages 147-149.

———. "Military History is Social History." Seminar on museum and historical agency administration, 5 February 1969, State University College, Buffalo, New York.



# Woodrow Wilson International Center For Scholars

BENJAMIN H. READ, *Director*

THE WOODROW WILSON INTERNATIONAL CENTER FOR SCHOLARS WAS established by Act of Congress, approved on 24 October 1968 (P.L. 90-637), to be a "living memorial expressing the ideals and concerns of Woodrow Wilson . . . symbolizing and strengthening the fruitful relation between the world of learning and the world of public affairs."

Congress has placed the Center in the Smithsonian Institution under the administration of its own fifteen-man, mixed public and private Board of Trustees to be appointed by the President. The members of the Board appointed by President Johnson and President Nixon in 1969 are: Hubert H. Humphrey, chairman; Allan Nevins, vice chairman; James MacGregor Burns, Ernest Cuneo, Robert H. Finch, Charles A. Horsky, Barnaby Keeney, Harry C. McPherson, Jr., Daniel Patrick Moynihan, L. Quincy Mumford, James B. Rhoads, S. Dillon Ripley, John P. Roche, and William P. Rogers. At its organization meeting in March 1969, the Board appointed Benjamin H. Read as acting director.

In April of 1969 the Ford Foundation extended a \$45,000 grant to cover the initial operating expenses of the Center. In addition, public appropriations have been requested to cover other early planning and operating costs.

Chairman Humphrey and the acting director have been in correspondence with several hundred persons—educators, public officials, professional people, businessmen, and others—in every state and a number of countries to obtain advice and suggestions about the future substantive role of the Center. Discussion meetings have been held in Washington and elsewhere for the same purpose. When the Board met in October 1969, it passed on a series of recommendations concerning the future goals and objectives of the Center.

The Smithsonian Institution contracted with Mr. Ralph G. Schwarz, president of the Urban Design and Development Corporation, a non-profit District of Columbia corporation established by the American

Institute of Architects, to study the feasibility of the recommended site for the Center on the proposed Market Square across Pennsylvania Avenue from the National Archives Building. This corporation reported its conclusions to Secretary Ripley and the Board of Trustees in September 1969.

On 28 April 1969 President Nixon's message to Congress on the District of Columbia described the Center in the following terms:

. . . a significant addition to Pennsylvania Avenue . . . an appropriate memorial to a President who combined a devotion to scholarship with a passion for peace . . . a center for men of letters and men of affairs . . . "an institution of learning that the 22nd century will regard as having influenced the 21st."

These goals the center hopes to achieve.

## American Studies Program

WILCOMB E. WASHBURN, *Chairman*

THE AMERICAN STUDIES PROGRAM of the Office of American Studies has continued for the fourth consecutive year in cooperation with universities in the local area. Although the head of the program, Wilcomb E. Washburn, has been on sabbatical leave during much of the year, the program has been carried on under the administration of Harold Skramstad. An orientation seminar was given in the fall of 1968. The subject of the course this year was "The Material Culture of Victorian Washington, 1850-1900." Students in the seminar were encouraged to continue with specialized research and reading courses in the spring semester. A seminar in "American Technology and Its Cultural Impact" was also given by Harold Skramstad during the spring semester.

The American Studies Program now includes, in addition to entering graduate students taking the orientation seminar, advanced students preparing doctoral dissertations with Smithsonian advisors, as well as others who are preparing for comprehensive examinations at their respective universities in fields of specialization taken at the Smithsonian. The total number of graduate students in the program this year is eighteen, of which nine were in the orientation seminar and ten were involved in advanced reading and research or preparation for their comprehensive examinations or doctoral dissertations. The students participating are from George Washington University, Georgetown University, Catholic University, and the University of Maryland. Staff members of Smithsonian Institution museums have participated in the program, which has been organized and coordinated by the acting head of the Program.

During the summer of 1968, Dr. Washburn and Mr. Skramstad participated, with historian Constance McLaughlin Green and planner Frederick Gutheim, in a joint Smithsonian-George Washington University Summer Institute in American Studies on the subject of "The Growth and Emergence of Washington as the Nation's Capital." Fifteen students from all over the country participated in the seminar.

In July 1968 Mr. Skramstad organized the Smithsonian portion of an East-West Center Program in American Studies (offered in conjunction with George Washington University and the Library of Congress) for Oriental students in graduate school.

During the year a Historical Laboratories Program has begun to evolve under the direction of Mr. Skramstad in which graduate students and staff could work together on common historical problems involving specific historical sites. Tentative arrangements are being developed so that St. Mary's City and Annapolis, Maryland, and Washington, D.C. can serve as historical laboratories for studies in 17th-, 18th-, and 19th-century American history.

Dr. Washburn, during his sabbatical, has presented scholarly papers at the Colloquium on Early Brazilian History sponsored by the Instituto Histórico e Geográfico Brasileiro in Rio de Janeiro, Brazil, and at the International Meeting on the History of Nautical Science sponsored by the University of Coimbra, Portugal. In addition, he has commented on several papers on "Science in America: New Interpretations" at the annual meeting of the American Historical Association; has participated in a panel discussion at a Conference on the Legal Rights of Indians in the Twentieth Century, which was sponsored by the Law Schools of the University of North Dakota and the University of Manitoba, at Grand Forks, North Dakota; and has presented a paper on exhibit techniques at a National Park Service Seminar at Grand Canyon, Arizona.

Mr. Harold Skramstad has presented a paper on the subject of museum-university cooperation in higher education at a meeting of the New England Conference of the American Associations of Museums.

During the year, Dr. Washburn was elected to membership in the American Antiquarian Society, was elected to the executive council of the American Studies Association as Member-at-Large for History, was named to the Board of Visitors of the Peabody Museum of Archeology and Ethnology at Harvard University, and was elected vice president of the Japan-America Society of Washington.

### *Staff Publications*

WASHBURN, WILCOMB E. "Are Museums Necessary?" *Museum News* (October 1968), volume 47, number 2, pages 9-10.

———. "Speech Communication and Politics." *Today's Speech*, the Journal of the Speech Association of the Eastern States (November 1968), volume 16, number 4, pages 3-16.

———. "Examen Critique des Questions Cartographiques dans la Découverte." Pages 77-87 in *La Découverte de L'Amérique*, Proceedings of the 10th Stage



International D'Études Humanistes, Tours, 1966. Paris: Librairie Philosophique J. Vrin, 1968.

———. "Temple of the Arts: The Renovation of Washington's Patent Office Building." *AIA Journal* (March 1969), volume 51, number 3, pages 54–61.



# The Joseph Henry Papers

NATHAN REINGOLD, *Editor*

AT THE END OF THE YEAR the Henry Papers staff is ready to start editing the first of a projected series of 20 volumes of previously unpublished documents of Joseph Henry, the early American physicist and first Secretary of the Smithsonian Institution. Devoted to the early, Albany, New York, period of Henry's life, this volume will contain approximately 340 documents by, addressed to, or referring to Henry, as well as several hundred items on the intellectual, social, and institutional environment in which Henry first attained prominence as an experimental physical scientist.

Copies of these Albany documents and an additional 16,000 manuscripts covering the entire range of Henry's long career have been acquired by an extensive canvass of domestic and foreign institutions by mail and by personal visit. While this hunt is far from complete, the project will shortly have in its possession not only all the known Albany period items but also most of the extant documentation for Henry's life at Princeton, 1832-1846. Although the Henry Papers staff has located many sources for Henry's Smithsonian period, 1846-1878, particularly the early formative years, the bulk of these manuscripts necessarily will remain unprocessed until the work of the early volumes are further advanced. All of the primary sources are being described and indexed by a computer system.

The ultimate purpose of an edition of the Henry Papers is not the mere convenience of having source materials in readable form but that our knowledge and understanding of the past is significantly increased. So much fresh material has come to light that the staff faces an embarrassment of riches in making the selection for the letterpress edition. While certain topics suffer, unfortunately, from the loss of documentation, others are profusely illustrated by manuscripts of great intrinsic interest. The early Albany period lacks many key items of evidence on the origins and nature of Henry's early research. For the Princeton years, there are very many splendid manuscripts on Henry's intellectual development. Much has turned up on the growth of Henry's ideas on education, on scientific method, and on the history of the American scientific

community in this period. Despite destruction in the fire of 1865, many items on Henry's concept of the Smithsonian Institution and on its operations in the early years have been located by the Henry Papers staff.

### *Staff Publications and Papers*

REINGOLD, NATHAN. "National Aspirations and Local Purposes." *Transactions of the Kansas Academy of Sciences* (1968), volume 71, number 3, pages 235-246.

———. "American Indifference to Basic Research, a Reappraisal." University of Illinois, Champaign, Illinois. May 1969.

———. "Using a Computer in Historical Research." University of Illinois, Champaign, Illinois. May 1969.

# SPECIAL PROGRAMS

FRANK A. TAYLOR

*Director General of Museums*

and

*Director, United States National Museum*





# Office of the Director General of Museums

FRANK A. TAYLOR, *Director General of Museums*

AN IMPORTANT EVENT OF THE YEAR for the museums of the United States has been the publication of the Belmont conferees' report describing the urgent needs of America's museums. The *Belmont Report* outlines the opportunities museums have within their grasp to make outstanding contributions to the cultural and educational development of the United States and to improve the quality of life for all Americans. Ironically, its publication coincided with announcements by officials of several large cities of their intent to reduce or terminate the financial support of museums.

The report states the problems museums face in meeting their responsibilities and recommends continuing studies of broad museum needs. For this purpose it speaks affirmatively of the National Museum Act as an authorized means to fund the studies required to develop justifications and procedures to obtain new aid for museums. The accreditation of museums and the setting of standards of performance and eligibility to qualify them for public aid is a necessary and complex undertaking. The Smithsonian under the authority of the National Museum Act has responded to requests from the American Association of Museums (AAM) for grants in aid of the Association's accreditation study.

Similarly, the Smithsonian under the authority of the act has cooperated with the Southeast Museums Conference in an experiment to improve the value of the annual meetings of regional conferences. The response to publication of the results of the two annual meetings has been so favorable that officers of other regional associations have requested advice and aid for developing similar meetings. At the request of AAM, the Smithsonian has made a grant to the Association to carry on the experiment in each of its six regional conferences.

Smithsonian documentary resources required to respond to steadily increasing requests for information about museums and for advice and assistance in meeting museum problems have been enlarged this year. Substantial aid has been given to the final editing of the report on a museum questionnaire circulated two years ago. This report was published in the summer of 1969 by the Office of Education.

The Office of the Director General of Museums has responded to numerous requests for advice from university, city, and state museums involved in reorganizing or rebuilding their institutions. Smithsonian scientists, museum directors, exhibits specialists, conservators, and others have gone to these museums to advise on problems and plans.

Officers and staff of the Smithsonian have cooperated with the director and officers of the American Association of Museums and the officers of the United States Committee of the International Council of Museums to establish a working relationship between the two groups for the benefit of domestic and foreign museums. Through the imaginative guidance of Peter Powers, Smithsonian general counsel, a permanent development secretary for ICOM will join the headquarters staff of AAM. At the annual meeting of AAM the director general participated in a panel discussion demonstrating to the American museum professionals the values of ICOM for museums of Canada, Mexico, and the United States. He pointed out that strong representation of museums before international cultural and development organizations can have important consequences for the museums of the United States. The director and the general counsel attended the working sessions, the executive committee meetings, and the general assembly of the ICOM Triennial Conference in Germany as representatives of Secretary Ripley, who was elected vice president of ICOM.

The director, in cooperation with the officers of the ICOM International Committee for Museums of Science and Technology, has continued to plan a laboratory to be established in India to produce basic science exhibits designed to meet the specific needs of individual developing countries. The Smithsonian Office of International Activities is cooperating in the support of a meeting to be held in Bangalore, India, to define the project in detail.

Experimentation and investigation of the methods required to improve the impact of museum exhibits has continued during the year. The annual meeting of the Southeast Museums Conference mentioned earlier was based on the subject of exhibits evaluation and testing. This was followed by a seminar at the Smithsonian on museum communication and the new techniques available to involve viewers with exhibits and to collect information about museum visitors and what they consider relevant to their interests. The visitors' survey is continuing, and a summer institute for selected undergraduates on the subject of exhibition objectives and methods was held under the direction of Peter Welsh. Conversations are continuing between the director of Academic Programs and a number of university people to determine ways and means of producing exhibitions on issues and concerns of the times that will

permit the viewer to make choices of priorities and solutions, to see the consequences of his decisions, and to register his likes and dislikes.

The Exposition Hall programs under the direction of Lloyd Herman are providing opportunities for experimentation with exhibits of a temporary kind. At the request of members of the Federal City College faculty, classes on design and reporting have been held in the "Photography and the City" exhibition. The exhibition "The Concerned Photographer" is being used as a test of the principle of charging admission to special exhibits. An exhibition surveying United States industrial design in 1968, co-sponsored by *Industrial Design* magazine, has been visited by industrial design classes from as far away as Baltimore. Film showings and a guest industrial design speaker have underscored the importance of good design in our environment. The premier exhibition of "Please Be Seated," tracing the history and evolution of the chair from 2000 B.C. to the present, has offered local art and history students opportunities for class visits and a "sketch-in" at the exhibit. The rehabilitation of public spaces and the general improvement of the appearance of the Arts and Industries Building have continued.

Laboratories and offices of the Smithsonian have provided instruction in museum practices for more than 500 museum personnel who came from other institutions to spend from a day to a year learning techniques of exhibition, conservation of museum objects, management of collections, and administration. These visitors came from 35 states and 25 foreign countries. Many attended on international travel grants provided by international foundations. A number obtained college credit under cooperative arrangements between their universities and the Smithsonian Office of Academic Programs.

Mr. Welsh participated on three occasions at the New York State Historical Association at Cooperstown in seminars on the use and presentation of nonverbal material in teaching social studies. In addition, he has taught a seminar in the Cooperstown Graduate Program that investigated the attitudes and values in American naive art. He continues to serve as editor of the Smithsonian *Journal of History*.

Planning for the Smithsonian's participation in the Bicentennial of the American Revolution, the events leading to it, and the subsequent development of the United States, has been accelerated through the efforts of John J. Slocum, a Foreign Service Information Officer detailed by the United States Information Agency in February 1969 to serve as Special Assistant for Bicentennial Planning. Mr. Slocum, has had extensive experience in international exhibitions and celebrations both in this country and abroad.

He is now coordinating the plans of various Smithsonian offices and is serving as the liaison officer between the Smithsonian and the American Revolution Bicentennial Commission, other government agencies, and private organizations.



## Office of Exhibits Programs

JOHN E. ANGLIM, *Chief*

**S**MITHSONIAN EXHIBITS HAVE ATTEMPTED to reach the public at every available level of communication, giving multidimensional personalized meaning, in the sense of today, to the facts of history, and science, and technology. Under its chief, John E. Anglim, and assistant chief, Benjamin W. Lawless, the Office of Exhibits Programs has sought to develop an especially meaningful rapport between the exhibit and the visitor, inviting truly significant museum-to-visitor mutual involvement.

Exhibits have had more impact, more relevance than ever before, seeking to tell their stories with candor and clarity. They have related the object to the visitor, the visitor to the object, the visitors to each other and to their predecessors. For only in this way can the real meaning of the historic, the scientific, the technological be understood. Only when the visitor can become personally involved with the exhibit will he gain a sense of himself, will he understand the object being exhibited. This has been the aim of the exhibits throughout the museums in 1969—those mounted by the staff assigned to the National Museum of History and Technology under the direction of Benjamin W. Lawless, chief, and Richard F. Virgo, chief of design; those by the staff at the National Museum of Natural History under the direction of James A. Mahoney, chief; and those by the staff of the National Air and Space Museum under the direction of Harry Hart, chief.

Epitomizing especially this mutual involvement of visitor and object has been the spectacular exhibit "The History of Jazz," which filled the Anacostia Neighborhood Museum with visitors for six weeks during the winter and then went on to reopen in downtown Washington at the Corcoran Gallery of Art's new Dupont Center. Designer Kenneth Young of the exhibits staff, assigned to the National Museum of History and Technology, has summarized the purpose of the exhibit as giving the "feeling of jazz" by teaching (relating the history of jazz to the music of today) and by community involvement (the youngsters of Anacostia presented their own interpretation of jazz through a mural that they painted for the exhibit). In an Environment Room (using



The *Lilly Collection of Gold Coins*, designed by Steven Makovenyi (above), was one of the year's major exhibitions (photo courtesy Larry Stevens).

Exhibits specialist Frank Caldwell mounts one of the 6,018 gold coins in the Lilly Exhibition (photo courtesy Larry Stevens).



two films and six slide projectors), visitors felt that they were actually walking amid a street-marching jazz band. They also saw musical instruments associated with the history of jazz: the trumpets of Dizzy Gillespie and Louis Armstrong. There were paintings from Birdland in New York portraying some of the greats of jazz: Sarah Vaughn, Count Basie, Billy Eckstine, Ella Fitzgerald, Earl Garner, and more. The total exhibit told the story of jazz in a vital, meaningful way that embraced the visitor; the Anacostia youngster became a part of it; it gave him a "sense of himself."

This has been just one of the unprecedented number of special exhibits in which the Office of Exhibits Programs has sought to reach the Smithsonian's millions of visitors, and, at the same time, to insure that the museum represented and communicated with all Americans. Other exhibits so motivated have included "Human Rights," "Quest for the Presidency," "Hail to the Chief," "Women, Cameras, and Images," and "Music Making Country Style" in the History and Technology Building; "Right to Existence," "African Interlude," and "Masada" in the Natural History Building; and the Saga of Anacostia" at the Anacostia Neighborhood Museum.

Mrs. Samuel K. B. Asante of Ghana examines a work of sculpture in the "African Interlude" exhibit with Mrs. Willie Mae Pelham, museum aide in the Division of Cultural Anthropology.

African Interlude, an exhibition of indigenous arts, artifacts, and textiles from several African nations, attracted large crowds, including many youngsters.



The exhibits of 1968–69 also have included “The Japan Expedition,” designed by Lucius Lomax, handsomely commemorating Commodore Matthew Calbraith Perry’s historic and successful mission to open Japan to United States trade in the mid 19th century. In the National Museum of History and Technology has been the immense Lilly Collection of Gold Coins, designed by Steven Makovenyi to present the 6,000 gold coins collected by Josiah K. Lilly, Jr. In the Arts and Industries Building, which is being readied for its role as the Smithsonian’s Exposition Hall, have been, among other exhibits: “Please Be Seated,” encompassing the little-known history of the chair; the “Bolivian Exhibit,” brought from HemisFair; “1968 Design Review;” and “Urban Design: Manhattan, West.”

All of these have been special exhibitions (as opposed to permanent)—temporary and relatively low-cost. The Office of Exhibits Programs has produced sixty-six of them in 1969 and has edited and printed labels for thirty-four more for the Traveling Exhibition Service. By their very nature, temporary shows are superbly valuable as experimental vehicles. They permit the testing of ideas and philosophies, and mechanical innovations as well, suggesting further development of those that prove good, and offering easy discard of those that do not. Experience with the specials has been applied to the permanent exhibits as ways were continually explored to make permanent halls more flexible and more current to new concepts of science, history, and technology.



Exhibits fabricators Herbert L. Brumback (left) and Olaf L. Leatherland construct coin cabinets for the Lilly Collection. Utmost accuracy of measurement was required to insure the necessary tight seal (photo courtesy Larry Stevens).





*Yoruba Textiles and Clothing*, a new exhibit in the Cultures of Africa and Asia Hall, was the project of a trainee whose nine-month fellowship permitted extensive study of exhibits techniques.

A colorful woodblock print in *The Japan Expedition* depicts a “foreign ship and some of the people it brought,” according to the Japanese legend at far right. Commodore Perry is represented in the upper row, extreme right (photo courtesy Mariners Museum).







Mrs. Terezia Takacs works on a design for the philately special exhibit *Commonwealth in Africa and the Caribbean*.



Workmen install a piece of pottery for *Masada*, a portrayal of one of the most dramatic episodes in Jewish history.

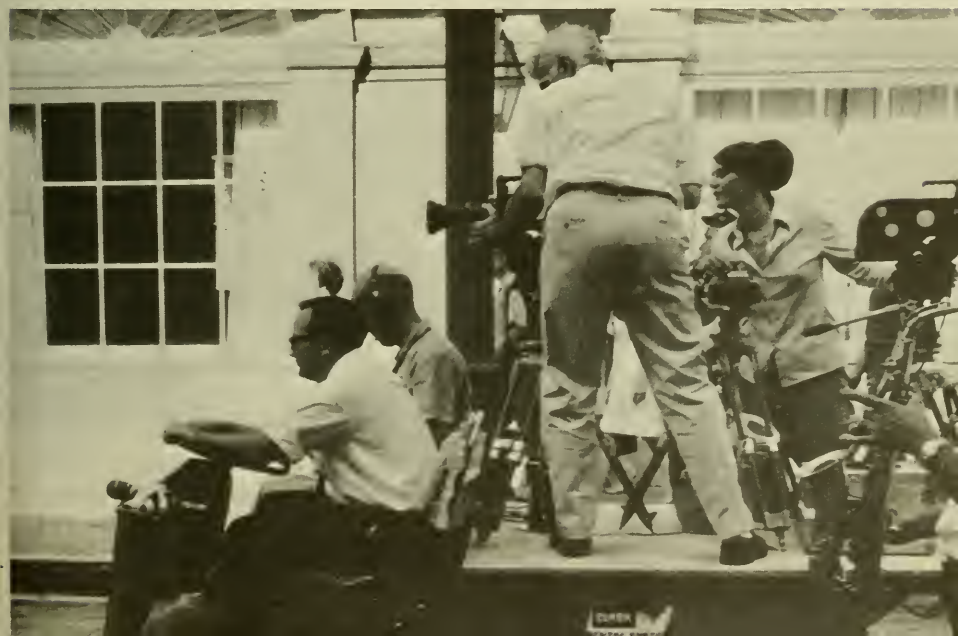


Exhibits technician Nicholas Michnya prepares a silk screen for an exhibits label (photo courtesy Larry Stevens).



Fisk University trainees learn silk-screening techniques in the History and Technology Exhibits laboratory.

Karen Loveland, who heads the Exhibits film unit, directs shooting of a movie for *The History of Jazz*. Films such as this and other audiovisual projects have contributed much to a rapport with museum visitors.



# HAIL TO THE CHIEF



*Hail to the Chief*, a lively record of Presidential inaugurations, succeeded *Quest for the Presidency*, the story of America's colorful political campaigns.

Significant work has continued in the past year on thirty-two permanent and semipermanent halls, especially the Halls of Electricity, Autos and Coaches, and Iron and Steel in the History and Technology Building, the Hall of Living Things in the Natural History Building, and (editing and printing for) the National Portrait Gallery.

Air and Space exhibits, which reverted in 1969 to the Office of Exhibits Programs, have included the first Annual Aerospace Model Exhibit, with model-building demonstrations that continued through the summer; a presentation in the Arts and Industries Building of the experimental rocket plane X-15-1; and the exhibition on the Mall of the NC-4, commemorating the fiftieth anniversary of the first transatlantic flight.

Also among the exciting developments of the year have been the film and audiovisual programs, both undertaken to create more and increasingly effective communications with visitors. Under the direction of Karen Loveland, the Film Unit made eleven movies, including two for the jazz exhibit; a lively film on pottery-making that now captures the visitor's attention as he approaches the Ceramics Hall; and a movie in the Agriculture Hall that compares old and modern sawmills.

The widely ranging audiovisual supplements developed under the direction of Eugene F. Behlen have added dimensions to exhibits throughout the museums: the "Star-Spangled Banner," narrated by Archibald MacLeish; various sounds of the Smithsonian, including the 1401 steam engine, clocks and watches, tools, power machinery, and country music—all in the History and Technology Building; the elephant, whales, and porpoises, and many other sounds in the Natural History Building. Slide shows throughout the buildings now provide yet another facet to scores of exhibits. In 1969, twenty-eight new audiovisual programs have been installed.

Now in the Natural History Building and soon to be installed in the History and Technology Building is the "By-Word" audio system, which provides additional information about exhibits to visitors renting headsets. These curator-approved exhibits supplements, developed under the direction of senior museologist A. Gilbert Wright, further involve the visitor in the exhibit, often presenting unique sounds relevant to the subject as well as more detailed information than is possible in most exhibits labels.

New organizations set up within the Office of Exhibits in 1969 have included a special unit under the direction of Harry Hart to produce traveling exhibits on Negro history—exhibits intended to show the rightful role of the American Negro in the development of the nation. One such exhibit has been written by Joanne Lewis; another, now in pro-



duction, was written and designed by Larry Thomas of the Anacostia Neighborhood Museum.

Another new and vital organization, headed by Carl A. Alexander, is the training division to coordinate and conduct the many programs under which the Office of Exhibits provides instruction for visiting students, grantees, and representatives of museums around the world. Many of the trainees are young people who offer the Smithsonian fresh approaches to the avenues through which the museum can communicate with its visitors. The students themselves are thoughtful and candid, eager to pierce through the myths of traditionalism as they seek out the facts of history. For example, a group of students from Fisk University enrolled in a formal twelve-week seminar with the Office of Exhibits in the summer of 1969. They chose *Color Me Mankind* as the subject of the exhibit that they produced. It was displayed first at the Smithsonian, later at Fisk and elsewhere.

In all, 26 persons from seven states and nine foreign countries have been trained a total of 6,065 hours in 1969, trainees that include the recipient of a special nine-month fellowship granted by the National Foundation of Arts and Humanities. The exhibit of Yoruba textiles developed by this student is now in the Cultures of Africa and Asia Hall in the Natural History Building.

Participating in many of the training programs, as well as in the permanent and special exhibitions, in *By-word*, in numerous tape recordings, and in other exhibits-related material has been the Exhibits Editor's office under the direction of Mrs. Constance Minkin. The writing, editing, and typographic services of this unit in 1969 have included the production of approximately 14,000 labels, ten leaflets, brochures, and directories, and the coauthorship of a popular publication supplementary to the Philately Hall.

Also contributing to the exhibitions in both the Natural History and the History and Technology Buildings, as well as the many exhibits for other organizations in and outside the Smithsonian, have been the lighting and special-effects unit directed by Carroll B. Lusk, the freeze-dry laboratory directed by Rolland O. Hower, the sound-systems office, the horticultural section, the conservation laboratories, the plastic shops, the model shops, and the silk-screen facilities. William M. Clark, assisted by Stanley M. Santoroski, heads the production laboratory for the National Museum of History and Technology, while Frank A. Nelms, assisted by Charles W. Mickens, heads the laboratory for the Museum of Natural History.





Visitors examine old political banners assembled for *Quest for the Presidency*, a colorful exhibit that highlighted the 1968 campaign.

*Human Rights Year* (1968), a special exhibition in the Hall of Historic Americans, depicted the struggles of American women and of American Negroes in enlarging their basic human rights.



## SPECIAL EXHIBITS

## History and Technology Building

<i>Exhibit</i>	<i>Designer</i>
Quest for the Presidency	Alfred McAdams
American Folk Craft Survivals	Deborah Bretzfelder
Jet Surgery	Deborah Bretzfelder
National Portrait Gallery	Kenneth Young
Stencil Ornaments of Louis Sullivan	Jerald Shelton
Drawings by Edgar Dorsey Taylor	Deborah Bretzfelder
Malta Stamps	Deborah Bretzfelder
Patent Controversies in History of Radio	Nadya Makovenyi
Raphael Soyer's Prints	Deborah Bretzfelder
Women, Cameras, and Images I (Cunningham)	Nadya Makovenyi
Puppet Theater I and II	Terezia Takacs
Abandoned Mine Scenes	Terezia Takacs
Recent Accessions III	Deborah Bretzfelder
Memorial to General Eisenhower	Robert Widder
Music Making Country Style	William Haase
Townshend Act	Barbara Fellows
The Capitol of the Future	Richard Virgo
High School Graphics	Barbara Fellows
Inaugural Medals	Robert Widder
Art and Astronomy	Kenneth Young
Helium Centennial	Alfred McAdams
Anniversary of the Armistice	Deborah Bretzfelder
Coins and Medals of Israel	Steven Makovenyi
Reading is Fundamental	William Haase
Lilly Collection of Gold Coins	Steven Makovenyi
Lingering Shadows	Nadya Makovenyi
Commonwealth in Africa and the Caribbean	Terezia Takacs
Ginning Cotton	Jerald Shelton
Hail to the Chief	Alfred McAdams
Human Rights	William Haase
Swiss Folk Art	Barbara Fellows
West German Stamps	Terezia Takacs
Golden Spike	Kenneth Young
Coke Push	Kenneth Young

## Natural History Building

Berlandier in Texas	Joseph Shannon
Carl-Henning Pederson	James Mahoney
Birds of the Eastern Forest	William Haase
Masada	William Haase
African Interlude	James Speight

## Natural History Building—Continued

<i>Exhibit</i>	<i>Designer</i>
The Japan Expedition	Lucius Lomax
Right of Existence	James Speight
Man's New Environment	Lucius Lomax
Tibetan Carpets	Dorothy Guthrie
Daraniyagala Paintings	Lucius Lomax
Yoruba Textiles	Lucius Lomax

## Arts and Industries Building

1st Annual Aerospace Modeling	Harry Hart
X-15-1	Harry Hart
Apollo	Harry Hart
Planetary Exploration	Harry Hart
Urban Design: Manhattan, West	Richard Virgo
Concerned Photographer	James Speight
Please Be Seated	Robert Widder
Bolivia	Richard Virgo

## The Mall

NC-4, First Transatlantic Flight	Harry Hart
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## Anacostia Neighborhood Museum

The History of Jazz	Kenneth Young
16 Washington Artists	Larry Thomas and James Mayo
Sage of Anacostia	Larry Thomas and James Mayo
All "27" of Me	Larry Thomas and James Mayo

## Other

FBI Block (shown at D.C. National Bank)	Deborah Bretzfelder
Chesapeake Bay Project (traveling)	Morris Pearson
History of Photography (traveling)	Steven Makovenyi
Printing of the Past (shown at National Press Building, District of Columbia)	Deborah Bretzfelder

National Portrait Gallery  
(editing and printing)

This New Man
Longacre Engravings

Smithsonian Institution Traveling Exhibition Service  
(editing and printing)

The American Landscape—A Living Tradition  
Stitching  
Marine Combat Art—Viet Nam  
Hans Christian Andersen  
Discovering Color In Nature  
Japanese Dolls  
Colors and Patterns in the Animal Kingdom  
Paul Feeley: Watercolors and Drawings  
The Paintings and Drawings of Justin Daraniyagala  
UNESCO Reproductions of Paintings From 1900 to 1925  
Handicrafts of the Southeast  
The Color of Man  
German Posters  
Radius 5  
John Held Jr.: "The Roaring Twenties"  
Polish Children and UNICEF  
Toledo Glass National II  
Polynesian Art  
Silent Cities: Mexico and the Maya  
Easter Island  
Carl-Henning Pedersen  
Recent Graphics from Prague  
Preservation of Abu-Simbel  
Photo Graphics  
View from Space  
Moppets and the Moon  
Recent British Prints  
Stage Design by Stewart Chaney  
Embroideries by Children of Chijmaya  
Southern Sculpture '67  
Visual Arts and the Deaf  
Yugoslav Naïve Paintings and Sculpture  
Georgian Country Houses  
Icon-Idea

PERMANENT EXHIBITIONS IN PROGRESS

History and Technology Building

*Exhibit*

Graphic Arts  
Foucault Pendulum  
Petroleum  
Philately  
Electricity  
Merchant Shipping

*Designer*

Alfred McAdams  
Jerald Shelton  
Alfred McAdams  
John Clendening  
Nadya Makovenyi  
Steven Makovenyi and  
Barbara Fellows

## History and Technology Building—Continued

<i>Exhibit</i>	<i>Designer</i>
Physical Sciences	John Clendening and Kenneth Young
Armed Forces	John Clendening
Agriculture	Alfred McAdams
Everyday Life in the American Past	Deborah Bretzfelder
Autos and Coaches	John Clendening
Light Machinery	Jerald Shelton
Growth of the United States	Deborah Bretzfelder
First Ladies	Deborah Bretzfelder
Medical Sciences	Deborah Bretzfelder
Ceramics	Robert Widder
Doll House	Nadya Makovenyi
Nuclear Energy	Alfred McAdams
Musical Instruments	Richard Virgo
Railroads	Kenneth Young

## Natural History Building

Hall of Living Things	Joseph Shannon
Cultures of Africa and Asia	Lucius Lomax
Life in the Sea	Lucius Lomax
Comparative Osteology	Morris Pearson
Physical Geology	Dorothy Guthrie
Paleontology	Lucius Lomax
Meteorites	Dorothy Guthrie
Physical Anthropology	Joseph Shannon
Gems	Dorothy Guthrie
Elephant	Morris Pearson

## National Portrait Gallery

(editing and printing)

The Presidents  
"Permanent Exhibitions"

## National Air and Space Museum

Various Harry Hart

## AUDIOVISUAL INSTALLATIONS

## History and Technology Building

Women, Cameras, and Images (Cunningham)  
Music Making Country Style  
Quest for the Presidency  
Sounds of the Clocks, *Light Machinery* hall  
Ipswich House, *Growth of the United States* hall



AUDIOVISUAL INSTALLATIONS—Continued  
History and Technology Building—Continued

Stereophonic Chairs, *Musical Instruments* hall  
Slide Presentation, *Musical Instruments* hall  
Kerr-McGee Drilling Rig, *Petroleum* hall  
Pottery Making, *Ceramics* hall  
Hail to the Chief  
Political Parade, *Hall of Historic Americans*  
Machine Shop, *Tool* hall  
Sawmills, *Farm Machinery* hall

Natural History Building

Whale and Porpoise Sounds, *Life in the Sea* hall  
The Japan Expedition  
Foyer  
Tibetan Rugs  
Right of Existence  
Masada  
African Interlude  
Volcano, *Physical Geology* hall

Arts and Industries

Photography and the City  
Museum Shops  
Bolivia  
Urban Design

Anacostia Neighborhood Museum

Making of a Museum  
The History of Jazz  
Sage of Anacostia

Other

The History of Jazz, *Corcoran Gallery Dupont Center*

EXHIBITS FILMS

<i>Film</i>	<i>Installation or Purpose</i>
Pottery Making	Ceramics Hall
Jazz (two films)	The History of Jazz
Nehru	Presented to Mrs. Nehru
The Stamp Engraver as an Artist	Philately Hall
Endangered Species	Right of Existence
Volcanoes	Physical Geology
Docents	Produced for Office of Academic Programs
Organic Forms	Produced for Office of Academic Programs
Sawmill	Agriculture Hall
Moppets in Space	Children's Film
Hail to the Chief	(Editing of Presidential Films)

# Conservation-Analytical Laboratory

ROBERT M. ORGAN, *Chief*

THE EXTREMELY VARIED ACTIVITIES of the laboratory staff fall, of course, into the two principal categories of conservation and analysis.

Analytical work requested by curators for use in their own research and publications has continued steadily.

The analytical methods in use are kept under review. At present, using available instruments, a method of quantitative analysis by x-ray fluorescence spectrometry is being developed that holds promise of being more generally satisfactory for museum needs than others that adequately serve industry.

Analytical facilities are being extended into neutron-activation analysis, making use of the atomic pile at the National Bureau of Standards. Papers have been published already on the use of this method to distinguish among excavated pots of the American colonial period those that were imported from England. Expansion of this work into studies of ancient glass is projected.

Another project, carried out by a summer interne, has involved analysis by infrared spectrophotometry of samples of a blue Mayan pigment with the object of discovering its relationship to a blue pigment currently made and used by the Seri-Indians. This work has been part of a larger project, still incomplete, aimed at identifying the coloring factor in Maya Blue.

About fifteen requisitions have given rise to more than eighty analyses of various degrees of complexity, ranging from spectrographic estimations (e.g., Oriental bronze and Peruvian silver) of forty elements at a precision of  $\pm 50$  percent of the quantity found to the simple identification of crystalline substances (e.g., pigments from paintings, corrosion crusts found on objects from underwater).

The problem of proper conservation of the millions of objects within the Smithsonian collections is immense and fragmented.

In general, the Conservation-Analytical Laboratory has sought to keep itself widely and well informed about sources of deterioration and to convey relevant information, analytical data, and, in emergency, even



Oval daguerrotype photograph (about 15 inches high) of former President Lyndon Johnson as a small boy aged four. As received (left), varnish and photographic emulsion scarred and chipped and the paper gouged, also marked with crayon. After treatment (right), damaged varnish removed manually with precision scalpel, gouged areas filled with paper pulp and inpainted. Final spraying with nonyellowing synthetic varnish.

physical assistance to those individuals throughout the Smithsonian who become involved in the handling, care, or use of objects. At present, only two of its eight-member staff can specialize in practical problems of conservation. It is hoped that recruitment during the next year will enable greater assistance to be provided. A realistic attempt, however, to deal economically with the colossal problem of conservation in the Smithsonian Institution will involve effective integration of activities and of facilities that at present are scattered. In addition, investment in an adequate engineering plant and in fumigation equipment is needed to control specific and major sources of deterioration.

Practical activities directed toward conservation of the collections have assumed various forms.

There has been continuous discussion and evaluation of conservation problems that will be encountered later; for example, in the preparation of exhibitions and during the raising of the USS *Tecumseh*.

A series of weekly lectures over a period of six months explaining the chemistry underlying both deterioration and many procedures for conservation has been attended regularly by almost sixty persons who work with museum objects.

During the year a research associate has worked with the Laboratory on problems of conservation in the course of obtaining a master's degree from New York University.

Surveillance of the conditions of relative humidity and temperature found in the galleries has continued since control of environment is less expensive and less destructive than repeated restoration of objects.

Assistance has been given to the Office of Exhibits by testing materials used in display cases for compatibility with the objects to be displayed. Unsatisfactory woodwork and paints have been detected, and materials to counteract tarnishing have been suggested and provided without delay to construction. In preparation for other exhibits, tests have been made of the paper, synthetics, textiles, plastic foils, and adhesives that have been proposed for prolonged contact with graphic art and other objects.

The early part of the year was devoted to completing the reconstruction and reorganization of the laboratory space. Streamlining of space and procedures has improved productivity. During the more productive part of the year, nearly eighty requisitions have been completed involving 200 objects received from twenty-seven sources within eight museums of the Smithsonian.

Advice on conservation has been given by letter (approximately 250 typed pages) and by telephone (at least 150 calls) to other museums and to members of the public.

Actual treatment has been given to 120 objects; another 150 have been examined and treatment prescribed. The majority of these objects have consisted of graphic art on paper, but silver coins, a brass gong, a leather bookbinding, and a limestone bust were treated. About forty objects and one hundred requisitions are still in hand awaiting early attention.

Professional contacts have been maintained by activities in support of the Committee for Conservation of the International Council for Museums.

### *Staff Publications and Papers*

Olin, J. S., M. E. Salmon, and C. H. Olin. "Investigations of Historical Objects Utilizing Spectroscopy and Other Optical Methods." *Journal of Applied Optics* (January 1969), volume 8, number 1.

Olin, J. S., and E. V. Sayre. *The Analysis of English and American Pottery of the American Colonial Period*. Publication 12719. Brookhaven National Laboratory, 1968.

- . "Compositional Categories of Some English and American Pottery of the American Colonial Period." *Proceedings of American Chemical Society Symposium on Archaeological Chemistry* [in press].
- Organ, R. M. *Design for Scientific Conservation of Antiquities*. xi+497 pages, 230 figures, 27 tables. Washington, D.C.: Smithsonian Institution Press; London: Butterworths, 1969.
- . "Humidification of Galleries for a Temporary Exhibition." In *Museum Climatology*, G. Thomson, editor, IIC, 1968.
- . "Conservation of Ancient Bronzes." In *A Symposium on Classical Bronzes*. Cambridge, Massachusetts: Fogg Art Museum, M.I.T. Press [in press].
- Salmon, M. E. "An Improved Method of X-ray Fluorescence Analysis for Museum Objects." Annual Meeting of International Institute for Conservation—American Group, Los Angeles, 1969.



## Office of the Registrar

HELENA M. WEISS, *Registrar*

THE OFFICE OF THE REGISTRAR passed a major milestone this year when the Office, with the exception of the shipping and mail sections, was moved from the Natural History Building to the Arts and Industries Building. The smooth transition was made possible by the excellent cooperation of the Buildings Management Department and the director of the National Museum of Natural History. Activities have remained the same but have been characterized by a greater volume in most areas. Responsive to new and energetic programs and continuing public interest in the Smithsonian, this volume of activity has continued to increase. During the year, mail service has been extended to the Anacostia Neighborhood Museum and to the units of the Smithsonian located in the Pension Building. The eighty-ton Alexander Calder sculpture *Gwenfritz* and, by way of contrast, several shipments of delicate animal brains for special study have been entered through United States Customs. Official travel documents have been obtained for 291 travelers to foreign countries.

An average of more than 5,000 inquiry letters has been received monthly, of which a good percentage has been channeled for reply through this office. Items appearing in the press or on the air are reflected immediately. For example, a popular television show asked its viewers to look around their homes for items of value and to write to the Smithsonian Institution for more information, a suggestion that piqued the imagination of scores of correspondents. The Department of Civil History has been the recipient of the largest number of such letters referred for reply, with First Ladies' gowns, Stradivarius violins, and coins remaining the most popular subjects for inquiry.

The number of accessions to the collections in the National Museum of History and Technology have continued to show a leveling off, following the peak years of the museum's transition to its new building. Acquisitions for collections of the National Museum of Natural History also seem to have tapered off. In addition to staff scientists and research aides conducting research in the records, scholars from widely scattered parts of the world have come to study methods of accessioning and rec-



U.S. Customs inspection of ethnological items imported from Pakistan. Customs inspector Abraham F. Binder (center) and museum staff members are shown.

Transportation specialist Gleason R. Shaver and shipping clerk Roland D. Watson surrounded by outgoing shipments.



ord keeping and to search the early files. Among the visitors have been Dr. Sampurno Kadarsan, Bogor Museum, Indonesia; Dr. P. H. D. H. de Silva, Director of National Museums, Colombo, Ceylon; Mr. A. G. K. Menon, Calcutta, India; Mr. Wayne Davis, University of British Columbia; and Mr. Martin Murphy, University of New Mexico.

Customs work for the office has been marked by two important changes. The United States Customs facility at the National Airport has been closed, its function shifted to Dulles International Airport, and the Washington Customs office has been elevated in status from that of a port to a district. Our relations remain good after this administrative change, and the transition to Dulles has been smooth although the location is less convenient. All but 23 of the 135 customs entries filed during the year have been for air shipments.

The central shipping office with its two branches has maintained an efficient service in effectively moving a diversity of museum objects.

### Shipping Office Activity

<i>Shipments (surface and air)</i>	<i>Pieces</i>	<i>Pounds</i>
Incoming		
Freight	11, 309	851, 470
Express	875	43, 119
Outgoing		
Freight	1, 374	327, 972
Express	628	44, 620
Parcel Post	6, 700	224, 997



## Traveling Exhibition Service

MRS. DOROTHY VAN ARSDALE, *Chief*

THE SMITHSONIAN INSTITUTION TRAVELING EXHIBITION SERVICE completed its 18th year in 1969. Despite one staff member less than last year, SITES has continued to expand its offerings to the 112 shows listed in its 1969-1970 catalog, plus an additional list of 14 in process of negotiation.

With the closing of one major traveling exhibition service and curtailment of another, SITES is challenged to expand its role in supplying museums of all sizes and character and other educational institutions and facilities with a broad range of exhibitions in all budget categories.

SITES is slowly increasing its roster of science and history exhibitions and is pleased to take over for tour many exhibitions organized by Smithsonian museums for their own programs. Among these are *Jean Louis Berlandier, Photography and the City*, and, later, *The Endangered Species*. SITES is happy also to cooperate with the Anacostia Museum in planning to circulate *The Sage of Anacostia*. Another Smithsonian Exhibit will be *World War I*, posters from the Department of Graphic Arts of the National Museum of History and Technology.

In turn, many of SITES' exhibitions have opened at the Smithsonian. Among these are *Paintings and Drawings of Justin Daraniyagala, Tibetan Carpets, Paintings by Carl-Henning Pedersen, The Stencil Ornaments of Louis Sullivan, Urban Design Manhattan, The Concerned Photographer*, and *Swiss Folk Art*.

This year SITES has tried a new venture, an exhibition of paintings by deaf children entitled *Shout in Silence - Visual Arts and the Deaf*. Many bookings have been made, clearly indicating an interest in work by the physically handicapped.

SITES continues to counsel community colleges, libraries, art councils, and various institutions regarding circulating exhibitions, and also to provide the material. SITES has been visited by many museum directors seeking advice as well as our traveling exhibitions. Advice has been given on various subjects from budgeting to box building.

SITES is continuing its cooperation with the Department of State and has been written into the Cultural Exchange Agreement between the





Smithsonian Secretary Ripley and Ceylonese Ambassador Oliver Weerasinghe at the opening of *Paintings and Drawings of Justin Daraniyagala*, held at the National Museum of Natural History.

United States and Romania. The third exhibition of five proposed Yugoslav exhibitions, *Yugoslav Naive Paintings and Sculpture*, is ready for tour.

In July of 1968, SITES' chief and the program assistant previewed the exhibition *Swiss Folk Art* in Basle, Switzerland. This major exhibition is currently touring the United States after a June opening at the Smithsonian.

An example of SITES' successful collaboration with the National Gallery of Art is the tour of *Physics and Paintings*, which ended in April 1969. This exhibition, prepared by Grose Evans, shows how the theories of Plato, Galileo, Newton, Einstein, and other thinkers are reflected by Duccio, Raphael, El Greco, Picasso, and other artists. The exhibition was booked in sixty-one institutions between October 1961 and April 1969. This represents a tour of twenty-six states from Maine to California, and also Canada. An estimated quarter of a million people have viewed this exhibition and have read the title panel: "Circulated by the Smithsonian Institution." If this figure were projected for just one hundred other exhibitions, SITES would have a viewing audience of about three and a half million people a year. Actually, the figure is much greater than this since *Physics and Paintings* was a low-key, inexpensive, educational exhibit and SITES' annual budget has not averaged \$200,000 for these years; therefore, on the basis of this conservative figure the show costs five cents or less for each viewer. It should be pointed out further that SITES' budget is 100 percent recoverable.

SITES has produced several noteworthy catalogs: *Swiss Folk Art*, *Carl-Henning Pedersen*, *The Art of John Held*, *Paul Feeley*, and *Venetian Bronzes*. Several leaflets also have also been printed.

Mrs. Van Arsdale has been a guest at many of the monthly meetings of the cultural attachés and has given a talk on SITES to a monthly meeting of the counselors. She has attended openings in Philadelphia, New York, Pittsburgh, and Toronto, has appeared on Danish television in connection with the exhibit *140 Years of Danish Glass*, and she has recorded a program for "Capital Assignments" on the Mutual network.

SITES could not function in its present capacity without the help of the embassies, more specifically the cultural, press, and information officers, our own Department of State, NASA, UNESCO, UNICEF, the Library of Congress, and various Smithsonian bureaus.

SITES continues to arrange exhibitions of foreign material, and new ones include shows from Switzerland, Denmark, Italy, Nepal, Yugoslavia, Ceylon, Great Britain, Czechoslovakia, Mexico, and Belgium.

Carried over from prior years have been 75 exhibitions: 34 have been initiated and 26 have been dispersed. The 1969-1970 catalog, published June 1969, lists 126 exhibitions.

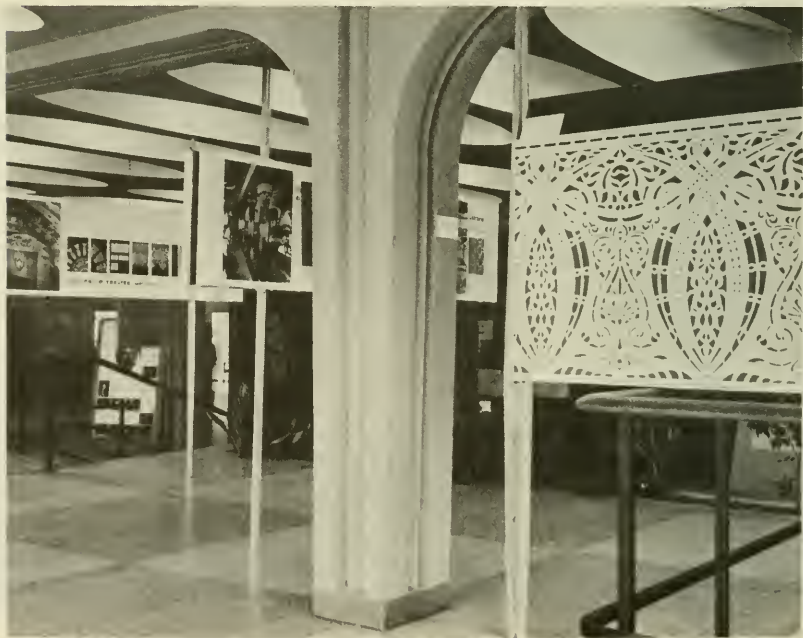
***Paintings by Carl-Henning Pedersen opening at the National Museum  
of Natural History.***





*Recent British Prints: 15 Artists*, installation photograph at IBM Gallery, New York City.

*The Stencil Ornaments of Louis Sullivan*, installation photograph at Dartmouth College, Hanover, New Hampshire.



## EXHIBITIONS INITIATED IN 1969

## Painting and Sculpture

John E. Costigan  
Paintings and Drawings of Justin Daraniyagala  
Paul Feeley  
Paintings of Carl-Henning Pedersen  
Venetian Bronzes

## Drawings and Prints

Recent British Prints  
The Art of John Held, Jr.  
Recent Graphics from Prague

## Architecture

Urban Design—Manhattan

## Design and Crafts

Stage Designs by Stuart Chaney  
Japanese Dolls  
Mexican Folk Art  
Polish Children to UNICEF  
People Figures  
Handicrafts of the Southeast  
Stitching  
Swiss Folk Art  
Tibetan Carpets  
Plastic as Plastic

## History

Eastern Island  
Artist in Vietnam

## Children's Art

Children and Animals  
Moppets and the Moon  
Shout in Silence

## Natural History and Science

Computer Technology  
John Desatoff

## Photography

Color of Man  
The Concerned Photographer  
Discovering Color in Nature  
Photographie  
Polynesian Art  
Silent Cities  
View from Space

## Reproductions

UNESCO Reproductions of Paintings from 1900-1925

## EXHIBITIONS CONTINUED FROM PRIOR YEARS

## 1967-1968

The American Landscape: A Living Tradition  
Eyewitness to Space (II)  
Contemporary Art of India and Iran  
Isleta Pueblo Paintings  
Radius 5  
Antique Maps  
Cross-Section of Contemporary Graphics—American, European, and Japanese  
Finnish Graphics Today  
Master Prints of the Fifteenth and Sixteenth Centuries  
Contemporary Mexican Prints  
Ornamental Pen Drawings  
The Grand Design  
Ten Italian Architects  
The Stencil Ornaments of Louis Sullivan  
140 Years of Danish Glass  
Wood Turnings from India  
Kaleidoscope Orissa  
Folk Art from India  
Popular Art from Peru  
Yugoslavian Tapestries  
The Carvings of Sanchi  
Paintings by Children of Many Lands (II)  
Tunisian Children's Art  
Transformation of Space  
Australia: The Sunburnt Country  
Laos: The Land and the People

## 1966-1967

Islamic Art from the Collection of Edwin Binney 3rd  
Graphic Art from Yugoslavia  
Albers: Interaction of Color  
Cape Dorset  
The Arts of an Eskimo Community  
German Posters  
Victorian Needlework  
Color and Light in Painting  
The People's Choice  
Les Enfants de Paris  
Paintings by Children of Many Lands (I)  
Things and Other Things  
Tokyo Children Look at the Olympic Games



Animal Behavior  
Minerals Magnified (2)  
Prehistoric Paintings of France and Spain

## 1965-1966

Eyewitness to Space (I)  
Action Reaction  
Polish Graphic Art  
Six Danish Graphic Artists  
Early Chicago Architecture  
Folk Toys from Japan  
Jazz Posters  
Posters from Denmark  
Danish Children Illustrate Hans Christian Andersen  
Embroideries by Children of Chijmaya  
Museum Impressions  
The Preservation of Abu Simbel  
New Names in Latin American Art

## 1964-1965

Bridges, Tunnels, and Waterworks  
Eskimo Graphic Art (III)  
Pier Luigi Nervi  
American Costumes  
American Furniture  
Colors and Patterns in the Animal Kingdom  
The Stonecrop Family: Variations on a Pattern

## 1963-1964

Alvar Aalto  
Birds of Asia  
Religious Themes by Old Masters (I and II)  
Eero Saarinen  
Swiss Posters

## 1962-1963

Craftsmen of the City  
Paintings by Young Africans  
UNESCO Watercolor Reproductions  
Contemporary Italian Drawings  
The Face of Vietnam  
Le Corbusier  
Robert Capa: Images of War



PUBLIC SERVICE AND  
INFORMATION ACTIVITIES

WILLIAM W. WARNER

*Assistant Secretary*



## Smithsonian Associates

LISA SUTER, *Program Director*

IT IS PLEASANT TO GLANCE BACK at the achievements of the Smithsonian Associates during its third remarkable year. Membership has surged to 9,200 individuals and families. Activities have radiated in all directions, have been refined and retouched until they bear their present distinctive imprint. The kaleidoscope of programs has added up to something far-reaching and conveys the excitement and special character by which the Institution is known.

Many speakers are remembered with admiration. The *Creative Persons* series has presented poet Carolyn Kizer, composer David Amram, photographer Cornell Capa, decorator John Greer, and designers Jack Lenor Larsen and David Rowland. Challenging and enlightening lectures on *Our Dynamic Earth* have been given by scientists who investigate earthquakes, volcanic eruptions, flying objects, oil spills, and other short-lived phenomena as they occur.

Associates' classes have provided a stimulating and noncompetitive environment for students of all ages. More than 150 courses have been offered in over 50 subject areas: art, architecture, archeology, anthropology, interior and urban design, history, literature and aesthetics, antiques, drama, cinema, astronomy, space science, ecology, paleontology, oceanography, mineralogy, and zoology. In addition there have been human awareness workshops dealing with perception, sensitivity and creativity; laboratory courses in the earth and life sciences; and studio courses in drawing and design, mixed media, filmmaking, and photography.

A new degree of interest also has been shown in *Ancient Crafts Revived*, workshops in batik, weaving, mosaic, stained glass, bookbinding, marble-and-paste papers, cloisonné, enamel, plique-à-jour, decoupage, and tole, all of which have been virtually oversubscribed. Instruction has been added in crafts that have special appeal for the young: papier maché, puppet making, paper weaving, enamel, wire sculpture, and Egyptian paste.

Groups of associates have studied in unusual and far-off places. Smithsonian curators have conducted walking tours of Washington, visits to



Dr. Mason Hale from the Department of Botany teaches a young scholarship girl how to examine specimens under the microscope. This course is one of many given on a variety of subjects for young Associates and scholarship children from local schools.



museums, historic houses, and private collections in New York, Boston, Providence, Newport, Winston-Salem, Charlottesville, Princeton, Philadelphia, Baltimore, Annapolis, Williamsburg, and Winterthur, as well as research expeditions to eastern and northern Appalachia, Vermont, and Maine. The Ladies Committee has sponsored study trips to South America and the Caribbean.

Field trips have continued to provide adventures and fun within the reach of everyone. Spring and fall wildflower forays have been added to the ever-popular mushroom, mineral, and fossil hunts, shore and forest strolls, bird, bee, and botany walks. Industrial archeology buffs have been offered trips to old railroad yards, factories, foundries, and mills.

The Smithsonian has become a showcase for new and experimental films. The Associates' *Film and Producer* series has continued with absorbing showings and discussions by James Blue, Charles Guggenheim, Paul Ronder, Arthur Barron, Richard Leacock, and Frances Flaherty. In January 1969 Henri Langlois' rare evening of 19th-century Lumière films added special sparkle to the program.

Another memorable event was the New York Chamber Soloists' performance on 6 May 1969 of *Music from the Court of the Sun King, Louis XIV*, enhanced with recitations from Molière, Racine, and La Fontaine by Madeleine Renaud and Jean-Louis Barrault. An altogether delightful and amusing *Evening of Mini Operas* on 10 June ranged from Donizetti's *Rita* to contemporary pieces written expressly for the



The *Ancient Crafts Revived* series runs throughout the year. Here is a participant in the batik workshop, which is held out of doors and has been repeated many times.

Field trips are held in the spring and fall and cover a variety of walks. Above, families search for fossils.



occasion. The Capitol Ballet Company's performances of Stravinsky's *Ebony Concerto* and a jazz ballet by Lloyd McNeill on 27 June were splendid, as was the folk music of The Young Tradition and The Blue Nile Group.

Enraptured young audiences have been introduced to the *Magic of the Theatre* through modern and classical dance recitals, films, improvisational drama, woodwind, brass, and string concerts, poetry readings and scenes from selected operas, puppet, and light shows. Through *Perceptions* the Associates have brought to adult audiences boldly experimental performances by the American Place Theatre, Meredith Monk, Alwin Nikolais, and others pioneering advances in modern theater.

For diversion and fun, on 16 December 1968 members brought instruments and joined in a musical event to honor Beethoven. On 15 October Associates activated the machines in an *Electronic Environment* created by Juan Downey and on 6 December participated in *Communication* and *Symbols*. Earlier shows (16–17 August) were *Integrated Mixed Media Science* and other *Happenings and Events*.

The hospitality of the Smithsonian has been enjoyed at the grand opening of the new National Portrait Gallery and at numerous previews of exhibitions. In light and charming biweekly luncheon talks, staff curators have given hints on collecting paintings, sculpture, prints, drawings, ceramics, glass, and furniture. The annual benefit for the scholarship fund, the gala premiere of *Star!* in November 1968 was preceded by Donald Brook's showing of the costumes he designed for the film. The *Kite Carnival*, *Zoo Night*, *Sketch-ins at the Zoo*, *Morning Talks*, and other experimental programs for children have been repeated for the third year by popular request.

Mrs. Lisa Suter has resigned as program director. She was replaced by Mrs. Susan Hamilton on 1 July 1969. Mr. Marlin Johnson has been appointed to the newly created position of program manager.

The Smithsonian Associates has survived its infancy and begun to flower. It is clear that its force is strongly felt in the community and that its impact is spreading.

### *Smithsonian Associates Membership*

Our deepest gratitude is extended to our more than 8,500 members for their interest and generous support of the Smithsonian Associates this year, and especially to those listed below, who have contributed amounts in excess of the membership dues.

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## Office of Public Affairs

FREDERIC M. PHILIPS, *Director*

OFFICE OF PUBLIC AFFAIRS activities have ranged this year from producing a prize-winning motion picture to issuing a major new publication, from a family of dinosaurs to a Christmas calendar, from establishment of a nationwide educational radio service to the inaugural ball.

These were some of the bubbles in the champagne of another busy year for an office broadly responsible for serving visitors to the Smithsonian and the public at large in the areas of public communication and public activities—including special events, visitor orientation, public inquiries, automatic telephone information services, communications media and community relations, audio-visual services, motion pictures, and publications.

*Festival in Washington*, first production of the newly established Smithsonian Institution Motion Picture Unit, has received the Golden Eagle Award from the Council on International Non-theatrical Events (CINE) and has been shown at film festivals in the United States and overseas. The film documents, colorfully and musically, the Smithsonian's second annual Festival of American Folklife. Early in the year the motion picture unit became a component of the office through contract with Eli Productions, Washington, D.C., to produce documentary films for public television and other distribution. The unit also has produced a documentary on the Anacostia Neighborhood Museum, *A Short Bus Ride*, which was well received when shown on public television and elsewhere. It was engaged at year's end in the first of a proposed series of monthly science reports.

*Radio Smithsonian* is another new departure. The primary product of this educational radio service is a half-hour weekly radio program designed to cover the full spectrum of Smithsonian disciplines in the arts, sciences, and history through discussions, interviews, music, reports on research findings or major events, book reviews, lectures, and other elements that grow naturally out of Institution collections and activities. Fred M. Gray, previously a broadcaster on a Washington station, has joined the staff to provide the required technical and production expertise. Following initiation of this service with short taped segments made

available to a number of stations, the weekly program was broadcast in Washington commencing early in the summer of 1969, and will be distributed to some 150 educational radio stations throughout the country. For the second year, as well, the concert series *Music at the Smithsonian*—a series of nine 90-minute programs—has been broadcast on educational radio in Washington. In addition to these regular programs, plans also have called for making materials in specific subject areas available with the cooperation of curators and other scholars. Establishment of this radio service has marked, in effect, the Smithsonian's return to regular radio programming since conclusion of the popular science series *The World Is Yours*, in the early 1940s after several years of weekly broadcasts in the Washington area.

*Increase and Diffusion* is the title of a comprehensive and definitive introduction to the Smithsonian Institution—history, components, programs, and activities—prepared by members of the office with Benjamin P. Ruhe of the news staff as compiler and Jewell B. Dulaney, administrative officer, as production director. The bureaus and offices of the Institution have cooperated closely in bringing together material for this publication to serve the general public, members of the many specialized communities in the United States and overseas whose concerns bring them into contact with the Smithsonian, and the communications media. This publication became available in limited numbers late in the winter of 1968. A second edition, with some revisions and modifications, is scheduled for publication in the coming year. *Increase and Diffusion*, which incorporates material from *The Smithsonian Institution* of 1959, now out of print, will be published in updated and revised editions in future years.

The cover page of a striking wall calendar for 1969, mailed across the nation and overseas at Christmas of 1968, contains a longer version of James Smithson's familiar quotation: "An Establishment For The Increase and Diffusion of Knowledge Among Men." Prepared through the generosity of the Scott Paper Company, with the participation of a number of staff members, the outsize calendar presents superb, full-color photographs of objects in the collections of the various bureaus along with a text that itself provides a short introduction to the Institution. When distributed in the limited numbers available to friends of the Smithsonian, beginning with the President of the United States and with the Duke of Northumberland, the calendars drew such interest that an effort has been mounted to secure a sponsor for subsequent years. The aim is an annual project that brings a high level of artistic talent to bear on significant objects in the collections. The results hopefully will be of value far beyond the conclusion of each twelve-month period.

Shortly after Christmas 1968, a significant event took place in Washington—the inauguration of President Richard M. Nixon. The Smithsonian was invited to hold an inaugural ball in its newest building, the National Museum of History and Technology. Meredith Johnson, chief of the Office’s special events branch, played a major role in overseeing the extensive arrangements required to accommodate the President and his party and many thousands of persons including officials and members of the diplomatic corps. Also, as part of the inaugural celebrations, the Smithsonian was host in the same Museum to a reception honoring Vice President Spiro T. Agnew and to another reception following the inaugural concert, of which Secretary Ripley was vice-chairman. These are three of some six hundred occasions through the year in which the Office has played a principal part, from meetings and lectures to the opening of the National Portrait Gallery, groundbreaking for the Joseph H. Hirshhorn Museum and Sculpture Garden, and the Smithsonian’s third international symposium.

And the family of dinosaurs? They were built for the Sinclair Oil Company for the New York World’s Fair of 1965, toured the country thereafter, and this year were turned over to the Office of Public Affairs. Arrangements have been made in cooperation with the National Zoological Park and the National Museum of Natural History to place the nine authentically designed fiberglass dinosaurs on display at the zoo after completion of an appropriate landscape design.

*News Releases Issued*

128 Works Displayed by Alexander Archipenko	4-7-68
Friday Series of Free Outdoor Films Instituted	8-7-68
12 Art Exhibitions Through 1969 at NCFA	8-7-68
Townshend Acts Bicentennial Commemorated	8-7-68
Sales Shop Opens in Arts and Industries Building	11-7-68
Last of Navy’s Flying Boats Given to Smithsonian	11-7-68
Performance Workshop by Washington Dance Theater	16-7-68
National Portrait Gallery Presents Historic Faces of America	17-7-68
Dejan’s Olympia Brass Band Performs at Smithsonian	18-7-68
John Paul Jones Letter Given to Smithsonian	25-7-68
Cooper-Hewitt Curator of Drawings and Prints Named	30-7-68
Smithsonian To Exhibit Newberger Art Collection	30-7-68
Smithsonian To Show “Music Making-Country Style”	31-7-68
Wood Sculpture Exhibit To Open at Smithsonian	1-8-68
Exhibition Traces “The Quest of the Presidency”	1-8-68
Smithsonian To Show Industrial Art Exhibit	1-8-68
Smithsonian Given Grant’s Carriage	8-8-68
Drum To Lecture on Science and Involvement	12-8-68
Smithsonian Associates Offer Compositions by Humphrey Evans	12-8-68



Jet-Age Surgical Instruments Go On Display	13-8-68
Afro-American Dance Group Performs on Mall	15-8-68
Center for Short-Lived Phenomena Established	15-8-68
Smithsonian To Exhibit Photos by Cunningham	15-8-68
Smithsonian To Present Dutch Puppet Theater	16-8-68
"Cars of America-Tomorrow" Presented by Smithsonian, DOT	20-8-68
First Hammond Electric Organ Given to Smithsonian	20-8-68
Smithsonian Puppet Theatre Scheduled	21-8-68
Presidential Portraits for NPG Opening Exhibition	22-8-68
Smithsonian, DOT Auto Festival Stresses Safety, Not Style	27-8-68
NPG Will Present Historic Faces of America	28-8-68
Background of National Portrait Gallery	28-8-68
Interior Decorator Addresses Smithsonian Associates	28-8-68
Junked Car Sculpture Added to Auto Festival	30-8-68
Rarely Seen Philatelic Items Shown at APS Meeting	3-9-68
Smithsonian Associates Offer Fall Courses for Adults, Youths	9-9-68
Seminar Considers New Approach To Urban Planning	9-9-68
NPG Features Distinguished Presidential Collection	11-9-68
Stamps of Malta Shown in Smithsonian Exhibit	12-9-68
Guest Artists Demonstrate Traditional Puppetry of India	13-9-68
Sheeler Retrospective Presented at NCFA	16-9-68
WPA Prints Go On Display at NCFA	18-9-68
Philately Display To Be Sent to National Stamp Show	18-9-68
United States Scientists Report on Costa Rica Volcano	18-9-68
Perry's Voyage to Japan Commemorated by Smithsonian	20-9-68
Library, Portrait Inventory Make NPG Major Reference Center	23-9-68
NPG Promises Surprises in Opening Exhibit	23-9-68
Gallery's Home Comes Naturally By Its Role	24-9-68
Smithsonian To Participate in Mexico Olympic Program	25-9-68
Smithsonian Sets Mexican Crafts and Arts Exhibit	25-9-68
National Collection of Fine Arts To Offer Free Film Theater	26-9-68
Assistant Director Named for National Collection of Fine Arts	26-9-68
Scholars Discuss The American Character at NPG Symposium	30-9-68
Official Washington Will Dedicate National Portrait Gallery	30-9-68
National Portrait Gallery: Staff Biographies	30-9-68
Smithsonian Philatelic Show To Be Exhibited in Mexico City	3-10-68
Smithsonian To Get Rare Edition of Breeches Bible	7-10-68
"Reading Is Fun-damental" Program Launched at Smithsonian	8-10-68
Theatre Festival To Introduce New Mall Tent Design	11-10-68
Most Museums To Be Closed Mondays	14-10-68
Special Smithsonian Exhibit Shows Children's Space Art	17-10-68
Apollo Lunar Program Traced in Smithsonian Exhibition	17-10-68
Poetry Reading Scheduled for Smithsonian Associates	17-10-68
Gustav Leonhardt To Open Smithsonian Concert Season	17-10-68
Architect Angelos Demetriou Addresses Smithsonian Associates	21-10-68
Freer Gallery of Art Shows Special Oriental Portraiture	21-10-68
"Star!" Premiere To Benefit Associates Scholarship Fund	22-10-68
Luncheon Talks Scheduled for Smithsonian Associates	22-10-68
Smithsonian To Exhibit 4000-year Evolution of the Chair	28-10-68
Chief Joseph Stamp Honoring NPG Will Be Issued	28-10-68
Museum Shops To Show American Printmakers	29-10-68

Judd and Detweiler Gives Smithsonian 1879 Hoe Press	29-10-68
Smithsonian Will Exhibit Prints By Raphael Soyér	1-11-68
Mrs. Lyndon Johnson Donates Inaugural Gown to Smithsonian	13-11-68
Cooper-Hewitt Museum Exhibiting 200 Recent Acquisitions	14-11-68
Special Exhibition Presents Art and Culture of Bolivia	14-11-68
S. Dillon Ripley To Open National Zoo Lecture Series	19-11-68
"This Thing Called Jazz" Presented at Anacostia Museum	27-11-68
United States Art from 34th Venice Biennale To Be Exhibited	2-12-68
"Perceptions" Series of Creative Theatre, Dance & Music	5-12-68
Emily Hahn To Lecture on "The Animals We Keep"	5-12-68
Human Rights Struggle Traced in Smithsonian Show	6-12-68
Major Exhibition To Trace Endangered Species	9-12-68
Scientists Will Use Deep-Sea Habitat for Research	10-12-68
Puerto Rican Bank Gives Bust of Robert Frost to NPG	16-12-68
Graphic Art of Winslow Homer Exhibited at NCFA	16-12-68
Smithsonian Research Center Imperiled by Panama Oil Spill	17-12-68
Registration Open for Winter Semester Smithsonian Classes	24-12-68
Works of Distinguished Ceylonese Painter Exhibited	30-12-68
History of the Hirshhorn Museum	2-1-69
Comments on the Hirshhorn Collection	2-1-69
The Hirshhorn Collection	2-1-69
Ground Broken for Hirshhorn Museum on Washington Mall	2-1-69
Hirshhorn Biography	2-1-69
Exhibit Chronicles History of Presidential Inaugurals	2-1-69
Hirshhorn Museum: Architecture	6-1-69
Remarks by S. Dillon Ripley, Joseph H. Hirshhorn Museum	7-1-69
Smithsonian To Show Tibetan Carpets	7-1-69
Marvin S. Sadik Named Director of NPG	13-1-69
"The Roots of Mankind" Traced in Zoo Discussions	14-1-69
Smithsonian Presents Talk on Origin, History of Cinema	14-1-69
Dillon Named To Direct Seminars for Smithsonian	15-1-69
Designer David Rowland To Address Smithsonian Associates	16-1-69
SIE Services Available to Non-Government Users	17-1-69
Smithsonian Sends American Art to Romania and Czechoslovakia	17-1-69
Smithsonian To Exhibit Works of Rico Lebrun	21-1-69
Radiation Biology Lab Presents Graduate Series on Environment	22-1-69
MacInnis and Lindbergh Discuss Underseas Programs	23-1-69
Neighborhood Museum Plans Negro History Week Exhibit	24-1-69
Daniel J. Boorstin Named Director, MHT	27-1-69
Smithsonian To Present 1968 Industrial Design Review	30-1-69
The Gregg Smith Singers To Perform at Smithsonian	30-1-69
Portrait Bust of Ex-President Johnson Put on Display	31-1-69
Guam Ecological Research Area Program	7-2-69
Pacific Ocean Biological Survey Program	7-2-69
Exhibition Will Honor 19th-Century Philadelphia Engraver	12-2-69
Tours of NPG, Available to Public, School Groups	13-2-69
Smithsonian To Show Mining Art Exhibit	19-2-69
Exhibition, Volume Offered on Texas Indians of 1830s	19-2-69
Exhibit of Art by Danish Painter Carl-Henning Pedersen	19-2-69
International "Man and Beast" Symposium Scheduled	20-2-69
Mexican Meteorite Shower Draws Quick Response	20-2-69

Avant-Garde Dance Company To Perform at Smithsonian	25-2-69
Danzi Woodwind Quintet To Appear at Smithsonian	25-2-69
"Mount Sinai" Lecture Subject at Freer Gallery of Art	27-2-69
Museum Shops Offer Contemporary European Tapestries	27-2-69
Colombian Andes Peaks Explored by Two Staff Members	27-2-69
Monosoff and Weaver Recital Scheduled	27-2-69
Major Exhibit of Contemporary European Paintings Planned	4-3-69
Contemporary European Paintings at NCFA	4-3-69
Background: Woodrow Wilson Center	5-3-69
"Perceptions" Series Presents "Boy on the Straight-Back Chair"	7-3-69
First "Producer" Film Series Presented	10-3-69
Lecture Series To Focus on Biological Hierarchies	10-3-69
Graphic Art of District High School Students To Be Displayed	12-3-69
NCFA Expanding Free Art Film Theater in April	14-3-69
Exhibition Surveys American Posters from 1856 to Now	14-3-69
Puppet Theater Presenting New Productions, New Times	17-3-69
Newcombe Parlor Displayed in MHT	26-3-69
Smithsonian Establishes "Dew Line" for Scientific Phenomena	27-3-69
Lecture Series on Origin and Dynamics of Biological Hierarchies	27-3-69
Kite Contest Rescheduled for 19 April at Monument	1-4-69
Lecture on Persian Miniature Paintings at Freer Gallery of Art	2-4-69
Exhibition Presented of Bird Paintings by Young Canadian	2-4-69
Lecture to Focus on Diggings at Israel's Tell El Qadi	3-4-69
First United States Exhibit of Collection of Folk Crafts from Holland	4-4-69
National Collection of Fine Arts To Show Kuniyoshi Retrospective	8-4-69
Alwin Nikolais Dance Group Will Appear in New Mall Theater	8-4-69
Lecture Series To Focus on Biological Hierarchies	9-4-69
Smithsonian To Present Museum Education Day	10-4-69
River Basins Survey Office Transferred to National Park Service	14-4-69
Richard Latham Lectures on "Industrial Design Today"	14-4-69
Cooper-Hewitt Adds Five Members to Advisory Board	14-4-69
Hillwood Estate Will Be Smithsonian Art Museum	15-4-69
Museum of Touchable, Climbable Displays Opened for Children	17-4-69
Historic Photographs Exhibited	16-4-69
Dr. Alex Kwapong of Ghana Chairs Global Symposium	17-4-69
Leaf-Cutting Ants Destroy Peruvian Tropical Farmland	17-4-69
Popular Museum Exhibit Is Just a Matter of Time	19-4-69
Communications Parley Includes Top-Level Executives	20-4-69
Auditions Held for Musical Comedy Productions	21-4-69
New York Guild of Handweavers Show at Cooper-Hewitt	23-4-69
Words and Music from the Court of the Sun-King, Louis XIV	23-4-69
NCFA Stages Community Festival for First Anniversary	24-4-69
Design Expert Lectures on "Transit and Its Impact"	25-4-69
Pepsi Cola and Park Service Fund Mall Tent Theater	28-4-69
Golden Spike Rail Centennial Commemorated	28-4-69
United States Entry in 10th São Paulo Biennial	29-4-69
Time Magazine Cover Portraits To Be Exhibited	1-5-69
858-Carat Gachala Emerald Donated by Harry Winston	1-5-69
Hurd Portrait of President Johnson Displayed at NPG	5-5-69

Smithsonian, Navy Exhibit NC-4—First Airplane To Fly Atlantic	6-5-69
Two Museum Shops Display Hollywood Posters	6-5-69
Jule Charney and Arie Haagen-Smit Receive Hodgkins Medal	6-5-69
Masada Exhibit Depicts Jewish Zealots' Sacrifice	8-5-69
Official Statement on "Minnesota Iceman"	9-5-69
Smithsonian Last Resting Place for American Horse "Lexington"	9-5-69
Dr. David Scott Resigns as Director of NCFA	9-5-69
"Concerned Photographer" Exhibit Chronicles Historic Events	22-5-69
Josiah K. Lilly and His Gold Coin Collection	23-5-69
Model Plane Championships and Demonstration Held	27-5-69
Pennsylvania Featured State in Annual Folklife Festival	28-5-69
Cafiriz Foundation Gift of Calder Sculpture To Be Dedicated	28-5-69
Alexander Calder Biography	28-5-69
Music and Dance of Turkey Presented in Theatre on the Mall	2-6-69
Smithsonian Associates Offer Summer Classes for All Ages	5-6-69
Smithsonian Creates Center for the Study of Man	5-6-69
Oceanographic Design Concepts To Be Exhibited	6-6-69
First United States Showing of Japanese Poster Exhibit at Cooper-Hewitt	11-6-69
Electronic Sculpture Exhibited at NCFA	11-6-69
Major Swiss Folk Art Show Exhibited in MHT	11-6-69
Sales Exhibition of Appalachia Photos by Tress	11-6-69
Czech Artist's Paintings of Mars on Exhibit	12-6-69
Art Treasures from Tibet Exhibited at NCFA	17-6-69
Equipment Spanning History of Typesetting Gift of Mergenthaler	18-6-69
Children's Theater Will Stage English Fairy Tale	20-6-69
Woodcuts by German Modernist Werner Drewes Exhibited	20-6-69
Gum-Bichromate Prints by Betty Hahn, Gayle Smalley	24-6-69
Berenice Abbott Retrospective Will Open at Smithsonian	24-6-69
Vickers "Vimy" Light Is Honored by Smithsonian	25-6-69
Reeves Telecom Corp. Plans Permanent Appalachian Art Archive	26-6-69
3rd Annual Folklife Festival To Be Held 1-6 July	27-6-69

## *Special Events*

Meetings, conferences, lectures, symposia	118
Presentations	17
Openings of exhibits	53
Motion picture showings (exclusive of Smithsonian Film Theater shown below)	22
Press previews	27
Special museum tours	13
Luncheon, dinner meetings for SI Boards, commissions	38
Smithsonian Associates events	62
Museum Shops activities	15
Receptions, ceremonies, miscellaneous functions	41
Professional and government groups	96
Foreign nations, international organizations	17



## Smithsonian Film Theater Programs

(Accompanied by curatorial lectures)

2 October 1968	<i>The Smithsonian Institution; A Short Bus Ride; The Smithsonian in Anacostia; Festival in Washington</i>
9 October	<i>The World of Jacques Yves Cousteau</i>
16 October	<i>Kaleidoscope Orissa</i>
23 October	<i>The Hidden World; Instincts of an Insect</i>
30 October	<i>Biography of the Motion Picture Camera; The Clown Princes; Abel Gance, Yesterday and Tomorrow</i>
6 November	<i>Aluminum; Steel on the Rouge</i>
13 November	<i>The Winged World</i>
20 November	<i>Vincent Van Gogh—A Self-Portrait</i>
27 November	<i>A Man's Dream—Festival of Two Worlds</i>
4 December	<i>Man, Beast, and the Land</i>
11 December	<i>Recent Achievements of the National Space Flight Program</i>
18 December	<i>Americans on Everest</i>
8 January 1969	<i>The River Must Live; The Last Frontier</i>
15 January	<i>Waves Across the Pacific; Physics and Chemistry of Water; Ocean Tides—Bay of Fundy</i>
22 January	<i>Mark Twain's America</i>
29 January	<i>The Weapons of Gordon Parks; We Have No Art</i>
5 February	<i>Eruption of Kilauea; Arenal Volcano</i>
12 February	<i>Pelican Island; Albatross</i>
26 February	<i>Amazon</i>
5 March	<i>Dive into History</i>
12 March	<i>Gauguin and Tahiti: Search of Paradise</i>
19 March	<i>Early Stone Tools; Dr. Leakey and the Dawn of Man</i>
26 March	<i>Wings at Work; A Place To Land</i>
2 April	<i>Shaped for Living; Why Man Creates; Worth How Many Words</i>
9 April	<i>Amazon</i>
16 April	<i>Voyage to the Enchanted Isles</i>
23 April	<i>Recent Achievements of the National Space Program</i>
30 April	<i>Rhesus Monkey in India; The Mountain Gorilla; Gelada: The Mountain Baboon of Ethiopia</i>
7 May	<i>Calder's Circus; Works of Calder</i>
14 May	<i>Noh Drama; Bunraku—Puppet Theater of Japan</i>
21 May	<i>Transatlantic Flying and the Story of the NC-4</i>
28 May	<i>Festival in Washington; To Hear Your Banjo Play; Traditional Pottery Production of North Georgia</i>

## Major Radio and Television Programs

"Moment With" Deena Clark (NBC-TV). Dr. Charles Nagel, Director, National Portrait Gallery.

"21st Century" Walter Cronkite (CBS-TV). Dr. Ira and Roberta Rubinoff, Smithsonian Tropical Research Institute.



"From Kitty Hawk To Paris" (ABC-TV). Paul Garber, National Air and Space Museum with collections.

"The Enormous Egg" (NBC-TV). Rebroadcast of children's story of a dinosaur at the National Zoological Park and the National Museum of Natural History.

"Jacques Cousteau Under The Sea" (ABC-TV). Discussion of whales under National Museum of Natural History blue-whale model.

The Inaugural Ball (CBS, NBC, ABC, Metromedia TV). Live coverage of inaugural ball for President Richard M. Nixon in the National Museum of History and Technology.

Groundbreaking Ceremonies for Joseph H. Hirshhorn Museum and Sculpture Garden (ABC, NBC, CBS-TV). President Lyndon B. Johnson officiated along with Secretary Ripley and Mr. Hirshhorn.

Opening of National Portrait Gallery (ABC, NBC, CBS-TV, Canadian Broadcasting Company, Japan Broadcasting Company). District of Columbia Mayor Walter Washington officiated along with Secretary Ripley.

Ceremonies marking the 50th Anniversary of the First Flight across the Atlantic by the NC-4 (NBC, CBS-TV). Secretary of the Navy Chafee, Deputy Chief of Naval Operations Connolly, Secretary Ripley, National Air and Space Museum Director S. Paul Johnston officiated.

Dedication of a stabile by Alexander Calder on the terrace of the National Museum of History and Technology (NBC, ABC-TV). Donated to the Smithsonian by Mrs. Gwendolyn Cafritz.

"Washington Today" (Mutual Broadcasting Company). Interviews with Dorothy Van Arsdale of the Smithsonian Institution Traveling Exhibition Service; Roger Pineau, Smithsonian Institution Press; Herbert Collins, Mendel Peterson, Dr. Walter Cannon, of National Museum of History and Technology.

"Today" (NBC-TV). Report on National Portrait Gallery by critic Aline Saarinen; interview with Dr. Sidney R. Galler, Assistant Secretary for Science; Dr. Marcus Cunliffe, Sussex University, participant in UPC symposium.

"Music At The Smithsonian" (WAMU Radio). Weekly series of concerts by the Division of Musical Instruments, NMHT.

Public Broadcast Laboratory (Nationwide public television). Interview with Secretary Ripley.

"The Breakfast Show" (Voice of America worldwide broadcast). Mrs. Ripley, separate interview with Secretary Ripley.

"Betty Groebli Show" (NBC Radio). Interview with Secretary Ripley.

"Festival of American Folklife" (NBC, CBS, ABC, Metromedia TV). Extended coverage of Mall activities over 4 July period.

"Panorama" (Metromedia TV). Interview with artist Peter Hurd, painter of portrait of President Johnson at National Portrait Gallery.

Interview with Peter Hurd (Canadian Broadcasting Corporation). Live coast-to-coast broadcast.

"Martin Agronsky's Washington" (CBS-TV). Report on the Junior Museum at the National Collection of Fine Arts.

"First Tuesday" (NBC-TV). Report on ecological study program in the Pacific.

"The Concerned Photographer" (public television). Documentary on this major temporary show of photographs in the Arts and Industries Building.

"Robert Goddard" (ABC-TV). Documentary with Smithsonian assistance on work by this pioneer in the science of rocketry, who received Institution financial support in his work earlier in this century.

P5M Presentation (CBS, NBC, Metromedia tv). Coverage of ceremony at Patuxent River Naval Air Station turning over last operational navy flying boat to the National Armed Forces Museum Advisory Board.

Third International Symposium (Voice of America, WAMU). Excerpts from the symposium "Man and Beast: Comparative Social Behavior" were broadcast internationally by the Voice of America and locally by WAMU. CBS and ABC televised brief reports locally.

### *Public Inquiries*

<i>Dial-a-Museum calls</i>	36,000
<i>Dial-a-Satellite calls</i>	132,000
Calls for information	21,900
Letter requests for information	8,320

### *Awards*

*Festival in Washington* (film). Golden Eagle Award, Council on International Non-Theatrical Events (CINE).

*The Torch* (employees' newspaper). Third place in government-wide judging of over 300 papers.

# Office of International Activities

DAVID CHALLINOR, *Director*

THE FOCUS OF THE OFFICE OF INTERNATIONAL ACTIVITIES during the past year has become increasingly directed toward the world-wide environmental and conservation interests of the Smithsonian Institution. This growth in emphasis reflects the concern of both scientists and statesmen with the ability of our planet to maintain its expanding human population. National boundaries have relatively little effect on human mobility and of course none at all on the aerial or aquatic dispersal of environmental pollutants. Only a truly international effort in studying and planning for the wise use of human and environmental resources seems to give promise of effective counteraction. To this end oia has devoted much of its attention.

In addition to maintaining close liaison with the Department of State, various agencies of the United Nations, and the diplomatic missions in Washington, the oia has taken over the in-house distribution of information on extraordinary natural events reported by the Smithsonian's Center for Short-Lived Phenomena. The Office is also the central agency for the Iran-United States Science Cooperation Agreement and thus is responsible for its implementation. The oia has been closely involved with conservation efforts in Dominica, the Galapagos, and the Pacific islands, especially the Hawaiian group. Plans are now under way for colloquia on the endangered species of Hawaii and on the research results of the past three years by Smithsonian scientists in Ceylon.

## *Foreign Currency Program*

In its fourth year of operation, the Program has continued to award grants for basic research in disciplines of traditional Smithsonian interest to American institutions of higher learning. The Program has received an appropriation of \$2,316,000 in "excess" foreign currencies (resulting from the sale of agricultural commodities under Public Law 480) to support research in Burma, Ceylon, Egypt, Guinea, India, Israel, Morocco, Pakistan, Poland, Tunisia, and Yugoslavia.



University of Minnesota archeologists remove a fresco from the ruins of the Palace of Diocletian, Split, Yugoslavia.

The Program authorization has expanded in 1969 to include astrophysics in addition to established interests in anthropology and systematic and environmental biology. The Program continues to make occasional modest awards in radiation biology, history, art, and museology under its congressional authorization for "Museum Programs and Related Research."

This year has seen a considerable broadening of research opportunities within the excess currency countries. In Yugoslavia in June 1969 Secretary Ripley signed an agreement with the Federal Administration for International Technical Cooperation to open the way for Program-sponsored research in ecology. Morocco, which was added to the list of excess currency countries this year, indicated that it would welcome biological research projects supported by the Smithsonian. The Foreign Currency Program Biological Sciences Advisory Council subsequently approved a survey of the marine flora and fauna in Morocco that will inaugurate there the Smithsonian Foreign Currency Program.

As the Program has developed new opportunities for research, the list of countries in which the United States owns an excess in local currencies unfortunately has diminished. As a result of rapidly dwindling reserves of excess currencies in both Israel and Ceylon, the Program has begun a phasing out of research activities in these countries. While an estimate from the United States Treasury has indicated that there is no immediate danger of the removal of either Israel or Ceylon from the list, all available funds have been committed to continuing research, but no additional funds are expected for the support of new projects.

In India, where most PL 480 funds are available, the Program has continued to take significant steps toward the development of mutually beneficial research. Discussions with the American Institute of Indian Studies resulted in an agreement that the AIRS would provide facilitative services for Program-sponsored scholars in India. This alliance promises to be a step toward Joseph Henry's goal of a "global network of correspondents for basic research and publication." In addition to the foregoing, the Foreign Currency Program has increased by \$25,000 its grant to the United States National Committee for the International Biological Program of the National Academy of Sciences. This action followed the November 1968 meeting of the committee, wherein it endorsed the use of these funds to develop joint United States-Indian ecological research that conformed to IBP objectives.

By the close of fiscal year 1969 the Foreign Currency Program has supported nearly one hundred separate research projects conducted by over forty United States institutions. Following is a brief list of the highlights of Program-supported research.

1. The University of Pennsylvania's project in Egypt to study the Temple of Akhnaten by computer sorting and by matching photographs of the thousands of widely scattered temple blocks has proved to be a highly successful and exciting venture. The temple facades, destroyed since antiquity, will thus be photographically recreated.

2. Physicists from the University of California at Berkeley have proved the technique of using cosmic ray high-energy particles to "x-ray" three Egyptian pyramids located at Gizeh and Dahshur (the x-rays revealed no previously undiscovered chambers).

3. A team of anthropologists from the Peabody Museum, Yale University, discovered the jaw of a *Gigantopithecus*-like ape in the Siwalik Hills near Chandigarh, India, a find that may push back the age of man beyond fourteen million years.

4. The University of Minnesota continues to make discoveries in its excavations of Diocletian's Palace at Split, Yugoslavia. This is one



of nine important archeological excavations in Yugoslavia undertaken with Program support since the summer of 1967.

5. The second volume of the *Handbook of Indian Birds* has been published under the direction of Secretary Ripley and Dr. Salim Ali of the Bombay Natural History Society.

6. Research results from the Palearctic Migratory Bird Survey directed by Dr. George Watson, chairman of the Smithsonian's Department of Vertebrate Zoology, have demonstrated that migratory birds carry live viruses and virus antibodies and that these birds could serve as vectors of human diseases. This project—like most projects receiving Foreign Currency Program grants—has provided research opportunities in this case for five United States and five foreign students in bird identification and banding and blood serology techniques in Egypt, India, the Chesapeake Bay Center, the National Museum of Natural History, and Yale University. Dr. Watson typifies the Smithsonian staff scientists whose research benefits from Foreign Currency Program grants.

### *Foreign Visitor Program*

The Office has continued to act as the Institution's center for greeting and establishing programs for foreign visitors. Some one hundred visitors were received during the year. Special programs were prepared for



Kenneth O. Horner and Sherif Teufik, an Egyptian student brought to the United States for training under the Palearctic Migratory Bird Survey, release a captured flicker from a mist net at the Chesapeake Bay Center.

officials from Kenya, Tunisia, and Mozambique. A reception was given by the Office for the foreign delegates to an international symposium on "Methodology and Theory in Archeological Interpretation." There were also small lunches for government ministers from Egypt and Pakistan, and the new United States ambassadors to Tunisia, Yugoslavia, India, and Somalia were briefed, prior to their departure, on areas of Smithsonian concern in the countries to which they had been assigned.

### *Cooperative Programs*

The Office of International Activities has cooperated with the International Union for the Conservation of Nature by making a grant of excess Indian rupees to the Union to help it finance research symposia conducted at the tenth General Assembly held in New Delhi in November 1969. Assistance in fund raising has also been offered the Charles Darwin Research Foundation for its work in the Galapagos and to the Linnean Society of London for refurbishing the storage facility housing Linnaeus' original type specimens. Cooperation has continued with the Organization of American States in regard to its fellowship program that places Latin American students at the Smithsonian and American universities. Finally, through the Director's membership in the International Coordinating Committee of IBP, the Office has maintained its close liaison with the National International Biological Program Committee.



## Division of Performing Arts

JAMES R. MORRIS, *Director*

ACTIVITIES OF THE DIVISION OF PERFORMING ARTS this year have gained momentum after a diversified start last year and have been sharpened in focus in several major areas.

Highlights of this development have been the continuation of the Festival of American Folklife and its related programs, the initiation of a program of contemporary forms in performing arts entitled *Perceptions*, the establishment of the Smithsonian Resident Puppet Theatre and the innovative Theatre-on-the-Mall as permanent facilities in which continuing programs of quality and exciting theater can be produced, and the establishment of resident companies in puppet theater, children's theater, and musical theater, as active producing units, exemplifying vital theatrical forms.

Activities conceived in the spring of 1968 for the National Park Service *Summer in the Parks* program have been produced and performed. As the new fiscal year began, mobile art demonstrations, jazz and folk concerts, puppet theater, and a film theater traveled to twenty parks during a ten-week period throughout Washington, climaxed at the summer's end by an exciting, contemporary, and highly theatrical presentation on the Mall by the Mura Dehn Dance Company, which traced the development of urban Negro dancing in this country.

The second annual Festival of American Folklife in July 1968, which brought more than half a million people to the Mall, presented craft demonstrations and concerts, offered the sale of artifacts and the service of traditional foods, and contributed to the great and urgent need of Americans to understand more about themselves and their cultural roots. In cooperation with the Department of State, the Division of Performing Arts produced an American Folk and Jazz Company, drawn from Folklife Festival performers, for performances at the XIX Olympiad at the Olympic Cultural Festival in Mexico City in the fall of 1968 and for additional appearances in St. Louis, Missouri, as part of the same tour.

*Perceptions*, a series of six programs in theater, music, and dance, has dealt with the contemporary and avant-garde work of recognized

American artists. Produced in cooperation with the Smithsonian Associates, this series has presented artists whose work strongly reflects the innovative character of contemporary American culture. The programs have included Peter Schickele's composer-performer trio called The Open Window, the Gregg Smith Singers, Meredith Monk's specially choreographed piece *Museum Dance*, the American Place Theater production of Ronald Tavel's *Boy On The Straight-Backed Chair*, the Alwin Nikolais Dance Company, and a restaging of the Federal Theatre script *One Third Of A Nation*.

Under the general heading of Touring Performances, a variety of programs dealing primarily with aspects of American culture have been conceived and have had their initial engagements across the country this year.

The Smithsonian Resident Puppet Theatre has provided professional, informative entertainment for children five days a week, with capacity audiences, since its opening in November 1968 in a specially designed theater in NMHT, has given special Christmas performances, and has featured guest appearances by the Van Deth puppets from Holland and the Andhra Shadow Puppets from India. A specially commissioned company of performers has produced two live children's plays in the Theatre-on-the-Mall during the summer of 1969, continuing the lively precedent set by the Resident Puppet Theatre for quality children's entertainment as a vital museum activity.

Calling attention to the exciting and creative work being done by college students in theater, the Division has represented the Smithsonian as one of five cosponsors of the first American College Theater

*Imago* (The City Curious) presented by the Alwin Nikolais Dance Theatre, featuring Murray Louis and Phyllis Lamhut, opened the Theatre-on-the-Mall on 22 April 1969. The staging, choreography, costumes, sound score, and lighting were created by Mr. Nikolais.







The Theatre-on-the-Mall at 12th Street and Madison Drive NW is a steel and nylon structure with a seating capacity of over 900 people. With a conceptual design by Richard Lusher, technical director of the Division of Performing Arts, the theater has been used for the first American College Theatre Festival and for other performing arts programs.

Festival, providing production staffs and facilities for the festival at Ford's Theatre and in the specially designed Theatre-on-the-Mall.

Recognizing that America's most significant contribution to this ritual ceremony that man calls "theater" has been the play with music, commonly known as the American musical comedy, the Division of Performing Arts completed its summer 1969 production schedule with four full weeks of professional musical theater in the Theatre-on-the-Mall, where it presented *Annie Get Your Gun* and *Of Thee I Sing* to critical praise and enthusiastic audiences.



# Smithsonian Museum Shops

CARL FOX, *Director*

ONE OF THE LARGEST OF MUSEUM SHOPS at the Smithsonian was opened early in July 1968 in the Arts and Industries Building. Under the design direction of James Mahoney, assisted by Michael Carrigan, this shop features a permanent sales exhibition area, a children's section, an adult section, a bookshop, and a storage area. Of the eight special sales exhibitions held at the A&I shop was one organized through the invaluable cooperation of Sr. Miguel Aleman and Sr. Octavio Trias Aduna of the National Tourist Council of Mexico. Utilizing every square foot of display and sales space as well as the 75-foot area beneath the skylight, this exhibition of Mexican craft, opening in October 1968, was a cultural salute to Mexico, host to the Olympics. Craft centers, villages, and workshops throughout Mexico were combed for traditional crafts by Caroline MacChesney, Tonatiuh Gutierrez, and the director. A major part of the National Tourist Council's collection was selected by Dorothy Van Arsdale and Frances Smyth for the Smithsonian Institution Traveling Exhibition Service, which opened in February 1969 its national traveling schedule of Mexican Crafts at the International Business Machines Gallery in New York City.

The National Air and Space Museum and the Museum Shops, in cooperation with the International Plastic Modelers Society, the Academy of Model Aeronautics, and the National Association of Rocketry, sponsored in June 1969 the First Annual Aerospace Modeling Exhibit at the same A&I shop. The exhibition was researched by the curatorial staff and installed by Harry Hart, Winthrop Shaw, and Mr. Hart's exhibit staff. As a side attraction, a special weekend competition of model flightcraft and model rocket launching was held on the Mall. Continual demonstrations by members of model-making groups was a feature of the summer-long exhibition and sale.

Ralph Rinzler and the director researched the Index of American Design at the National Gallery for an exhibition of original watercolor renderings. Contemporary but traditional American crafts were selected by Mr. Rinzler to accompany the paintings. This exhibition was taken



*Folk Arts of Mexico, sales exhibition, Museum Shop,  
Arts and Industries Building.*

by the Mexican government to the cultural Olympics in Mexico City in October 1968.

An exhibition of early New England gravestone rubbings from the shop's collection was loaned to the famous Barr department store of St. Louis in October 1968.

Richard Virgo and the Office of Exhibits redesigned, repainted, and relighted the attractive shop on the Mall side of the National Museum of History and Technology.

The director of Museum Shops attended the World Crafts Council meeting August 1968 in Lima, Peru, where, as a panelist with Madame

*Movie Posters of the 40s*, sales exhibition, National Museum of History and Technology Rotunda Shop.



*Arts and Crafts of West Africa*, sales exhibition, Museum Shop, Arts and Industries Building.

*Tribal Arts of India*, sales exhibition, Museum Shop, Arts and Industries Building.





Dayan of Israel and Madame Jayakar of India, he participated in a discussion, "The Dialogue in Marketing." He also selected the exhibition material and wrote the introduction to a catalog for the Nelson A. Rockefeller collection of Mexican Folk Arts at the Museum of Primitive Art in New York City. Finally, he wrote a report for the New York State Council on the Arts, "The Craftsman in the Market Place."

## *Smithsonian Museum Shops Sales Exhibitions Held During the Year*

Folklife Festival (five sales tents on the Mall) July 1968

### NATIONAL COLLECTION OF FINE ARTS

*American Printmakers* (November–December 1968)

*List Art Posters* (May–June 1968)

*New England Gravestone Rubbings* (August–September 1968)

*Multiples* (July 1968)

*Wood Engravings by Winslow Homer and his Contemporaries* (March–April 1968)

*Movie Posters of the 40s* (May–June 1968)

### NATIONAL MUSEUM OF HISTORY AND TECHNOLOGY

*Appalachian Crafts* (July 1968)

*Eleven Photographers* (August–September 1968)

*New England Gravestone Rubbings* (July 1968)

*Japanese Prints* (March 1969)

*Eskimo Prints* (March 1969)

*Mexican Arts and Crafts* (October 1968)

*Christmas around the World* (November–December 1968)

*Movie Posters of the 40s* (May 1969)

*Appalachia: People and Places*, photographs by Arthur Tress and Appalachian crafts (June 1969)

### NATIONAL MUSEUM OF NATURAL HISTORY

*Index of American Design and American Traditional Crafts* (July 1968)

*Ann Ruppert, Animal Prints* (April–May 1968)

*Curatorial Publications* (December–January 1968)

### ARTS AND INDUSTRIES BUILDING

*Sculpture by Charles Butler, Canadian Primitive* (July 1968)

*Mexican Arts and Crafts* (October–December 1968)

*Indonesian Arts and Crafts* (August 1968)

*India: Tribal Crafts* (January 1969)

*Arts and Crafts of West Africa* (February 1969)

*European Tapestries* (March 1969)

*Folk Arts from the Netherlands* (April–May 1969)

*First Aerospace Modeling Exhibit* (June 1969)

# Belmont Conference Center

DAVID B. CHASE, *Director*

**N**OW IN ITS THIRD YEAR OF OPERATION, the Belmont Conference Center continues to attract an increasing number of conference groups. During the year, fifty-one conferences, sponsored by twenty-seven government agencies and public and private organizations, have been held at Belmont. With the Center operating close to maximum capacity during the spring and autumn months, a number of groups that have requested dates during these peak periods could not be accommodated.

Smithsonian groups that have held conferences at Belmont during the year include the Smithsonian Council, the Interdisciplinary Communications Program, and the Program for Postdoctoral Fellows in Education Research, the latter conducted by the Smithsonian under a grant from the United States Office of Education.

**Belmont Conference Center. North front of the main house.**



With the completion of an additional bedroom in the main house, the number of conference guests who can be housed overnight has been increased to twenty-four. The daytime capacity of the Center is thirty people and, when necessary, arrangements are made to house additional overnight guests in a nearby motel. Two more bathrooms also have been installed in the main house.

Catering services by an outside supplier were discontinued during the year when a highly experienced chef joined the full-time staff. This new arrangement permits greater flexibility in planning meals and a better control of food service.

Efforts are being continued to preserve and enhance the unique character of the main house and its setting. Several beds of the original flower garden near the house have been planted for the first time since the property was acquired by the Smithsonian. Arrangements have been completed to replace the roof of the main house using materials similar to those of the existing surface.

Conference operations continue to be directed toward the needs of small groups that require the kind of attractive and secluded setting which Belmont provides, together with the advantages of easy access to Washington and Friendship International Airport.

# Anacostia Neighborhood Museum

JOHN R. KINARD, *Director*

IN SETTING FORTH THE PURPOSES of the Anacostia Neighborhood Museum, Secretary Ripley, in *Smithsonian Year 1968*, incorporated lofty goals to which all museums ought to aspire: "To anyone interested in what I have called 'social biology,' the linking in a common cause for research of modern biologists, especially ecologists and sociologists, the so-called slums are the areas ripe for studies cut in a new fashion and tailored to new dimensions."

This idea certainly challenges not only museums located in large urban centers, where massive social, economic, and political problems abound, but also it gives direction and purpose to every division previously situated in the museum complex. The natural scientist, historian, anthropologist, and ethnologist can make their research and exhibits relevant to current human situations. The neighborhood museum must meet the practical needs of its community; indeed, its existence is predicated upon the proposition that there are critical needs to be met. The neighborhood museum exists to articulate those needs, to graphically illustrate those needs, and to take firm action that will provide for creative satisfaction of those needs. It must attract a significant number of neighborhood people on all levels to insure its involvement and strengths. It should also make every effort to analyze and interpret the history of its community.

The past year has indeed been one of increased involvement and activity at the Anacostia Neighborhood Museum. The educational programs, directed by Miss Zora Martin, have covered a broad spectrum for guiding children and adults through exhibits and workshops for community reading assistants of the Anacostia Model School Project to special science units led by a part-time teacher on loan from the District of Columbia Board of Education.

Members of the Youth Advisory Council, meeting with Smithsonian personnel, have helped plan a major exhibit on jazz. The exhibit was so successful that it later traveled to the Corcoran Gallery of Art's Dupont Center. This group of young people subsequently assisted in raising funds to enable three of their members to spend the summer in

Africa under the auspices of Operation Crossroads Africa, Inc. Members of this committee have continued their efforts at fund raising and have initiated a Travel Fund to enable the entire group to travel abroad in 1970 for part of the summer.

In February 1969, the educational staff provided a well-organized series of lectures, discussions, films, and dramatic performances for the Museum's celebration of Negro History Week. In addition to this, the staff has provided guided tours for the exhibit "The Sage of Anacostia," a graphic history of the Afro-American, featuring the life of Frederick Douglass. This has been the most successful exhibit executed by the Anacostia Museum and, undoubtedly, one of the most informative. It was attended by approximately twenty-seven thousand metropolitan area school children.

Throughout the year, the Museum has presented various programs of educational and popular interest related to current exhibits. These have included jazz performances, gospel singing, and science demonstrations, as well as tours of the Smithsonian. In addition, local talent was spotlighted for several weeks in March 1969 during the second annual "Festival of the Arts of Anacostia." Skits, plays, concerts, and dance programs received extensive local and national coverage. Through these programs, both children and adults in the neighborhood have been given challenging opportunities for creative self-expression.

This year also has seen the establishment of the Museum's Research Center and Library for the purpose of furthering the development of the neighborhood museum concept. The center will serve not only the needs of Anacostia but a wider area as well. The Research Center and Library is directed by Larry Erskine Thomas, the Museum's research and design coordinator. The development of this research facility will enable the community, the general public, and all who make use of its services to understand the true significance of the black man's social and cultural environment and his influence on the progress of a great nation. The Center's initial achievement has been the exhibit "The Sage of Anacostia," which will be circulated throughout the country by the Smithsonian's Traveling Exhibition Service. The Center already has consulted with and provided services to a wide variety of museums and organizations as they in turn seek to reshape their programs and exhibits.

Additional funds have made possible the transfer of arts and crafts activities to another building. James Campbell, coordinator for the Crafts Center, has extended his services to include the teaching of model-making techniques in numerous elementary schools and Head Start Centers. He also has conducted demonstrations for the District of Columbia Recreation Department and other organizations. Evening



classes in model making are held for adults at the Crafts Center, which also houses workshops in pottery and photography for community residents of all ages. During the summer months of 1969, Neighborhood Youth Corps enrollees did a photo-journal of community organizations and projects in Anacostia. Neighborhood children were provided with a learning experience in African culture and history through participation this summer in crafts, painting, drawing, sewing, dramatics, field trips, and various means of research.

The Junior League of Washington has presented the Museum with a two-year grant of \$44,000 to be used for a Mobile Division. Fletcher Smith is coordinator of this project, which allows the Museum to bring traveling exhibits, programs, speakers, and creative activities to all areas of the community.

During the first six months of 1969, more than 102,000 children and adults visited the Museum. The Museum continues to seek every means of working directly with the needs of the community and with problems as it sees them in an effort to enhance the quality of life in Anacostia. Many of Anacostia's needs are the needs of America. As the Museum seeks to provide creative solutions to these human problems, others also may be led into such paths.



## Smithsonian (Magazine)

**B**EGINNING 2 JANUARY 1969, an experimental task force was organized under the leadership of Edward K. Thompson, as prospective editor, to investigate extending the scope of the Smithsonian Associates to a national group by means of a magazine, ultimately to be called *Smithsonian*. Leading design and expert publishing consultants were engaged.

A small editorial staff was assembled during the final six months of fiscal year 1969. The conclusion reached, concurred in by Secretary Ripley, was that the project was promising enough to proceed into more realistic stages. Samples of what various parts of the magazine might look like were shown at the May 1969 Regent's meeting.

Specifically, the exploratory work showed that a wealth of good editorial material exists, that the project should begin to pay its own way in the third year of operation, and that the magazine would fill a niche in a profitable specialized field. It would enhance the Smithsonian's national image.

As of 30 June 1969 much work remained to be done: completion of an editorial staff, assembling of a business staff, conducting the necessary direct mail tests, letting of various production contracts.

*Smithsonian* has been conceived as a class magazine, approximately half of it in color, to be published monthly, the page size 8½ inches wide by 11⅛ inches deep, on coated paper. It will probably be printed in the Washington area to achieve quality control by the staff.

The subject matter, according to the Secretary's specifications, will include all the chief interests of the Smithsonian—natural, physical, and behavioral sciences; the arts, folk and fine; and cultural history. These subjects will relate to modern man, whether it be to conserve his resources, improve his environment, or in other ways lead him to a fuller and richer life.



# Archives

SAMUEL T. SURATT, *Archivist*<sup>1</sup>

ORIGINATED MERELY AS A DEPOSITORY for older letters, scientific papers, and similar documents that were deemed worth saving, the Archives has existed, at least nominally, almost from the beginning of the Smithsonian, but only in recent years has it been organized into a viable operating unit, with a staff of its own. The growth of the collection has been partly systematic—with regard to the official correspondence of the Secretary, for instance—and partly a random accumulation.

The bulk of the holdings consists of official correspondence, most of it dating from around 1865, when much of the earlier correspondence was destroyed by fire. This material has been supplemented from time to time with correspondence and papers relating to various Smithsonian divisions and projects and with the professional papers of eminent scientists such as William Healey Dall, G. Brown Goode, and W. H. Holmes, who either worked for the Smithsonian or contributed their collections to the National Museum.

In the past year, the Archives has been involved mainly with reorganizing its holdings, many of which have never been described or cataloged. This will provide historical scholars with usable and important primary sources on a wide range of topics, especially the growth of science in America in the nineteenth century. The staff is increasingly occupied with research requests, from other parts of the Smithsonian and from the country at large, and it also serves the needs of visiting scholars.

A continuing and long-range enterprise is the microfilming of the collections, which is well underway. This is especially important as a partial substitute for an extensive preservation program. The Archives also provides microfilm for special requests, as was done, for example, with the official correspondence of the Smithsonian with President Lyndon B. Johnson and his staff.

The accessibility and value of the Archives collections will be enhanced when the office moves to new quarters in the renovated part of the Smithsonian Institution Building. At that time, the Archives will be in

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<sup>1</sup> Resigned 21 April 1969; replaced by Nathan Reingold.



a better position to undertake a close survey of all branches of the Smithsonian in order to locate and describe manuscript materials. Because of limited space and staff, the accession program continues on a restricted scale. As in the past, it will not be limited to the Smithsonian itself, as evidenced by the recent acquisition of the papers and records of the Washington Philosophical Society.

Plans for the future include a central information bank on manuscript and photographic materials in the Smithsonian, a computerized information-retrieval system, an expanded program of preservation and microfilming, and special historical projects utilizing the most valuable parts of the collections.

# Smithsonian Institution Libraries

RUSSELL SHANK, *Director*



FEDERAL FISCAL RESTRAINTS during this year have dictated caution in the advancement of new programs. The Libraries have thus been delayed in setting and implementing plans to create a library environment fully commensurate with needs that arise from new emphases in education and research in the Institution. Attention instead has been given to the most essential demands of users and to several basic housekeeping functions that tend to put collections and services in better order pending the start of more rapid change in library service programs. Emphasis has been given to the gathering of information about users' needs, the conditions of the libraries and their collections, the streamlining of portions of the collections, the curtailment of low-priority services, and the testing of ideas for the future by discussions with several library committees within the Institution.

In a major move to strengthen the planning and operation of improved readers' services, Frank Pietropaoli, a senior member of the Smithsonian's Library of Congress liaison staff, has been reassigned to the office of the Director of Libraries to serve as a public service advisor. He has surveyed the working collections in the National Museum of Natural History and has produced the publication *Guide to the Library of Congress for Smithsonian Researchers*, the first of a proposed series of orientation leaflets on the use of the Libraries. At the close of the year he was at work on the problems of obtaining access to the National Agricultural Library in its new location.

The Central Reference and Circulation staff has maintained its high standard of service, even increasing its productivity in the face of reduced staff. The 34,500 reference questions handled by this small staff is an increase of about twelve percent over the previous year. The

staff also has handled nearly thirty percent more interlibrary loan forms, although the fulfillment rate for requests to borrow material showed little change. In order to accommodate the extra workload with a reduced staff, the Libraries have curtailed office deliveries and have reduced the hours of public service. The Library of Congress, the National Agricultural Library, the Geological Survey Library, and the Department of Interior Library remain the principal suppliers of interlibrary loans coming into the Institution.

Funds for the purchase of library materials, which have been difficult to acquire, came to the Libraries intermittently throughout the year. Fortunately, since the professional staff of the Institution has continued to select new titles, there has not been a dearth of requests to which funds could be applied. The Libraries' inability to match the timing of its response to the pressure of requisitions for library materials has forced various departments of the Institution to divert a significant portion of their own funds to the purchase of library materials that were kept for use only within the departmental offices.

Strong library collections attract additional material and thus grow even stronger. The Institution has been the honored recipient of a number of exceptionally important and valuable library collections. Among these are the Dwight-Tucker Ornithological Collection given by Mrs. Carll Tucker; a collection on Ceylon given by Mr. N. A. Forde, a former British army officer who served in that country; and a collection of Chinese reference books from the oriental scholar Dr. Rhea Blue. The close affiliation of the patent examiners and the curators in the National Museum of History and Technology has resulted in the transfer of nearly 40,000 volumes from the Patent Office to the Smithsonian Institution—principally pre-1900 material in technology now quite essential to the study of the development of American science and industry. The American Military Institute has deposited its collection of approximately 10,000 volumes on military history with the Smithsonian, which has placed them in the charge of the National Armed Forces Museum Advisory Board. Not as dramatic, but nevertheless as vital, is the steady input of materials obtained through individual gifts and through the exchange of the Smithsonian's own publications with those of other scholarly agencies.

The Libraries have taken every opportunity to improve the quality of management of collections and services. A memorandum on the management of the Libraries was issued by Secretary Ripley during the year to guide operational decisions toward effective use of our resources. The working collections in the various departments and divisions of the National Museum of Natural History have been surveyed in order to provide an analysis of library operations on which

rules for management to meet users' needs efficiently will be established. Near the end of the year an experimental exchange of cataloging copy was initiated between the National Gallery of Art Library and the National Collection of Fine Arts and National Portrait Gallery Library. Hopefully this will increase the amount of cataloged art material and will foster fuller exploitation of our art libraries.

The automation of the Libraries has proceeded slowly and carefully as the part-time task of several key staff members. The machine-readable data base, available from the already automated acquisition functions, has been used to create a monthly in-process list that charts the course of purchased books through the processing routines and announces the availability of newly cataloged books. The data base also has been used to measure the performance of the vendors of library materials with which the Libraries deal. Plans are being made to test the efficiency of processing routines through an analysis of the records of the flow of books through the various task groups as these records are updated. The products of these analyses are powerful tools for the proper management of the Libraries that could never have been economically obtained except through the advent of automation. The design of the system and the specification of forms and data elements for the automation of the purchase records for serials was accomplished by the close of the year through close cooperation with the Information Systems Division. The creation of a machine-readable data base for the control of serials acquisition is a major goal for the ensuing year.

The stature of a research library is in part determined by the quality of its contribution to the world of librarianship. In this effort, commensurate with the talents and the time of the staff, the Smithsonian Libraries have been active to the fullest extent possible. The Smithsonian has completed the second of its two-year elected term on the Federal Library Committee, and the director and assistant director continued membership on three of the FLC task forces. The affairs of two important segments of the American Library Association have been managed within the Smithsonian Institution. The director served as the president of the Information Science and Automation Division, and Carol Raney, head of the Cataloging Division, served as acting president of the Resources and Technical Services Division. Mary Huffer, the assistant director of Libraries, won election as president of the D.C. Chapter of the Special Libraries Association; Jean Chandler Smith assisted in the formation on the national level of the Natural Resources Division of the Association; and Mrs. L. Frances Jones accepted appointment to a subcommittee of the Seminars on the Acquisition of Latin American Library Materials.

William Walker, librarian of the National Collection of Fine Arts and National Portrait Gallery Library has continued his work on the revision of the Library of Congress classification schedule for fine arts. The director has accepted an appointment to a committee in the office of the Deputy Librarian of Congress to offer counsel on conducting a study of the problems in converting retrospective catalog records to machine-readable form for computer processing. The director also has continued his service to the National Library of Medicine in the analysis of the capabilities of various American universities to fulfill the educational mission of the Medical Library Assistance Act. Jack Goodwin, librarian of the National Museum of History and Technology Library further enhanced his and the Smithsonian's leading position in the bibliography of the history of technology through his preparation of the annual bibliography on this topic for the Society for the History of Technology and through his many book reviews in leading historical journals. Though time has been a precious commodity to the Libraries in this difficult year, these commitments nevertheless have been deemed vital to the upgrading of the quality of that part of the library world within which Smithsonian Libraries operate.

### *Staff Publications and Papers*

- GOODWIN, J. "Current Bibliography in the History of Technology (1967)." *Technology and Culture*, 1969, volume 10, pages 228-303.
- SHANK, R. "Automation in Design for Change." *Missouri Library Association Quarterly*, 1969, volume 30, pages 65-72.
- . "Cooperation between Special Libraries and Other Types of Libraries." [Paper presented at the Institute on Cooperation between Types of Libraries, University of Illinois, Allerton House, November 1968.]
- . "Libraries and their Ancillary Complex." [Paper presented at the Annual Business Meeting of the Engineering Division of the Special Libraries Association, June 1969, Montreal, Canada.]
- SMITH, J. C. "Bibliography on the Biochemistry of Endoparasites." *Experimental Parasitology*, 1968, volume 22, pages 352-422.



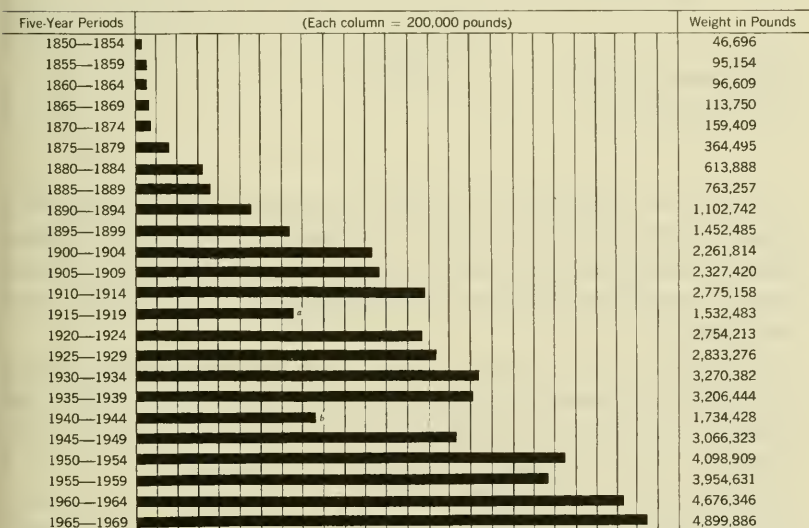
# International Exchange Service

J. A. COLLINS, *Director*

THE INTERNATIONAL EXCHANGE SERVICE has operated continuously since 1849, having been established by the Smithsonian Institution to provide a means through which it could *supply* its publications to libraries in other countries and would *receive* in return the publications of those foreign institutions. Since then, other organizations in the United States have been permitted to use the Service.

Colleges, universities, museums, societies, and individuals forward their publications through the Service to similar organizations in other countries and, in return, receive through the Service publications from foreign libraries. More than 350 organizations and individuals have exchanged publications through the Service during the past year.

*Progressive weight of publications received for  
transmittal through the International Exchange Service  
between 1850 and 1969, (by five-year periods)*



<sup>a</sup> Interruption of service in World War I.

<sup>b</sup> Interruption of service in World War II.

*Packages received for transmittal from foreign and domestic sources,  
fiscal year 1969*

<i>Classification</i>	<i>For transmittal abroad by the Smithsonian</i>		<i>Received by the Smithsonian for distribution in the United States</i>	
	<i>Number of packages</i>	<i>Weight in pounds</i>	<i>Number of packages</i>	<i>Weight in pounds</i>
U.S. parliamentary documents received for transmission abroad. ....	870, 160	388, 903	—	—
Publications received from foreign sources for U.S. parliamentary addressees. ....	—	—	23, 027	27, 063
U.S. departmental documents received for transmission abroad. ....	180, 715	171, 252	—	—
Publications received from foreign sources for U.S. de- partmental addressees. ....	—	—	9, 633	11, 756
Miscellaneous scientific and literary publications received for transmission abroad. ....	158, 063	204, 418	—	—
Miscellaneous scientific and literary publications received from abroad for distribution in the United States. ....	—	—	47, 048	90, 077
Total. ....	1, 208, 938	764, 573	79, 708	128, 896
Total packages received. ....	1, 288, 646			
Total pounds received. ....	—	—	—	893, 469

Publications weighing over 700,000 pounds have been received from organizations in the United States for forwarding to libraries in other countries during the year. Over 100,000 pounds of publications have been received from the foreign exchange bureaus for addressees in the United States.

During the past five years, packages of publications weighing more than 4,800,000 pounds have been received from both foreign and domestic sources. This is the largest amount of publications received during any five-year period in the history of the Service.

Medical and dental publications have been received from more than 150 libraries in the United States for exchange with medical and dental libraries in other countries.

Official United States government publications represent the largest single item of exchange through the Service. Over 350,000 pounds of documents have been received for exchange with the parliamentary libraries of other countries. These exchanges are based on (1) bilateral treaties between the United States and other countries, (2) conventions to which the United States is a signatory, and (3) other agreements for the international exchange of publications. During the year the Cyril and Methodius National Library in Sofia, Bulgaria, was added to the list of recipients of the partial sets of official documents. Full sets of official United States documents have been exchanged with 60 foreign libraries, and partial sets of official documents have been sent on exchange to 45 libraries.

A strike of the longshoremen on the east coast of the United States during the winter has delayed the sending of many publications and also has delayed the receipt of publications from foreign exchange bureaus.



## Information Systems Division

NICHOLAS J. SUSZYNSKI, JR., *Director*

THE INFORMATION SYSTEMS DIVISION, offering a total dimension of information services, utilizes advanced computer systems and techniques to gather, organize, and apply information to the Institution's diverse needs. Divisional activities encompass designing, programing, and processing of computer applications; managing complete computerized information systems; and providing mathematical modeling, simulation, and scientific computations.

This Division, equipped with a staff competent in information retrieval and indexing techniques, mathematical computation, and management information services, offers Smithsonian museologists technical assistance in systems design, programing of new systems, and programing maintenance of previously developed information systems. In addition, the Information Systems Division provides support to Smithsonian administrative, curatorial, and research activities by supplying automatic data processing for business and fiscal data. The staff has conducted several research and development projects to discover new computer techniques for museum application. This Division also has sponsored educational training programs of introductory, intermediate, and advanced courses in computation to acquaint the Institution staff with computers and their uses. In an effort to encourage knowledgeable uses of these facilities, this year these courses have been made available to any Smithsonian employee whose responsibilities involved or were directly related to computation.

The Information Systems Division is structured to support four functional information-technology needs: information storage and retrieval, scientific applications, library systems, and management systems.

The Information Storage and Retrieval Section, in cooperation with members of the National Museum of Natural History, has developed the Smithsonian Institution Information Retrieval system (SIIR) that provides an investigator with the ability to direct a broad spectrum of questions to a data bank consisting of specimen records and related bibliography in the field of natural history. While the system is being expanded to encompass a variety of specimen-related data, it is cur-



rently processing data on birds, crustacea, and rocks and minerals. Soon this information-retrieval system also will be able to process mammalian data.

Another project—with a different orientation, developed in cooperation with Smithsonian botanists—provides an automated information collection and dissemination system for botanical types. The project now is being expanded to create a data bank of taxonomic type data derived from botanical specimens. In this system a record for each type specimen is prepared containing the specimen-related data with a list of “housekeeping” information displaying the particular institution’s acronym, a catalog number, and the kind of types reported by various cooperating herbaria. Institutions participating in the botanical types project receive distribution records reflecting the holdings that have been reported for a given taxon. This system prevents a redundant mailing of records and also insures that no institution in the network is bypassed. It is capable of rapidly processing large volumes of data while facilitating data validation, correction, and printing of reports on the collected holdings of cooperating herbaria.

During the year this section also has developed a system of coordinate indexing of ship models for the Division of Transportation in the National Museum of History and Technology. The investigator may retrieve data from a machine-compiled index or from a deck of punched cards. In the latter case, information can be located by passing a needle-like rod through the apertures in the deck to select the appropriate information. In addition, a continuing program of research and development in information storage and retrieval techniques is being conducted to bring the Institution a range of systems that provide maximum capability at minimum cost. When new applications are developed, an attempt is always made to implement generic systems that will be flexible enough to be of specific utility to particular requirements, yet general enough to have more than one application in the Institution.

The Scientific Applications Section has generated several systems to fulfill the needs of various departments. Programs have been written for the Department of Paleobiology to produce tables on the velocities of free-falling particles in a viscous fluid. Another set of computer programs has been developed for the Department of Vertebrate Zoology to conduct a zoogeographic study that facilitates an analysis of faunal relationships without prior knowledge of the ecological parameters. In cooperation with the Department of Anthropology, this Division has developed mathematical approaches to study the microstructure of bone by electron probe processing. The program converts the raw data, calculates ratios, and performs elementary statistical analysis. Efforts also have been initiated with the Department of Anthropology to construct a



New information-retrieval projects are reviewed by participating units. ISD's Reginald Creighton and Dr. Melvin Jackson of NMHT discuss coordinate indexing of ship models as an aid in research activities.

proposal for the mathematical analysis of archeological teeth data. It is hoped not only that this study will reveal a historical sketch of the types and transmission of periodontal diseases found among various populations of ancient man, but also that the research will provide results applicable to these diseases when found in modern man.

A set of artifact materials excavated by the Smithsonian in the thirties contains the greatest diversity of materials located at any known site. A project in the Anthropology Department has been undertaken to study and publish the material in order to determine a model of hunter-gathering culture in the late Pleistocene. Computer programs have been written to establish a data bank of the variables associated with the specimens and to perform descriptive statistical calculations on this data. Multivariate analysis of this quantifiable artifact data, combined with ecological and geographical variables hopefully will provide a model to help understand the way of life of that time. Descriptive statistical calculations also have been performed for the Division of Petrology to compare the variation of deep-sea basaltic lavas with continental basaltic lavas, a study that attempts to determine the origin of deep sea lavas.

The installation of the telecommunications line connecting the H-1250 computer to the CDC-6400 computer at the Smithsonian Astrophysical Observatory has provided additional calculational capabilities to Smith-

sonian scientists. The UCLA Biomedical Computer Programs library of mathematical routines has been installed on the Astrophysical Observatory computer system. The telecommunications line has provided the capability to perform various special projects for scientists in the Department of Paleobiology, projects that otherwise would have been too large to handle with the present facilities. These programs have included univariate and bivariate analyses of morphometric data, multivariate analysis of variance, and canonical analysis. In addition, the mathematical computations section has provided programing support to the external customers who make use of the telecommunications line.

In cooperation with the Office of the Director General of Museums, the Information Systems Division has developed a computer-processable questionnaire now used to interview Smithsonian visitors. In addition, a postcard-size questionnaire has been prepared for information feedback from organized visitor tours. Once the survey is completed, extensive statistical analyses of the data will be performed.

The Library Systems and Programs Maintenance Section is responsible for the development and implementation of information systems for Smithsonian Libraries and for the continuous upgrading and maintenance of selected computerized systems. In its research activity this group is concerned with automated systems for the processing of bibliographic data. This Section has implemented an In-Process Inventory File for the Libraries based on the successful conclusion of a pilot project conducted last year. The system supplies the library, research, and curatorial staffs with up-to-date information on the status of published monographs.

An automated bibliography, prepared for the Flora North America Project, also has been designed to produce a concise diagnostic manual of all vascular plants north of Mexico. When completed, it should stimulate new research in plant systematics and related fields. The current system's capability prepares an index to new species and new chromosome counts as cited in the literature.

In cooperation with the National Portrait Gallery, this section is scheduled to generate an interface between the file of cataloged portraits and scholars via an automated portrait-information-retrieval system. The combined efforts of the staffs of the Information Systems Division and the National Portrait Gallery's Catalogue of American Portraits have yielded a final system design to be implemented next year. It will provide the means for housing and maintaining a major portion of the cataloged information through three unique, yet closely cross-referenced and related, data banks. The application of machine retrieval will make it possible to do both quantitative and qualitative studies.



Computer facilities at ISD operate seven days a week, 24 hours a day. Roy Perry (center) supervises the handling of one of the many programs processed at this installation.

A study has been performed for the Smithsonian Libraries to determine what benefits may be obtained from placing the serial purchase record in a machine-readable form. The results of the investigation suggest that at least two advantages can be expected once the file is converted. The machine will be able to take over time-consuming tasks of file surveillance in order to initiate renewals or process order titles into the system. It also will provide up-to-date listings to keep the librarian posted on actions to be taken in a more accurate and timely manner than possible under any manual method.

Research also has been initiated to determine how the Institution's computational facility may be applied to develop a multifaceted access to the architectural records in the National Museum of History and Technology. Another newly initiated project deals with the placement of the vitae of the Institution's professional staff into a machine-readable form for the Office of Academic Programs.

The Management Systems Section, in addition to modifying and maintaining its production programs, has implemented new accounting systems for the federal and private accounting offices to provide more timely and accurate accounting data. Reports produced for these offices vary from the initial verification of transaction data to the final posting in the general ledger. In addition, a system has been designed



by this section to provide the Buildings Management Department with procedures and methods of reporting and accumulating cost and work-backlog data for labor and materials at all management levels to facilitate expenditure analysis and to report future projections of required labor and materials.

A system design has been completed and programing has been initiated to develop a combined payroll and personnel system. Reporting requirements for this system are now being revised to satisfy current needs, while all aspects of information flow requiring manual intervention are either simplified or eliminated. From the payroll aspect, the new system will simplify manual procedures and add greater flexibility to the maintenance of data. The system will provide an up-to-date automated personnel system to replace the present manual procedures for the Office of Personnel Management and Resources. All personnel data and associated costs will be readily available. Once an employee is entered into the system, all future actions will be accomplished automatically, either as a result of a coded input or as a result of preprogrammed testing for certain conditions within the contents of the data bank.

The Smithsonian Subscription Fulfillment Program, developed in cooperation with the Office of Public Affairs and the Smithsonian Associates, has been substantially modified to provide greater flexibility in maintaining control over the mailings and the status of Smithsonian Associates accounts. Indicative of the activity connected with this program is the size of the member file, which contains the addresses of over 37,000 people to whom more than 300,000 individual mailings were provided. Labels for these mailings have been selected and printed under the control of the Division's computer programs.

The computer facility with its supporting staff has provided services this year in the form of data preparation, data conversion, and computer time to process the Smithsonian's workload. In addition, it has acted as a service bureau to United States government agencies. Computer operations are conducted on a 24-hour basis seven days a week. The computer center functions on a nonprofit, cost-recoverable basis. It is fully reimbursed by individual users through payment for the machine-time used in the solution of their problems. Costs associated with this service are approximately fifty percent less than a comparable commercial facility would charge.

The fiscal year billing of this computer center has amounted to slightly more than a quarter of a million dollars, representing a like saving to the government. In addition to the saving realized through lower computer costs, the Smithsonian Institution has benefited through overhead recovery of approximately \$45,000.





**Members of the Management Systems Section discuss plans for personnel and payroll applications with Leonard Pouliot, director, Personnel Division.**

In the past year the Information Systems Division has provided services to other government agencies in an excess of \$120,000. These services have included systems development, programing, and various data-processing operations on the computers. Among agencies receiving such services are: Bureau of Mines; Bureau of Yards and Docks; Department of Health, Education, and Welfare; General Service Administration; Naval Ordnance Laboratory; Office of Business Statistics; Office of High Speed Ground Transportation; Department of the Army; and Post Office Department.

During the year, the Information System Division staff has participated in conferences designed to share new techniques in museum data processing with other institutions. A training session on the application of data processing to collections in natural history was attended by museum directors from the National Museum of Canada; the Museum of Zoology, University of Michigan; the Museum of Natural History, University of Kansas; New York Botanical Gardens; and the Field Museum of Natural History, Chicago. Other demonstrations have been offered throughout the year to acquaint interested investigators from home and abroad with the Division's indexing and information storage and retrieval techniques.

Museums and institutions throughout the world have expressed interest in projects currently under operation in this Division. The *SUR* system, in particular, has continued to be an item of special interest, and requests for information and documentation on it have increased. Of these, one request was received from visiting scientists of the Centre de Documentation de l'Armement, Paris, interested in applying the system to their aerospace museum. A similar request was received from the United States Military Academy regarding possible application of the information retrieval technique to the history of ordnance in the library at West Point.

Technical information also has been made available to the University of Mexico (a multi-index and concordance system) and to the University of Virginia (documentation of the Joseph Henry Papers Project to be applied to its George Washington Papers Project).

In summary, it may be stated that the activities of this Division in the past year have been characterized by a continuous effort to coordinate new data-processing techniques with existing museum resources, to design additional systems capable of aiding scientists and researchers in their tasks, and to disseminate the products and techniques of these activities throughout the museum community. Above all, efforts are constantly under way to develop and implement the most expeditious methods of utilizing information. Staff members cooperate with scientists and museologists to develop information-dissemination systems, to design experiments, and to generate statistical methods to support the conclusions of these experiments.

**New information-retrieval projects are reviewed by participating units. Dr. Charles Nagel and Mrs. Virginia Purdy of the National Portrait Gallery examine automated catalog of portraits with James Crockett of ISD.**



*Staff Publications and Papers*

CREIGHTON, REGINALD, and RICHARD KING. "The Smithsonian Institution Information Retrieval (SIIR) System: For Biological and Petrological Data." *Proceedings of the Sixth Annual National Information Retrieval Colloquium*, May 1969.

PIACESI, DANTE, and REGINALD CREIGHTON. "An Approach to the Geography Problem in Museums." *Proceedings of the Sixth Annual National Information Retrieval Colloquium*, May 1969.

SUSZYNSKI, NICHOLAS J. "Installation Management." *Data Processing*, October 1968, volume 8.



# Smithsonian Institution Press

ANDERS RICHTER, *Director*



**D**URING THE YEAR the Press has conceived, refined, and executed plans inaugurating four series for dissemination of basic research in the natural sciences. The first numbers of *Smithsonian Contributions to the Earth Sciences*, *Smithsonian Contributions to Zoology*, *Smithsonian Contributions to Paleobiology*, and *Smithsonian Contributions to Botany* were in press or distributed by the close of the year. Formats for the new series and standardization of style have been established by editor Albert L. Ruffin, Jr., through consultation with the Publications Committee of the National Museum of Natural History and with the later assistance of Charles L. Shaffer, who joined the Press staff in October 1968 as production manager of serial publications. Format for the covers and for a fifth new serial entitled *Smithsonian Studies in History and Technology* was developed by managing designer Stephen Kraft. A form solicitation, describing the several Smithsonian series and stating distribution policies, has been sent to libraries and has resulted in approximately 800 new subscriptions for one or more series. These revisions and improvements in the serials publication program, which include numerous details of economy and simplification, will yield a substantial gain of effectiveness in the Institution's diffusion of knowledge to the scholarly community.

The book publishing program has advanced in sales volume from \$100,678 in the previous year to \$235,049, a gain of 134 percent. Sales increases have occurred in all sectors: to the domestic trade through Random House, to foreign customers, and to the Smithsonian Museum Shops. The decision has been made to distribute Smithsonian books to European customers more directly from a British depository. On 22 August 1968 an agreement was signed with David & Charles (Pub-





Smithsonian publications displayed at the 13th International Congress of Entomology in Moscow, August 1968. These were the only American publications on exhibit at the meeting. Note between desk lamps the label giving publisher's name in Russian and English.

lishers), Ltd., of Newton Abbott, Devon, for exclusive sale of Smithsonian books in the United Kingdom and Europe, effective 1 July 1969. A large stock order of backlist and forthcoming titles has been received for shipment to England.

The foregoing gains have been made in the face of fiscal stringencies in both federal and private funds. Despite a backlog of 7500 manuscript pages in the house awaiting production at the beginning of the year, no effective increase has been allowed in the Press budget of federal funds. As a result, the Press has imposed a procedure of "page budgets" for the several museums and offices that submit manuscripts for publication in the Smithsonian series. Most of the principal sources of new manuscripts expended their page budgets by the end of October 1968. By March 1969, when the backlog and thin flow of new manuscripts had been processed, the Press rescinded these restrictions, though in the interim many authors had elected to publish their manuscripts elsewhere. Consequently, the Press has been enabled to operate within its budget and to conclude the year with no backlog of manuscripts in hand.

A concomitant economy of private funds has caused the Press to closely examine its third major program, popular publications, where considerable investment in museum guides and pamphlets have con-

sistently failed to return sufficient income from sales. At the request of the Acting Assistant Secretary for Public Service, the Press director has chaired three meetings of an ad hoc committee on popular publications composed of representatives from the administration, various public service offices, and the museums. This committee has produced a list of recommendations that the Secretary approved in April 1969, including the curtailment of publishing in this area until priorities can be established and marketing deficiencies solved, and the continuance of the committee to oversee these objectives.

Attention has been focused also on catalogs for temporary exhibitions or permanent collections in the Smithsonian museums. Recently, the Institution has launched two major art galleries in new quarters and has taken over another, and in prospect are the openings of two new art museums in Washington. The publication of exhibit catalogs soon will assume a large dimension. Though catalogs in the past have been published with private funds because of the demands of high-quality printing and difficult schedules that the Government Printing Office cannot meet, they are an integral part of a museum exhibition program that has been supported historically by the federal government. Accordingly, the Press director, the Treasurer, and the Legal Counsel have discussed the matter at length with managers of GPO and with staff of the Joint Committee on Printing. Following these meetings, a waiver requesting the exemption of catalogs from GPO production was submitted and was approved by the Joint Committee on Printing in June 1969. In the future, such catalogs may be produced outside GPO with federal funds.

The titles of one hundred publications issued under the Smithsonian imprint during fiscal year 1969 are listed below. The sharp decline in output from 151 titles published in the previous year is attributed to the moratorium on manuscript submissions, and to a minimum manuscript size of thirty pages newly instituted for the serials. Production costs of seventy-one publications were funded by federal appropriation in the amount of \$333,304.08; twenty-three were supported by Smithsonian private funds in the amount of \$200,754.04; and six were subsidized by grants or loans in the amount of \$100,980.83. The Press warehouse distributed 241,126 publications during the year, while Random House shipped 34,308 Smithsonian books on order, for a total distribution of 275,434 publications.

Among the year's new titles are works of major significance. *The Japan Expedition 1852-1854: The Personal Journal of Commodore Matthew C. Perry*, edited by Press managing editor Roger Pineau and introduced by Samuel Eliot Morison, has received a long approbation in the *New York Times Book Review* as well as favorable notices in

other media. The original manuscript, unpublished and dispersed, has been assembled and carefully annotated by Pineau. Of major documentary importance, it is eminently readable. *Design and Color in Islamic Architecture* by Sonia P. Seherr-Thoss, with extraordinary photographs by Hans C. Seherr-Thoss, likewise will serve scholars for decades to come, in this case by preserving the details of rapidly disintegrating monuments of incomparable artistic refinement. The book itself, containing 138 color plates, is a triumph of design and offset reproduction. *The Civilizational Process* by Darcy Ribeiro, formerly rector of the Universidade de Brasília and now under political arrest in Brazil, has been given major critical attention in *Natural History* magazine and *Current Anthropology*. This dialectical survey of the rise of civilizations by a citizen of the "third world" promises fertilization of anthropological theory north of the border.

The Smithsonian's cooperative venture with the American Heritage Publishing Company has been less successful. The *Smithsonian Library*, a series of illustrated popular books, was a commercial disappointment to American Heritage, which terminated the series after publication of the sixth volume. *The Evidence of Evolution* by Nicholas Hotton III, *Bridges, Canals, and Tunnels* by David Jacobs and Anthony E. Neville, *America's First Civilization* by Michael D. Coe, and *Worlds Around the Sun* by Lee Edson have appeared in the series during the year.

Shortage of office space on the Mall has dictated transferal of the Press administrative, editorial, production, and promotion offices to the Pension Building on G Street, between Fourth and Fifth Streets NW. The new offices are large and in contiguous layout, though these advantages are partly offset by the disefficiency of more distant communication with Mall authors. The Print Shop, which has remained in the Arts and Industries Building, has completed 816 jobs during the year.

In January–February 1969 the director was detailed for eight weeks as the Smithsonian's first candidate to the Federal Executive Institute in Charlottesville, Virginia. He again has represented the Institution on the Interagency Book Committee. The managing editor has organized an exhibition of Commodore Perry memorabilia about which one reviewer has said, "The viewer who explores this exhibition does so with astonishment and delight. No Washington museum in recent years has offered a show of greater interest." The managing editor also has served on the Copyright Committee of the Association of American University Presses, and continued as a trustee of the Japan-America Society of Washington. He was interviewed on "Washington Today" (Mutual Broadcasting Company) concerning the Perry Exhibit, and he and the director have been interviewed together over WAMU on the American University radio program "Social Values in Transition." The managing

designer has been awarded a Distinctive Merit Award by the Art Director's Club of Metropolitan Washington for his design of the Islamic architecture book. He also has taught a two-semester course "Graphic Design Techniques" at The American University and has conducted a seminar for the American Association for State and Local History. He has been impanelled as a critic of periodicals by the American Institute of Graphics Arts; and he and the director have served as panelists for the Georgetown Writers' Conference. Editor Louise J. Heskett has been awarded third place in competition by the Federal Editors Association for her design and editing of *The Invention of the Sewing Machine*.

### *Staff Publications*

PINEAU, ROGER, editor. *The Japan Expedition 1852-1854: The Personal Journal of Commodore Matthew C. Perry*. Washington, D.C.: Smithsonian Institution Press, 1969.

———. *The Japan Expedition 1852-1854 of Commodore Matthew Calbraith Perry*. Exhibit catalog. Privately published, 20 pages, October 1968; 32 pages, November 1968; 12 pages, March 1969.

## PUBLICATIONS OF THE SMITHSONIAN INSTITUTION PRESS FOR THE YEAR ENDED 30 JUNE 1969

### BOOKS

BERLANDIER, JEAN LOUIS. *The Indians of Texas in 1830*. Edited by John C. Ewers. xii + 209 pages, 20 plates, 39 figures. Publication 4745. 7 April 1969. Cloth \$10.00, paper \$5.95.

*Charles Sheeler: Essays by Martin Friedman, Bartlett Hayes, and Charles Millard*. 156 pages, 170 illustrations. Publication 4746. October 1968. Cloth \$10.00, paper \$5.95.

GESKE, NORMAN A. *Venice 34: The Figurative Tradition in Recent American Art*. 131 pages, 10 color plates, 60 black and white illustrations. September 1968. Cloth \$10.00, paper \$5.95.

GOODRICH, LLOYD. *The Graphic Art of Winslow Homer*. Foreword by Donald H. Karshan. 136 pages, 123 gravure illustrations. 2 June 1969. \$10.00.

GREENEWALT, CRAWFORD H. *Bird Song: Acoustics and Physiology*. 194 pages, 168 figures. 9 December 1968. \$12.50.

*Museums and Education*. Edited by Eric Larrabee. 262 pages. 18 July 1968. \$6.50.



- OLIVER, SMITH HEMPSTONE, and DONALD H. BERKEBILE. *The Smithsonian Collection of Automobiles and Motorcycles*. 164 pages, 125 illustrations. Publication 4719. November 1968. Cloth \$4.95, paper \$2.95.
- ORGAN, R. M. *Design for Scientific Conservation of Antiquities*. 497 pages, frontispiece, text figures, tables. 5 May 1969. \$16.00.
- PERRY, MATTHEW C. *The Japan Expedition 1852-1854: The Personal Journal of Commodore Matthew C. Perry*. Edited by Roger Pineau with an introduction by Samuel Eliot Morison. xix+241 pages, 48 color plates, 40 black-and-white illustrations, endpaper maps. 7 April 1969. \$10.00.
- PETERSON, MENDEL. *History Under the Sea: A Handbook for Underwater Exploration*. xvi+208 pages, 57 plates, 1 map. Originally published in 1965, reprinted in cloth. March 1969. \$5.95.
- RIBEIRO, DARCY. *The Civilizational Process*. Translated and with a foreword by Betty J. Meggers. 201 pages, 3 illustrations. December 1968. \$6.50.
- RIPLEY, S. DILLON. *A Paddling of Ducks*. Illustrated by Francis Lee Jaques. 256 pages, line drawings throughout text. Originally published 1957, reissued 15 April 1969. \$5.95.
- RITTERBUSH, PHILIP C. *The Art of Organic Forms*. 149 pages, 45 figures, 23 plates, color frontispiece. Publication 4740. 16 September 1968. Cloth \$10.00, paper \$5.95.
- SEHERR-THOSS, SONIA P. *Design and Color in Islamic Architecture: Afghanistan, Iran, Turkey*. Photography by Hans C. Seherr-Thoss, introduction by Donald N. Wilber. 312 pages, 138 color plates, 14 text figures. 21 October 1968. \$27.50.
- SWANTON, JOHN R. *The Indian Tribes of North America*. vi+726 pages, 5 maps. Bureau of American Ethnology Bulletin 145, originally published 1952, reissued in cloth 15 April 1969. \$15.00.
- This New Man: A Discourse in Portraits*. Edited by J. Benjamin Townsend, introduction by Charles Nagel, with an essay by Oscar Handlin. 217 pages, 163 illustrations. Publication 4752. October 1968. Cloth \$12.50, paper \$6.95.
- VAZQUEZ DE ESPINOSA, ANTONIO. *Description of the Indies (c. 1620)*. Translated by Charles Upson Clark. xii+862 pages. Smithsonian Miscellaneous Collections, volume 102, entitled *Compendium and Description of the West Indies*, originally published in 1942, reissued in cloth 16 September 1968. \$12.50.
- WETMORE, ALEXANDER. *The Birds of the Republic of Panama: Part 2.—Columbidae (Pigeons) to Picidae (Woodpeckers)*. v+605 pages, 76 illustrations. Publication 4732. Smithsonian Miscellaneous Collections, volume 150, part 2. 2 September 1968. \$15.00.



## BOOKLETS

- BISHOP, PHILIP W. *Petroleum*. 32 pages, illustrated. Publication 4751. 17 April 1969. \$.50.
- KINNARD, HARRY W. O. *Vertical Airlift*. 24 pages, illustrated. Publication 4761. 6 December 1968. \$.75.
- PURDY, VIRGINIA C., and DANIEL J. REED. *Presidential Portraits*. Edited by J. Benjamin Townsend. iv+74 pages, 38 illustrations. Publication 4748. 4 October 1968. \$1.25.
- SCHLEBECKER, JOHN. *Living Historical Farms: A Walk into the Past*. 32 pages, illustrated. Publication 4747. 15 November 1968.

## SERIAL PUBLICATIONS

## UNITED STATES NATIONAL MUSEUM—BULLETINS

258. J. LAURENS BARNARD. *Gammaridean Amphipoda of the Rocky Intertidal of California: Monterey Bay to La Jolla*. x+230 pages, 65 figures. 14 May 1969.
261. DAVID A. YOUNG. *Taxonomic Study of the Cicadellinae (Homoptera: Cicadellidae): Part 1, Proconiini*. vii+287 pages, 261 figures. 25 July 1968.
266. H. F. LOOMIS. *A Checklist of the Millipeds of Mexico and Central America*. v+137 pages. 24 October 1968.
271. J. LAURENS BARNARD. *The Families and Genera of Marine Gammaridean Amphipoda*. 535 pages, 173 figures. 14 May 1969.
272. J. T. PENNEY and A. A. RACEK. *Comprehensive Revision of a Worldwide Collection of Freshwater Sponges (Porifera: Spongillidae)*. v+184 pages, 15 plates. 24 September 1968.
273. MIGUEL A. SCHÖN. *The Muscular System of the Red Howling Monkey*. vi+185 pages, 49 figures, 5 tables. 12 August 1968.
275. GARY L. RANCK. *The Rodents of Libya, Taxonomy, Ecology, and Zoogeographical Relationships*. vii+264 pages, 54 figures, 16 plates. 2 October 1968.
276. FREDERICK W. STEHR and EDWIN F. COOK. *A Revision of the Genus Malacosoma Hübner in North America (Lepidoptera: Lasio-campidae): Systematics, Biology, Immatures, and Parasites*. vi+321 pages, 399 figures. 30 December 1968.
279. CHARLES W. BAKER. *Larval Taxonomy of the Troginae in North America with Notes on Biologies and Life Histories (Coleoptera: Scarabaeidae)*. v+79 pages, 59 figures. 16 December 1968.
280. JAY C. SHAFFER. *A Revision of the Peoriinae and Anerastiinae (Auctorum) of America North of Mexico (Lepidoptera: Pyralidae)*. vi+124 pages, 178 figures, 12 maps. 27 November 1968.

283. SUJIT KUMAR DAS GUPTA and WILLIS W. WIRTH. *Revision of the Oriental Species of Stilobezzia Kieffer (Diptera, Ceratopogonidae)*. iv+149 pages, 99 figures, 1 table. 28 August 1968.
284. VICTOR G. SPRINGER. *Osteology and Classification of the Fishes of the Family Blenniidae*. 85 pages, 16 figures, 11 plates. 10 September 1968.
285. THOMAS R. WALLER. *Two FORTRAN II Programs for the Univariate and Bivariate Analysis of Morphometric Data*. vi+55 pages, 2 figures. 3 April 1969.
287. KENNETH J. BOSS, JOSEPH ROSEWATER, and FLORENCE A. RUHOFF. *The Zoological Taxa of William Healey Dall*. vi+427 pages, 25 November 1968.
289. DONALD R. DAVIS. *A Revision of the American Moths of the Family Carposinidae (Lepidoptera: Carposinoidea)*. v+105 pages, 122 figures, 10 maps. 11 March 1969.
290. RICHARD E. WHITE. *A Review of the Genus Cryptocephalus in America North of Mexico (Chrysomelidae: Coleoptera)*. iv+124 pages, 140 figures. 31 January 1969.
292. FENNER A. CHACE, JR., and HORTON H. HOBBS, JR. *Bredin-Archbold-Smithsonian Biological Survey of Dominica: The Freshwater and Terrestrial Decapod Crustaceans of the West Indies with Special Reference to Dominica*. 258 pages, 76 figures, 5 plates. 14 May 1969.
294. REMINGTON KELLOGG. *Cetothere Skeletons from the Miocene Choptank Formation of Maryland and Virginia*. vii+40 pages, 2 figures, 25 plates, 23 tables. 14 May 1969.

#### CONTRIBUTIONS FROM THE MUSEUM OF HISTORY AND TECHNOLOGY

(Short papers are issued individually and later collected into Bulletins, all of which are casebound)

31. VLADIMIR CLAIN-STEFANELLI. "History of the National Numismatic Collections." 108 pages, 140 figures. 16 April 1969. (To be in Bulletin 229.)
63. RICHARD E. AHLBORN. "The Penitente Moradas of Abiquiú." 46 pages, 55 figures. 11 October 1968. (To be in Bulletin 250.)
64. CLAUDIA B. KIDWELL. "Women's Bathing and Swimming Costume in the United States." 32 pages, 18 figures, 29 January 1969. (To be in Bulletin 250.)

#### BULLETIN 252

(Papers 69-72 on technology)

72. JOHN N. HOFFMAN. "Anthracite in the Lehigh Valley of Pennsylvania." 53 pages, 23 figures. 3 July 1968.

## BULLETIN 253

C. MALCOLM WATKINS. *The Cultural History of Marlborough, Virginia*. viii+224 pages, 91 figures, 89 line drawings. 24 October 1968.

## BULLETIN 254

GRACE ROGERS COOPER. *The Invention of the Sewing Machine*. viii+156 pages, 137 figures. 2 July 1968.

## BULLETIN 269

EDGAR M. HOWELL and DONALD E. KLOSTER. *Catalog of United States Army Uniforms in the Collection of the Smithsonian Institution: Volume 1, United States Army Headgear to 1854*. xii+75 pages, 54 figures. 9 May 1969.

## BULLETIN 274

DEBORAH JEAN WARNER. *Alvan Clark & Sons: Artists in Optics*. vi+120 pages, 28 figures. 13 November 1968.

## BULLETIN 281

RITA J. ADROSKO. *Natural Dyes in the United States*. vii+160 pages, 11 figures (1 color), frontispiece (color). 25 November 1968.

## CONTRIBUTIONS FROM THE UNITED STATES NATIONAL HERBARIUM

(Bulletin subseries with volumes numbered separately and issued in parts)

## VOLUME 34

7. WILLIAM LOUIS CULBERSON and CHICITA F. CULBERSON. "The Lichen Genera *Cetrelia* and *Platismatia* (Parmeliaceae)." Pages i-iv+449-558, 25 plates, 31 figures. 10 July 1968.

## VOLUME 37

5. PETER H. RAVEN. "A Revision of the Genus *Camissonia* (Onagraceae)." Pages 161-396, 81 figures, frontispiece. 5 February 1969.

6. MARIE L. FARR. "Bredin-Archbold-Smithsonian Biological Survey of Dominica: *Myxomycetes* from Dominica." Pages 397-440, 5 figures. 31 January 1969.

## PROCEEDINGS OF THE UNITED STATES NATIONAL MUSEUM

## VOLUME 125

(Final volume of series)

3658. A. STANLEY RAND and STEPHEN S. HUMPHREY. "Interspecific Competition in the Tropical Rain Forest: Ecological Distribution among Lizards at Belém, Para." 17 pages, 2 figures. 30 July 1968.

3660. J. F. GATES CLARKE. "Neotropical Microlepidoptera, XVII: Notes and New Species of Phaloniidae." 59 pages, 30 figures, 4 plates. 30 July 1968.
3664. MARVIN C. MEYER. "Moore on the Hirudinea with Emphasis on His Type-Specimens." 32 pages. 19 November 1968.
3665. OLIVER S. FLINT, JR. "Bredin-Archbold-Smithsonian Biological Survey of Dominica, 9: The Trichoptera (Caddisflies) of the Lesser Antilles." 86 pages, 231 figures. 13 December 1968.
3666. NASIMA M. TIRMIZI and RAYMOND B. MANNING. "Stomatopod Crustacea from West Pakistan." 48 pages, 17 figures. 13 December 1968.
3667. KARL BANSE and KATHERINE D. HOBSON. "Benthic Polychaetes from Puget Sound, Washington, with Remarks on Four Other Species." 53 pages, 8 figures. 20 December 1968.
3668. PERRY C. HOLT. "The Genus *Pterodrilus* (Annelida: Branchiobdellida)." 44 pages, 12 figures. 19 November 1968.

## SMITHSONIAN ANNALS OF FLIGHT

## VOLUME 1

3. PHILIP S. DICKEY III. *The Liberty Engine, 1918-1942*. x+110 pages. 10 July 1968.

## SMITHSONIAN CONTRIBUTIONS TO ANTHROPOLOGY

## VOLUME 6

(Whole volume)

- CLIFFORD EVANS and BETTY J. MEGGERS. *Archeological Investigations on the Rio Napo, Eastern Ecuador*. xviii+130 pages, 80 figures, 94 plates, frontispiece, 15 tables. 4 October 1968.

## VOLUME 8

(Whole volume)

- OLGA LINARES DE SAPIR. *Cultural Chronology of the Gulf of Chiriquí, Panama*. xiii+119 pages, 55 figures, 20 plates, 12 tables. 6 December 1968.

## VOLUME 10

(Whole volume)

- SAUL H. RIESENBERG. *The Native Polity of Ponape*. lx+115 pages, 12 plates, 4 figures. 31 December 1968.

## SMITHSONIAN CONTRIBUTIONS TO THE EARTH SCIENCES

1. GEORGE SWITZER and WILLIAM G. MELSON. "Partially Melted Kyanite Eclogite from the Roberts Victor Mine, South Africa." 9 pages, 5 figures. 15 April 1969.

## SMITHSONIAN CONTRIBUTIONS TO ZOOLOGY

1. RAYMOND B. MANNING. "Notes on Some Stomatopod Crustacea from Southern Africa." 17 pages, 4 figures. 9 June 1969.
2. B. D. BURKS. "Species of *Spalangia* Latreille in the United States National Museum Collection (Hymenoptera: Pteromalidae)." 7 pages, 3 figures. 13 June 1969.
3. HOWARD E. EVANS. "Bredin-Archbold-Smithsonian Biological Survey of Dominica: Bethyloidea (Hymenoptera)." 14 pages, 16 figures. 13 June 1969.
5. RICHARD E. YOUNG and CLYDE F. E. ROPER. "A Monograph of the Cephalopoda of the North Atlantic: The Family Cycloteuthidae." 24 pages, 3 figures, 9 plates. 9 June 1969.
6. KRISTAN FAUCHALD, "A Revision of Six Species of the *Flavus-Bidentatus* Group of *Eunice* (Eunicidae: Polychaeta)." ii + 15 pages, 6 illustrations. 13 June 1969.

## SMITHSONIAN MISCELLANEOUS COLLECTIONS

## VOLUME 152

3. THOMAS E. SNYDER. "Second Supplement to the Annotated Subject-Heading Bibliography of Termites, 1961-1965." ii + 188 pages. Publication 4705. 31 December 1968.

## VOLUME 153

2. PORTER M. KIER. "Echinoids from the Middle Eocene Lake City Formation of Georgia." 45 pages, 44 figures, 10 plates. Publication 4738. 11 October 1968.
3. CLAYTON E. RAY, ALEXANDER WETMORE, DAVID H. DUNKLE, and PAUL DREZ. "Fossil Vertebrates from the Marine Pleistocene of Southeastern Virginia." 25 pages, 2 figures, 12 plates. Publication 4742. 2 August 1968.
4. C. LEWIS GAZIN. "A Study of the Eocene Condylarthran Mammal *Hyopsodus*." iv + 90 pages, 10 figures, 13 plates. Publication 4744. 27 November 1968.
5. C. G. ABBOT and LENA HILL. "A Long-Range Forecast of Temperature for 19 United States Cities." ii + 21 pages, 1 figure, 4 tables. Publication 4753. 31 May 1969.

## OTHER SERIAL PUBLICATIONS

(Editorial or production services by Smithsonian Institution Press)

*Atoll Research Bulletin*. Number 127: "Ornithology of the Marshall and Gilbert Islands," by A. Binion Amerson, Jr. 348 pages. 28 May 1969.



## CATALOGS

- Abandoned Mine Scenes: Oil Paintings by Carol Riley.* Exhibit folder. June 1969.
- Annotated List of Photographs in the Division of Agriculture and Forest Products.* Compiled by Pauline B. Christian. 126 pages. 30 January 1969.
- HABERSTICH, DAVID, *Women, Cameras, and Images I: Imogen Cunningham.* 2 pages, 1 illustration. December 1968.
- MCCLELLAND, DONALD R. *The Paintings and Drawings of Justin Pieris Daraniyagala.* 8 pages. 11 December 1968.
- Sixty Afternoons in Austin, Texas.* Exhibit folder. October 1968.
- STEWART, ROBERT G. *A Nineteenth-Century Gallery of Distinguished Americans.* Foreword by Charles Nagel. vi+93 pages, 168 plates. 19 February 1969.
- Recent British Prints.* Exhibit folder. April 1969.

## INFORMATION LEAFLETS

- The Arts and Industries Building.* Guide map.
- Chesapeake Bay Center for Field Biology.* Folder. June 1969.
- A Guide to the National Museum of Natural History and Museum of Man.* May 1969.
- Hodgkins Medal.* Folder. 6 pages. June 1969.
- Museum of History and Technology Hall Guide.* Folder. 22 August 1968.
- National Collection of Fine Arts.* Folder. April 1969.
- National Portrait Gallery.* Guide map. April 1969.
- National Portrait Gallery.* Folder. April 1969.
- The NC-4: The First Transatlantic Flight.* 12 pages, 6 illustrations. 8 May 1969.
- Organs in Early America.* Folder. 5 February 1969.
- SHELDON, ROBERT E. *Wind Instruments.* Folder. 11 February 1969.
- Sage of Anacostia: An Exhibit on Afro-American History and Highlights in the Life of Frederick Douglass.* Foldout. 24 January 1969.
- SETZER, HENRY W. *Directions for Preserving Mammals for Museum Study.* Smithsonian Information Leaflet 380. 20 pages. November 1968.
- Smithsonian Institution.* Folder. July 1968.

## ANNUAL REPORTS

- Annual Report of the American Historical Association for the Year 1967.* Volume 1: "Proceedings." xviii+136 pages. 22 April 1969.

*Smithsonian Year 1968: Annual Report of the Smithsonian Institution for the Year Ended 30 June 1968.* vii+557 pages, illustrated. Publication 4760. 10 April 1969.

## OFFICIAL PUBLICATIONS

*A Guide for Smithsonian Researchers at the Library of Congress.* 8 pages. April 1969.

*Smithsonian Research Opportunities 1969-1970.* 16+204 pages, 16 illustrations. October 1968.



# Science Information Exchange

MONROE E. FREEMAN, *Director*

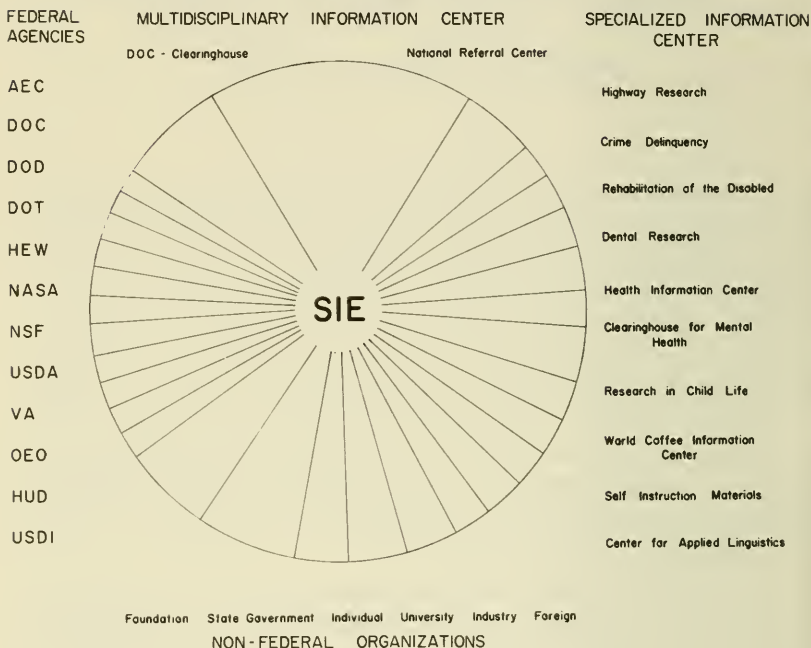
ON 3 DECEMBER 1968, the Science Information Exchange commemorated the twentieth year of its establishment with a program at the National Museum of History and Technology. In attendance were Secretary Ripley and other leaders from the governmental and private scientific and information communities. Dr. Charles W. Shilling, one of the founders and a former chairman of the Governing Board of SIE, recalled the early history as a pioneering enterprise in the science information field. Members of the SIE staff briefly reviewed the growth of its data base and the expansion of its usage throughout the national research community. Highlighted were SIE's accomplishments in the design, development, and testing of new methods and techniques in the large scale processing of scientific information.

A number of significant changes have been initiated during the past year. A user-fee system to provide for partial cost recovery has been necessitated by the rapidly increasing workloads, an increasing number of users, and rising operational costs. Service fees have been initiated for nonfederal users in December. Federal users will be subject to the same service fees after 30 June.

A number of developments designed to produce more information in more varied arrangements at lower costs became operational during the year. New computer programs have been developed and tested using the SIE subject-index system to produce catalog material on magnetic tape compatible with the Government Printing Office Linotron. This substantially reduces the printing costs of the annual catalogs SIE prepares for several of the federal agencies. Two large catalogs—*Water Resources Research*, volume IV, and *Marine Sciences*—were delivered on computer tape. Others are in preparation.

Another important development, in cooperation with federal agencies, has been to receive agency research records on compatible magnetic tape that feeds directly into the SIE computer. Almost fifty percent of the federal research records are now entering the SIE data bank this way at a saving of more than \$1.50 per record.

## *ROLE OF SIE IN THE NATIONAL INFORMATION NETWORK*



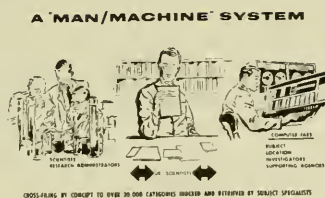
New retrieval programs, including random access for the compilation of administrative information, have reduced computer search time from four hours to fifteen minutes. This development provides faster response time and offers a wider variety of services to all users at a much lower cost.

These and other innovations, as well as continual surveys and studies on user needs, user acceptance, and user satisfaction, have been reported in the publications and conference presentations listed below. Staff members have served as panelists and moderators at the annual meeting of the American Society of Information Science.

In summary, SIE has maintained its routine services to the national science community and has actively continued the development of new methods of organizing and handling scientific information to provide the fastest and most comprehensive service at reasonable rates while maintaining the scientific quality that is expected from the nation's largest processor of information about research in progress.



AB-123-6-2 Accession Number
G-HEN-PHS-NIH-MH Agency Code
G E C Misc. Codes
TENN-27(A) Agency No.
AF-482973 Contract No.
10/68 Beginning Date
9/69 End Date
69 Fiscal Year
\$25,499 Funds
Adams, H. E. Principal Investigator
4-192-24-403 Location Code
Chemistry Dept. or Specialty
ORR, H. C. .... ROGERS, J. L. .... ..... Other Investigators
L-BRAIN L-SHOCK K-SF-INFO O-MAN P-PHOSPHATE P-DALUNOMYCIN ..... Subject Index Codes
NEW CELL CULTURE Title
By using various culture techniques additional substrates for vaccine production will be..... Text



### SIE DATA BANK

#### Master File

Provides for Retrieval by:

1. a. Who  
b. Where  
c. When  
d. How Much
2. Subject and Administrative  
a. What and/or Who, Where  
When, and How Much

#### Inverted Subject File

(Random Access Distribution  
Storage)

1. For Immediate Subject Retrieval  
(2-3 minutes per question)

S 5600 SS 750 25 995 Subject Index Code			
1 Record Number			
15 Count of Trailing Grants			
GH	446-2	68	0
GPE	64-5	68	0
GPE	S11-6	68	0
GQA	380	68	1
GQA	519-2	68	1
GSB	467-3	69	0
GUW	257	69	1
PKF	117	68	0
QUF	647	68	2
ZPE	778-2	69	2
ZPE	964	69	0
ZQA	53-1	68	2
1A1	15759-1-1	69	0
1CA	4088-8-1	69	0
1GM	1175-5-1	69	0
Grant or Contract	Accession Number	FY Continu- ation	

## Staff Publications and Papers

FREEMAN, M. E. "The Role of the Science Information Exchange." Science Information Exchange, 20th Anniversary program, at the Smithsonian Institution. 3 December 1968.

HERSEY, D. F. "Improving the System." Science Information Exchange, 20th Anniversary program, at the Smithsonian Institution. 3 December 1968.

———. "Interrelationship of Microbial Agents and Antigens in Selected Diseases." Armed Forces Institute of Pathology, Washington, D.C. 23 April 1969.

———, W. R. FOSTER, M. SNYDERMAN, and F. J. KREYSA. "Conceptual Indexing and Retrieval of Current Research Records: An Analysis of Problems and Progress in a Large Scale Information System. I, The Science Information Exchange: Description and Problems; II, Recent Improvements in the SIE System, and an Evaluation." *Methods of Information in Medicine, Journal of Methodology in Medical Research, Information and Documentation* [German journal] (July 1968), volume 7, number 2, pages 172-187.

———, W. R. FOSTER, E. W. STALDER, and F. J. KREYSA. "Determination of Acceptable Noise Levels in Subject Requests from an Information System." American Society for Information Science meeting at Columbus, Ohio. 20-24 October 1968.

- , and E. D. SHAW. "Viral Agents in Hepatitis – A Review." *Laboratory Investigation* (November 1968), volume 19, pages 558–572.
- KREYSA, F. J. "Management of R&D Information for Future Technological Growth with Special Emphasis on Czechoslovakia." Fourth Congress, Czechoslovak Society of Arts and Sciences in America, Inc. 1 September 1968.
- . "Participants in the Science Information Exchange System." Science Information Exchange, 20th Anniversary Program, at the Smithsonian Institution. 3 December 1968.
- LONG, B. L. Presentation regarding Marine Council activities with particular emphasis on the Food-from-the-Sea Program. The State Department. 19 July 1968.
- ROTH, H. M. Presentation on Science Information Exchange services before a conference entitled "Hard-Core Education and Training and Employment." The National Industrial Conference Board, Princeton Inn, New York City. 4 September 1968.
- SNYDERMAN, M., and B. HUNT. "Seventeen Ideas for Managing Small Computer Installations." *Journal of Data Management* (July 1968), pages 20–26.
- , and R. A. KLINE. "Job Costing a Multiprogramming Computer." *Journal of Data Management* (January 1969), pages 19–20.

# ADMINISTRATIVE MANAGEMENT

JAMES BRADLEY

*Assistant Secretary*



# Administrative Management

JAMES BRADLEY, *Assistant Secretary*

THE CHARACTER OF MODERN CIVILIZATION has been largely determined by the twin influences of democracy and science. The evolutionary theory of management views democracy and science as dynamic factors which must be integrated into both the practice and the theory of management. Just as the factory has been viewed as the representative work place of a technically advanced society during the past two centuries, the work which typifies the future will be performed in the laboratory and the study. Management practice, organization structure, and leadership style must be revised to meet the requirements of the knowledge-oriented institution.<sup>1</sup>

The evolving need to pursue this theory and practice in the administration and management of Smithsonian affairs has been well recognized during recent years. The diversity of our new and expanding programs, the growing importance and use of the National Collections, the developing of an unrivaled complex of museums and art galleries available to millions of visitors, and the continuing dedication of the Smithsonian to works of scholarship have demanded that its administrative and management policies and practices be pliant, responsive to new and changing needs, innovative, and progressive.

Accordingly, too, the program-support groups have been guided by similar objectives to help assure the successful accomplishment of the Smithsonian's main purposes. These groups have not benefited by position and funding increases corresponding to the growth of the Smithsonian program units and, in addition, they have experienced serious cutbacks under the Revenue and Expenditure Control Act of 1968. Despite this, they have performed a remarkable amount of excellent support work this year. Organizational changes, reassignment of personnel, personal sacrifices, increased efforts, increased use of automatic data processing, and elimination or deferral of lower priority projects have contributed in large part to the achievements made by these groups. The following statement highlights some of their activities.

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<sup>1</sup> Waino W. Suojanen. Preface to *The Dynamics of Management*, New York, N.Y.: Holt, Rinehart & Winston, Inc., 1966.



## PROGRAM SUPPORT ACTIVITIES

### *Office of Personnel and Management Resources*

A continuing responsibility of this Office is to advise and assist all Smithsonian staff in fostering an administrative management environment that encourages high achievement and makes optimum use of resources. A successful, close-working relationship now has been established between the personnel management consultant staff and managers throughout the Smithsonian. The value of such a coordinated effort in meeting common objectives has been brought into sharp focus this past year. The restrictions of the federal Revenue and Expenditure Control Act of 1968, coupled with an existing awareness of the need to derive maximum use of Smithsonian manpower, has presented a major management problem. To cope effectively with this difficulty, this Office has developed a new system whereby all position vacancies are assessed critically to determine how they relate to the accomplishment of essential programs and objectives. All levels of management participate in fixing the priority for filling each vacancy, and their collective evaluations are reflected in a listing of position vacancies presented to the Secretary for his personal review and final action.

Working with other Smithsonian units concerned, a new computerized payroll-personnel system has been developed. Among the benefits to be realized from this program will be the capability of obtaining very comprehensive and timely management information to aid in making critical decisions. Also, increased efficiency in accomplishing routine operations will permit some redirection of staff efforts toward more support of professional activities.

An innovation this year has been the biweekly publishing of a "*Recruiting for*" bulletin that lists all vacant Smithsonian positions. Distributed to all employees, this publication has kept them informed of promotion opportunities and also has brought forth their assistance in recruiting outside applicants for some of its vacancies.

The Incentive Awards Program has been expanded to include a special award for citizen contributions to the Smithsonian's programs and mission. Designs have been completed for the Secretary's Exceptional Service Gold Medal award and for a new bureau director's award for Scientific or Curatorial Excellence.

Employee development and educational programs have been strengthened, and special attention has been given to employing and training persons in need of enhanced job opportunities, the handicapped, and young adults during the summer.

The *Executive Profile Catalogue* of key Smithsonian officials, prepared this year, has been a particularly helpful reference source for Smithsonian management staff.

### *The Treasurer's Office*

Combining the Office of Programming and Budget, the Fiscal Division, the Contracts Office, and internal audit expertise under the new Smithsonian treasurer has resulted in a number of marked benefits in the administration and management of the financial affairs of the Institution. Further, the more recent merging, in May 1969, of the federal and private fiscal groups under a new accounting division that reports to the assistant treasurer will induce additional economies in personnel and other resources and will offer greater career opportunities for staff members in the unit. Improved communications among the individual groups have resulted from these reorganizations and have enhanced the financial staff's ability to provide guidance, assistance, and instructions to all Smithsonian program units.

The forward planning and budgeting of private funds has been placed on a thoroughly professional basis and is coupled with a system of monthly management reports that enable all units to maintain a continuing control of private fund expenditures throughout the year.

Another innovation this year has resulted in a comprehensive analysis of federal expenditures for all organization units. This detailed examination of the base resources of each unit not only makes possible a more informed allocation of current federal resources but also supports sound planning for the future use of these limited resources.

A sophisticated combined payroll-personnel system—developed through the coordinated efforts of this Office, the Office of Personnel and Management Resources, the Information Systems Division, and the Administrative Systems Division—will be operational in fiscal year 1970. This computer-supported program will provide a wide variety of additional financial and personnel-management data on a timely, scheduled, and continuing basis.

### *Buildings Management Department*

Largest of all Smithsonian units, this Department's responsibilities include operating and maintaining the physical plant, which contains nearly 3.5 million square feet of floor space; safeguarding the priceless national collections; and guiding, assisting, and protecting the millions of people who visit the Smithsonian each year.

Record of Visitors During Fiscal Year 1969<sup>1</sup>—1 July 1968–30 June 1969

1968	Smithsonian Building	Arts and Industries Building	Natural History Building	Air and Space Building	Freer Gallery of Art	History and Technology Building	Fine Arts and Portrait Galleries	Totals
July	104, 134	151, 429	294, 709	139, 991	16, 714	589, 054	12, 471	1, 308, 502
August	120, 891	176, 989	347, 326	166, 483	21, 952	650, 850	12, 218	1, 496, 709
September	50, 234	73, 664	154, 430	65, 338	12, 124	222, 680	10, 158	588, 628
October	Closed	73, 952	166, 005	59, 386	10, 562	227, 021	<sup>2</sup> 19, 597	556, 523
November	Closed	79, 975	180, 394	55, 003	9, 733	213, 543	14, 892	553, 540
December	Closed	52, 269	118, 187	33, 729	6, 405	180, 898	12, 094	403, 582
1969								
January	Closed	62, 561	127, 575	43, 391	7, 354	141, 918	16, 353	399, 152
February	Closed	74, 500	139, 854	49, 932	8, 649	192, 620	13, 422	478, 977
March	Closed	118, 882	203, 404	84, 053	11, 089	275, 362	11, 177	703, 967
April	Closed	248, 616	440, 385	186, 339	25, 918	531, 252	12, 121	1, 444, 631
May	Closed	171, 791	390, 264	143, 909	24, 335	453, 617	18, 412	1, 202, 328
June	Closed	208, 513	354, 216	198, 405	24, 539	495, 256	13, 262	1, 294, 191
Totals <sup>3</sup>	275, 259	1, 493, 141	2, 916, 749	1, 225, 959	179, 374	4, 174, 071	166, 177	10, 430, 730

<sup>1</sup> Reductions in the guard staff caused by the Revenue and Expenditure Control Act of 1968 resulted in the unprecedented action of closing all buildings, except the History and Technology Building, to the public on Mondays from 21 October 1968 until 7 April 1969.

<sup>2</sup> The National Portrait Gallery opened 6 October 1968.

<sup>3</sup> The total of visitors this year to all parts of the Smithsonian complex has been 17,562,986, which includes 1,283,398 at the National Gallery of Art and an estimated 5,848,858 at the National Zoological Park.

The complete success of the Institution's diversified research, cultural, educational, and public-enlightenment programs frequently is contingent in large part upon the timely, understanding, and effective support provided by the Department's staff.

Among the major construction contracts, totaling an estimated expenditure of \$4.7 million, which has required the Department's attention at varying stages from initial planning through completion, are: the Calder Stabile and Pool, renovation of the Smithsonian Institution Building, the Renwick Gallery renovation, mezzanine construction in the Arts and Industries Building, modernization of elevators in the Natural History Building, and construction of Building 22 at Silver Hill, Maryland. Other projects requiring extensive manpower and materials support during the year have included: restoration of the Offices of the Director General of Museums, construction of numerous offices and laboratories, and relocation of several activities and collections in the Pension Building and in the former Records Center at Alexandria, Virginia.

Major effort also has been expended for the 2,300 special events and ceremonies that have occurred this year. Highlights of these affairs are: the Vice President's Reception and the Inaugural Ball held in the History and Technology Building, opening of the newly renovated quarters of the National Portrait Gallery, and the ground-breaking ceremony for the Joseph H. Hirshhorn Museum and Sculpture Garden.

Plans have been initiated for a new computer program designed to provide the director with regular, detailed financial and work progress data covering all projects under way in the Department. Implementation of this program in fiscal year 1970 is anticipated.

### *The Supply Division*

Purchases this year have exceeded 11,000 units, an estimated increase of 1,000 over the previous year. Under the government property distribution and utilization programs, items from rockets to art objects, with an original acquisition value exceeding \$3,000,000, have been obtained for exhibition and research purposes.

The combining last year of property management, stocking, and receiving activities under one manager has resulted in the elimination of a position and more efficient and economical use of personnel and other resources.

## *The Photographic Services Division*

In direct support of the Smithsonian research, educational, cultural, and public service programs, the Division has produced 21,117 negatives, 14,000 color slides, 50,000 microframes, and 111,000 prints.

Photographic talents and other resources of the Division have contributed to the completion of seventy-three new exhibit units in eight main exhibition halls. Successful rush treatment necessary to produce forty-two special, temporary exhibitions has been provided. This work has required the application of unusual techniques and spectacular photographic treatments to assure attractive and meaningful presentation of exhibited items. Of special note has been the photographing of a major portion of the recently acquired famous Lilly coin collection containing some 6,000 items.

The branch photographic laboratory for the Oceanographic Sorting Center has not been activated this year because of lack of funds for personnel and other purposes.

## *Travel Services Office*

All aspects of the travel support services provided by the small staff of three, have continued their upward trend. Compared with last year, increases experienced are: air and rail reservations booked, 36 percent; travel itineraries issued, 29½ percent; transportation requests processed, 15¼ percent; and hotel reservations booked, 35 percent.

Planning data, advisory services, and travel arrangements have been provided to support national and international conferences, meetings, and expeditions; e.g., the Symposium for the Association for Tropical Biology at the University of Puerto Rico; an archeological expedition to Yugoslavia, Greece, and other countries; the Olympics in Mexico City; and the three-week Systematics Symposium in Washington, D.C.

A new venture started this year places responsibility on the Travel Services Office for correlating activities of the Smithsonian Institution with the American Institute of Indian Studies on travel matters associated with Excess Foreign Currency Awards made to the Institute.

## *Administrative Systems Division*

A critical review of current Smithsonian administrative directives, including policy and procedural materials, has resulted in a decision to develop a new coordinated system for these management guidelines. Smithsonian Staff Handbook—530, *Property Management*, was issued





Dr. V. Clain-Stefanelli, curator of numismatics, receives one of the rare "Jet Age Dollars" from Mr. Herbert D. Ford of American Airlines. The medallion, issued to American Airlines passengers ten years ago on the first transcontinental jet flight, is being admired by Mrs. Clain-Stefanelli and Mrs. Betty V. Strickler. Mrs. Strickler is chief of the Smithsonian's Travel Services Office, where the presentation ceremony was held.

in February 1969 and a similar handbook, *Requisitioning of Supplies and Services*, will be published early next year.

The Forms Management Unit has supported hundreds of Smithsonian activities from logs covering preventive maintenance in our machine shops to forms for recording specimens on board ship by the Smithsonian Oceanographic Sorting Center. Over 600 requisitions for in-house reproduction of forms and form letters have been processed in addition to more than 150 orders for purchases from the Government Printing Office and other external sources.

## CONSTRUCTION PROGRESS DURING FISCAL YEAR 1969

### *Museum of History and Technology*

CALDER STABILE. Design was completed by architect Walker Cain in December 1968 and a construction contract was awarded to Barr and

Barr Incorporated of New York. The stabile was completed in France in March 1969 and arrived in Washington the following month. It was installed in May 1969 and the dedication ceremony was held on 3 June.

### *National Zoological Park*

HOSPITAL-RESEARCH BUILDING. Construction by the Lomack Corporation continued through the fiscal year and is scheduled for completion in the fall of 1969.

MULTICLIMATE HOUSE. Final design has been started by architects Metcalf and Associates and will be completed early in fiscal year 1970. Construction funds are available and construction can start upon completion of design.

HEATING STUDY. Engineering consultant William Brown has completed a planning study for new heating plants at the Zoological Park. This study will serve as a guideline for future design.

### *Joseph H. Hirshhorn Museum*

Design was completed by the architect in January 1969, bids were solicited on 20 March 1969, opened on 27 May 1969, and rejected in June 1969. Demolition of the Armed Forces Institute of Pathology building started in January 1969 and was completed in February 1969. A ground-breaking ceremony was held on 8 January 1969.

### *Restoration and Renovation of Buildings*

RENOVATION AT SMITHSONIAN INSTITUTION BUILDING. Construction work by Grunley-Walsh Construction Company has continued through the year, and is now scheduled for completion in the spring of 1970. A contract was awarded to William Pahlmann Associates in the amount of \$20,000 in June 1969 for interior design for furnishings and finishes.

OCEANOGRAPHY SORTING CENTER. Installation of air conditioning by Marathon Service Incorporated was started in September 1968 and completed in June 1969.

RENWICK GALLERY. The Smithsonian assumed occupancy of the Renwick Gallery from GSA and from the construction contractor (American Construction Company) in February 1969. The incompleting remains closed pending further appropriation of funds.

**ARTS AND INDUSTRIES BUILDING.** Plans and specifications for renovation of the A&I Building have been essentially completed by architects Collins and Kronstadt. Construction funds will be requested in the fiscal year 1971 budget.

**RADIATION BIOLOGY LABORATORY.** A lease has been negotiated between GSA and the Danac Corporation for a new building containing 50,000 square feet at Rockville, Maryland. The new building will be completed about September 1969, at which time the laboratory will be moved.

### *Feasibility Studies*

**WOODROW WILSON CENTER.** A feasibility study contract was awarded to Urban Design and Development Corporation in the amount of \$35,000 on 4 April 1969. The contract completion date is 1 September 1969.

**PARKING.** A feasibility study contract for parking garages under the Mall and for parking at the National Zoological Park was awarded to Wilbur Smith and Associates in the amount of \$80,000 (\$30,000 from National Park Service and \$20,000 from Zoo Construction) on 19 May 1969. Completion time is six months.

**STORAGE.** A feasibility study contract for redevelopment of Silver Hill was awarded to the George M. Ewing Company in the amount of \$20,000 on 19 May 1969. Completion date is 1 October 1969.



NATIONAL GALLERY OF ART

JOHN WALKER

*Director*





# The National Gallery of Art

JOHN WALKER, *Director*<sup>1</sup>



DEAR MR. SECRETARY: Submitted herewith, on behalf of the Board of Trustees, is the report of the National Gallery of Art for the fiscal year ended 30 June 1969. This report, which is the Gallery's 32nd annual report, is made pursuant to the provisions of section 5(d) of Public Resolution No. 14, 75th Congress, 1st session, approved 24 March 1937 (50 Stat. 51; United States Code, title 20, section 75(d)).

## ORGANIZATION

The National Gallery of Art, although technically 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 such 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*. The five General Trustees continuing in office during the fiscal year ended 30 June 1969, are Paul Mellon, John Hay Whitney, Dr. Franklin D. Murphy, Lessing J. Rosenwald, and Stoddard M. Stevens. On 1 May 1969, Paul Mellon was re-elected by the Board of Trustees to serve as President of the Gallery, and John Hay Whitney was re-elected Vice President.

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<sup>1</sup> Retired 30 June 1969; replaced by J. Carter Brown.

The executive officers of the Gallery during the fiscal year ended 30 June 1969 are as follows:

Chief Justice of the United States, Earl Warren, Chairman <sup>2</sup>  
 Paul Mellon, President  
 John Hay Whitney, Vice President  
 Ernest R. Feidler, Secretary and Treasurer  
 John Walker, Director <sup>3</sup>  
 E. James Adams, Administrator  
 Ernest R. Feidler, General Counsel  
 Perry B. Cott, Chief Curator <sup>3</sup>  
 J. Carter Brown, Deputy Director

The three standing committees of the Board as constituted at the annual meeting on 1 May 1969 are 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, David M. Kennedy, 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

## APPROPRIATIONS

The Congress of the United States, in the regular annual appropriation, and in a supplemental appropriation required for pay increases, has provided \$3,230,000 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

<sup>2</sup> From 23 June 1969: Warren E. Burger, Chairman.

<sup>3</sup> Retired as of the end of fiscal year 1969.

the National Gallery of Art (Public Resolution No. 14, 75th Congress, 1st session, approved 24 March 1937 (50 Stat. 51; United States Code, title 20, sections 71-75)).

The following obligations have been incurred:

Personnel compensation and benefits	\$2, 576, 908. 26
All other items	\$ 652, 408. 24
	<hr/>
Total obligations	\$3, 229, 316. 50

PERSONNEL

At the close of the fiscal year full-time government employees on the permanent staff of the National Gallery of Art numbered 309. The United States Civil Service regulations govern the appointment of employees paid from appropriated funds.

ATTENDANCE

There have been 1,283,398 visitors to the Gallery during the year. The average daily attendance was 3,536.



*Sitting Bull (?)*. By J. W. Bradshaw (American, probably last quarter 19th century). Canvas, 20 x 16 inches. (Gift of Edgar William and Bernice Chrysler Garbisch.) National Gallery of Art.



*Felucca Off Gibraltar.* By Thomas Chambers (American, 1807/1808—living 1866). Canvas,  $22\frac{1}{8} \times 30\frac{1}{8}$  inches. (Gift of Edgar William and Bernice Chrysler Garbisch.) National Gallery of Art.

## ACCESSIONS

There have been 180 accessions by the National Gallery of Art as gifts or extended loans during the year.

## GIFTS

The following gifts have been accepted by the Board of Trustees:

PAINTINGS		
<i>Donor</i>	<i>Artist</i>	<i>Title</i>
Colonel and Mrs. Edgar William Garbisch	Bradshaw Chambers Unknown	Plains Indian <i>Felucca Off Gibraltar</i> <i>Northwestern Town</i>
Frances Frieske Kilmer Brenda Kuhn National Gallery of Art, Ailsa Mellon Bruce Fund	Frieske Kuhn Claude Lorrain Jordaens	<i>Memories</i> <i>Wisconsin</i> <i>The Judgment of Paris</i> <i>Portrait of a Man</i>



		SCULPTURE	
<i>Donor</i>	<i>Artist</i>		<i>Title</i>
Gustave Pimienta	Pimienta		<i>Orpheus</i>
	Pimienta		<i>Eagle</i>
Lauson H. and Marshall H. Stone	Sterne		<i>Seated Nude</i>
GRAPHIC ARTS			
Mrs. Ludwell Detzer Denny	Sherwin, after Gainsborough		Glass print: <i>William Pitt</i>
Colonel and Mrs. Edgar William Garbisch	Strengé		<i>Fraktur Vorschrift</i>
Mr. and Mrs. Harry Le Bovit	Tester		<i>Fraktur "Nicht Lotran"</i>
	Szábó		6 wood engravings
National Gallery of Art, Ailsa Mellon Bruce Fund	Rubens		<i>A Lion</i>
National Gallery of Art, Andrew Mellon Fund	Callot		<i>The Tree of St. Francis</i>
Lessing J. Rosenwald	Bonasone		<i>Portrait of Michelangelo</i>
	Bosch		<i>St. Martin with His Horse in a Boat</i>
	Bunker		<i>Seasonal</i>
	Cranach		<i>The Stag Hunt</i>
	Della Bella		53 etchings
	Feininger		17 prints
	Kaplan, Jerome		<i>Diamond Shoals</i>
	Lipman-Wulf		Portfolio of engravings
	Maitin		<i>After a Time, Another Com- ment Concerning the Garden</i>
	Henry Moore		<i>Ideas for Sculpture</i>
			<i>Two Seated Figures</i>
	Parker and Neal		3 portfolios of rubbings
	Rossigliani		<i>Adoration of the Magi</i>
	Schrag		18 prints
	Spruance		43 prints and drawings
	Viesulas		<i>Since Then</i>
	Houdin		<i>Design for the Louvre</i>
	Dürer		9 woodcuts
	Hollar		<i>Great View of Prague</i>
DECORATIVE ARTS			
Colonel and Mrs. Edgar William Garbisch	Unknown		American embroidered picture

## GIFTS OF MONEY AND SECURITIES

Gifts of money and securities have been made by Avalon Foundation, Mrs. Ailsa Mellon Bruce, Mr. Thomas Gardiner Corcoran, J. I. Foundation, Inc., Samuel H. Kress Foundation, Mrs. Cordelia S. May, The A. W. Mellon Educational and Charitable Trust, Mr. Paul Mellon, Old Dominion Foundation, and others.

## WORKS OF ART ON LOAN

## RECEIVED

<i>Owner</i>	<i>Artist</i>	<i>Title</i>
Catholic University of America	Eakins	<i>Cardinal Martinelli</i>
Los Angeles County Museum of Art	Copley	<i>Portrait of Hugh Montgomerie, 12th Earl of Eglinton</i>

## RETURNED

Colonel and Mrs. Edgar William Garbisch	Various	29 American paintings
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## LENT

Ackland Art Center, University of North Carolina	Doughty Quidor	<i>Fanciful Landscape</i> <i>The Return of Rip Van Winkle</i>
Albany Institute of History and Art	Stuart Phillips	<i>Lawrence Yates</i> <i>Lady in White</i>
American Federation of Arts	Kensett various	<i>Beacon Rock, Newport Harbor</i> 34 American naive paintings 26 American naive water-colors and pastels <i>Lady in White</i>
Museum of American Folk Art	Phillips	
American Museum in Britain	Catlin	4 paintings
American Embassy, London	various	9 paintings
Baltimore Museum of Art	Copley Whistler	<i>Baron Graham</i> <i>Self-Portrait</i>
Blair House	various	6 paintings
Cedar Rapids Art Center	Catlin	<i>Indian File</i>
Columbia Museum of Art	various	7 mural sketches
Columbus Museum of Arts and Crafts	various	20 American naive paintings
Georgia Museum of Art, University of Georgia	various	14 paintings
High Museum of Art	various	4 paintings
Immaculate Heart Retreat House	Pratt	<i>Madonna of Saint Jerome</i>
International Exhibitions Foundation	Elliott	<i>William Sidney Mount</i>
Joslyn Art Museum	Catlin	35 paintings
Robert E. Lee Boyhood Home	various	4 paintings
National Collection of Fine Arts	Quidor	<i>The Return of Rip Van Winkle</i>

<i>Owner</i>	<i>Artist</i>	<i>Title</i>
National Portrait Gallery	various	18 paintings
National Society of Colonial Dames, Dumbarton House	Stuart	<i>Betsey Hartigan</i> <i>Unknown Man</i>
Norfolk Museum of Arts and Sciences	various	7 paintings
Phoenix Art Museum	Catlin	28 paintings
	Eakins	<i>The Biglin Brothers Racing</i>
Memorial Art Gallery, Uni- versity of Rochester and others	Cole	<i>The Notch of the White</i> <i>Mountains (Crawford</i> <i>Notch)</i>
Abby Aldrich Rockefeller Folk Art Collection	Hofmann	<i>Berks County Almshouse, 1878</i> <i>View of Benjamin Reber's Farm</i>
	Mader	<i>Berks County Almshouse, 1895</i>
Royal Academy of Arts, London	Copley	<i>Watson and the Shark</i>
St. Paul Art Center	Catlin	26 paintings
Museum of Fine Arts, St. Petersburg	various	5 paintings
Smithsonian Institution	various	5 paintings
Tampa Bay Art Center	various	6 paintings
United States Capitol	Lambdin	<i>Daniel Webster</i>
	Courter	<i>Lincoln and His Son Tad</i>
United States Department of Justice	various	4 paintings
United States Department of State	Catlin	7 paintings
	Flemish	tapestry
United States Supreme Court	various	3 paintings
White House	various	8 paintings
Whitney Gallery of Western Art	Catlin	72 paintings

## EXHIBITIONS

*Paintings from the Albright-Knox Art Gallery.* Continued from previous year through 1 July 1968.

*Prints of the Danube School.* Continued from previous fiscal year through 10 October 1968.

*Photographs by Alfred Stieglitz from the Alfred Stieglitz Collection.* 16 August through 3 December 1968.

*Prints by Lucas van Leyden.* 11 October through 26 November 1968.

*Modern British Prints.* 3 August 1968 through 21 October 1968 (with a portion on view until 17 November 1968.)

*J. M. W. Turner, A Selection of Paintings from the Collection of Mr. and Mrs. Paul Mellon.* 31 October 1968 through 21 April 1969.

*Painter of Rural America: William Sidney Mount.* 23 November 1968 through 5 January 1969.

*An Exhibition of Christmas Prints from the Rosenwald Collection.* 26 November 1968 through 5 February 1969.

*17th-Century Landscape Prints from the Collection of the National Gallery of Art.* 4 December 1968 through 8 April 1969.

*The Birds of America by John James Audubon.* 25 January through 16 February 1969.

*Prints and Drawings by Alphonse Legros.* 6 February through 17 April 1969.

*Rembrandt in the National Gallery of Art.* 9 March through 11 May 1969.

*Festivals and Fairs, Prints from the Collection of the National Gallery of Art.* 9 April 1969 to continue into next fiscal year.

*Lithographs by Henri de Toulouse-Lautrec from the National Gallery of Art Rosenwald Collection.* 18 April through 24 June 1969.

*John Constable, A Selection of Paintings from the Collection of Mr. and Mrs. Paul Mellon.* 30 April 1969 to continue into next fiscal year.

*111 Masterpieces of American Naive Painting from the Collection of Edgar William and Bernice Chrysler Garbisch.* 12 June 1969 to continue into next fiscal year.

*Bandboxes and Wallpaper from the Index of American Design.* 25 June 1969 to continue into next fiscal year.

Exhibitions of recent accessions: *Mrs. Metcalf Bowler* by Copley (16 July through 9 August 1968); *Pumpkins* by Walt Kuhn (3 September through 12 December 1968); *An Architectural Fantasy* by Jan van der Heyden (13 December 1968 through 10 April 1969); *The Judgment of Paris* by Claude Lorrain (11 April through 5 June 1969); *Portrait of a Man* by Jordaens (20 June 1969 to continue into next fiscal year).

## CURATORIAL ACTIVITIES

Under the direction of chief curator Perry B. Cott, the curatorial department has accessioned 178 gifts to the Gallery during the year. Advice has been given with respect to 1,431 works of art brought to the Gallery for expert opinion, and forty visits to collections have been made by members of the staff in connection with offers of gifts.

The Registrar's Office has issued 112 permits to copy and 73 permits to photograph. About 4,000 inquiries, many of them requiring research, have been answered orally and by letter. There have been 250 visitors to the Graphic Arts Study Room, and permits for reproduction involving 95 photographs have been issued.

Assistant chief curator William P. Campbell has continued to serve as a member of the Special Fine Arts Committee of the Department of State. Curator of painting H. Lester Cooke has continued as contributing editor of *American Artist* magazine and NASA art consultant, visiting Cape Kennedy with artists. He has lectured at the Richmond library, has judged an art show in Reading, Pennsylvania, and has appeared on several television shows during the year. Registrar Peter Davidock has attended conferences in New York on the use of com-

puters in museum work. Assistant curator of graphic arts, Katherine Shepard, has continued as secretary of the Washington Society of the Archaeological Institute of America. She also has taught two courses for MA candidates at the Catholic University of America. David Rust, museum curator, has judged three art shows. Diane Russell, museum curator, has taught two courses at the American University.

The Richter Archives has received and cataloged 272 photographs on exchange from museums here and abroad; 1,326 photographs have been purchased and about 3,000 reproductions have been added to the Archives. Five hundred photographs have been added to the Iconographic Index.

*The Judgment of Paris.* By Claude Lorrain (French, 1600–1682). Canvas, 44 $\frac{1}{4}$  x 58 $\frac{7}{8}$  inches. (Ailsa Mellon Bruce Fund.) National Gallery of Art.







*Portrait of a Man.* By Jacob Jordaens (Flemish, 1593–1678). Wood, 41½ x 29 inches. (Ailsa Mellon Bruce Fund.) National Gallery of Art.

## GRAPHIC ARTS

Graphic arts from the National Gallery of Art collections have been included in two traveling exhibitions, and special loans have been made to twenty-two museums, universities, schools, and art centers in the United States and abroad.

## RESTORATION

Francis Sullivan, resident restorer of the Gallery, has made regular and systematic inspection of all works of art in the Gallery and on loan to government buildings in Washington and periodically has removed dust and bloom as required. He has relined, cleaned, and restored nine paintings and has given special treatment to sixty-six. Twenty-eight paintings have been x-rayed as an aid in research. He has continued experiments with synthetic materials as suggested by the National Gallery of Art Research Project at the Carnegie-Mellon University, Pittsburgh, Pennsylvania. Technical advice has been given in response to 214 telephone inquiries. Special treatment has been given to works of art belonging to government agencies including the United States Capitol, the Treasury Department, the White House, and the Department of State.

## PUBLICATIONS

*Report and Studies in the History of Art 1967*, the first of a new series, edited by Michael Mahoney, has combined scholarly articles with a report by the director and a report of the Gallery's activities. Contributions include a forty-three page study of the Leonardo da Vinci *Ginevra de'Benci* by director John Walker, articles by Kress professors-in-residence Jakob Rosenberg and René Huyghe, and by National Gallery fellows Charles Talbot, Catherine Blanton, and Mark Zucker. Raymond S. Stites has readied the manuscript of his book *The Sublimations of Leonardo da Vinci* for publication. H. Lester Cooke has written the introduction for a book entitled *Vietnam Combat Art*. David E. Rust has prepared for publication the catalog of illustrations of the European paintings and sculpture in the National Gallery of Art. Anna Voris has worked on publication of *Paintings from the Samuel H. Kress Collection: Italian Schools XV-XVI Century*, by Fern Rusk Shapley. Diane Russell has written two book reviews for *Museum News*. Thirty-three gallery leaflets have been revised, and fourteen new leaflet texts have been prepared by members of the staff.



**A Lion.** By Peter Paul Rubens (Flemish, 1577–1640). Black chalk heightened with white, 10¼ x 11¼ inches. (Ailsa Mellon Bruce Fund.) National Gallery of Art.

## PUBLICATIONS SERVICE

To meet growing public demand, the Publications Service has taken a major step by opening a new publications facility in April 1969. Reproductions and publications are made available on a self-service basis in a single centralized area comprising 3,800 square feet of floor space.

The Publications Service has made available nine new publications: *A Guide to Art Museums in the United States* by Erwin O. Christensen, former curator of the Index of American Design; *Art Treasures of the World* by Frank Getlein, with an introduction by John Walker, director emeritus of the National Gallery of Art; *French Painting in the Time of Jean de Berry, The Boucicaut Master* by Millard Meiss, the second offering in the Kress Foundation Studies in the History of European Art; *The National Gallery of Art in the Newsweek* "Great Museum

Series" (English and Italian editions); *Paintings from the Samuel H. Kress Collection*, Volume II, by Fern R. Shapley, former assistant chief curator; *Favorite Subjects in Western Art* by A. L. Todd and Dorothy Weisbord, with foreword by John Walker, director emeritus of the National Gallery of Art; *National Gallery of Art Report and Studies in the History of Art 1967*.

The 1962 A. W. Mellon Lectures, *Blake and Tradition*, volumes I and II, by Kathleen Raine, have been published this year; and *Art and Illusion* by E. H. Gombrich, an earlier Mellon Lecture, has been issued in a new paperback edition.

Four new catalogs of special exhibitions have been published and made available: *J. M. W. Turner Exhibition*, *William Sidney Mount Exhibition*, *Rembrandt Exhibition*, *John Constable Exhibition*. This year the Gallery also has published an illustrated companion to the *Summary Catalogue of European Paintings and Sculpture*.

An illustrated catalog of forty-eight Christmas cards using reproductions of paintings, sculpture, and prints from the Gallery's collection has been published and 40,000 copies have been distributed free of charge. A total of 222,689 Christmas cards have been sold.

This year, twenty-seven full-color 11 x 14-inch subjects from the collections and twenty-one new postcard subjects have been added to the selection of reproductions.

Estimated number of customers served:

Publications Rooms	377, 332
By mail	10, 843
Total number of customers	388, 175

The above figures compare favorably with the previous year after taking into account the fact that the regular sales area was substantially reduced for eight months during the remodeling period.

## OPERATION AND MAINTENANCE ACTIVITIES

The Gallery building, mechanical equipment, and grounds have been maintained throughout the year at the established standards.

Improvements in the utilization of space has made possible the temporary construction of nine new offices and an increase in library shelving of more than 500 lineal feet.

The building alterations for the new publications rooms have been completed, and specially designed fixtures and furnishings have been installed. At the end of the year, the modifications in the driveway,

sidewalk, and moat-wall openings at the west end of the building were about eighty percent completed.

The Gallery greenhouse has produced flowering and foliage plants in sufficient quantities to meet all of the decorative needs of special openings, holiday periods, and the daily requirements of the interior garden courts.

## PRE-RECORDED TOURS

LecTour, the Gallery's radio tour system, and Acoustiguide, a small tape playback device offering a 45-minute highlight tour, have been used by 38,916 visitors.

## EDUCATIONAL PROGRAM

The program of the Educational Department has been carried out under the direction of Dr. Margaret Bouton, curator in charge of educational work. Attendance figures for the series of lectures, tours, and special talks are as follows:

<i>Type of tour</i>	<i>1969</i>
Introduction to the collection	20,333
Tour of the week	9,492
Painting of the week	15,307
Sunday lectures	13,389
Special appointments	28,437
Scheduled visits for area school children	77,672
Pre-school children	281
	<hr/>
Total public response	164,911

Special tours, lectures, and conferences have been arranged for groups from government agencies and the armed forces. Many Congressional offices have arranged tours for groups of constituents. Tours and lectures have been given for wives of Cabinet officers and Congressmen, for American and foreign educators, foreign dignitaries, groups of men and women attending conventions in Washington, and student and scout groups from all parts of the United States.

The program of training volunteer docents has continued, and volunteers from the Junior League of Washington, D.C., and the American Association of University Women have conducted tours for children from public and private schools in the District of Columbia and surrounding counties of Maryland and Virginia.



The program for pre-school children, begun two years ago in connection with the Cooperative Nursery Schools supervised by the District of Columbia Department of Recreation Association, has continued; twelve volunteer docents have conducted tours of the Gallery for children from eleven schools.

On Sunday afternoons 51 lectures with slides or films have been given in the auditorium. There have been 34 guest lecturers. Among these, the Andrew W. Mellon Lecturer in the Fine Arts, Jacob Bronowski, has given six lectures entitled "Art as a Mode of Knowledge." Eleven lectures have been given by members of the Educational Department, and one full-length film has been presented.

The slide library now has a total of 55,936 slides in its permanent and lending collections. During the year 15,807 slides have been borrowed by 508 people (the majority have been professors at colleges and universities), and it is estimated that the slides have been seen by 25,770 viewers.

Educational Department staff members have prepared texts for forty-nine leaflets to accompany reproductions of the Painting of the Week sold in the Publications Rooms. Thirty-eight radio talks have been produced for broadcast during intermission periods at National Gallery Orchestra Sunday concerts, and members of the Educational Department have begun preparation of a series of Radio Pictures of the Week for national distribution. One new LecTour tape has been recorded, eight gallery leaflets have been written, three have been revised, and one text has been written for the Grade School Program.

Raymond S. Stites, assistant to the director for educational services, has delivered seven talks outside the Gallery. William J. Williams has taught a general art history course for the Smithsonian Institution's Employees' Welfare and Recreation Association.

## EXTENSION SERVICE

To serve the nation outside the District of Columbia, the Office of Extension Service is circulating a number of programs to a growing audience across the country. Traveling exhibitions, films, and slide and film strip lectures are lent free of charge to more than three thousand communities annually. During the year these programs have reached approximately 2,757,000 persons, an increase of 581,000 over last year.

This year 210 traveling exhibits covering sixteen different subjects have been viewed by an estimated 1,073,000 persons; 219 prints of three films on the National Gallery of Art have been circulated and seen by

approximately 230,000 viewers; 2,425 slide lectures have been circulated and seen by more than 779,075 viewers.

The Special Loan Project has been continued, and 385 slide lectures have been lent to schools in 61 school systems, reaching approximately 675,000 classroom viewers.

The Loan Project having been so successful, it has been decided to offer a basic set of five slide lectures to all school systems in cities of 500,000 population and above. As of 30 June 1969, fifteen school systems have responded, and slide lectures have been sent to these schools. School systems participating in this program have agreed to furnish the Extension Service reports of bookings at the end of each semester, and the school systems are responsible for any loss or damage of materials beyond normal wear and tear.

The recorded and printed text of the slide lecture *Paintings of the Great Spanish Masters* has been translated into Spanish this year, and several copies of the lecture containing the Spanish recording have been placed in New York City schools with large numbers of Spanish-speaking students. In addition, a copy of the lecture with a recording of the Spanish text was used in the summer institute *Educational Media for the Spanish Surnamed*, 9-20 June 1969, at Colorado State College, Greeley, Colorado.

Starting in February 1969, the Extension Service in cooperation with the Boardman School in Youngstown, Ohio, has conducted a series of four telephone lectures featuring members of the Gallery's curatorial staff. In February Dr. Grose Evans gave the first lecture on Renaissance Art; in March Dr. Margaret Bouton gave the second lecture on American Art; in April Dr. Evans spoke on 19th-Century French Painting; and in May George Kuebler presented Contemporary Art. The slides for each lecture had been forwarded in advance of the lecture date. On the day of the lecture, the staff member was connected by long-distance phone with the school. After a short presentation by the staff member, the students were able to talk with the lecturer and ask questions about the presentation. Reports from the Youngstown school indicate that the series has been very successful.

## LIBRARY

The library, under the direction of Miss Anna M. Link, has accessioned by gift, exchange, and purchase 2,381 books, pamphlets, and periodicals; has processed 2,217 publications; has filed 7,670 cards in the main catalog and shelf list; has received by gift, exchange, or purchase 3,578 periodicals; has charged to staff members 5,112 books; has

shelved 6,737 books; and has borrowed through interlibrary loan facilities 694 books, of which 662 have been lent by the Library of Congress.

Under the exchange program the library has distributed 2,044 copies of National Gallery of Art catalogs and leaflets to foreign and domestic institutions and has received 691 publications in exchange.

The library has continued to serve as 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 6,945 photographs have been added to the stock in the library during the fiscal year, and 1,363 orders for 6,352 photographs have been filled, including 425 permits for reproduction of 906 subjects.

## INDEX OF AMERICAN DESIGN

During the year thirty-eight exhibitions have been circulated in seventy-one bookings in twenty states, the District of Columbia, and Mexico. The Index also has circulated 183 sets of color slides (9,315 slides) throughout the country; 881 photographs of Index subjects have been used for exhibits, study, and for publication. The Index has received 232 visitors who studied the material for research purposes and for collecting material to be used in design and publication. Eighteen permits to reproduce 841 Index subjects have been issued for publication.

A special exhibition has been prepared for display in the Gallery, and a selection of Index of American Design watercolors has been on view in the Gallery the entire year.

Special loan exhibitions have been prepared for the Smithsonian Institution's *Summer Festival of the Arts*; for exhibition in Mexico City during the Olympic Games; for the Mariners Museum, Newport News, Virginia; for the Department of State to circulate between the border states and Mexico; for the Washington County (Maryland) Museum of Fine Arts; and for the 1969 Seminar on Shaker Arts and Crafts held in Pittsfield, Massachusetts.

## MUSIC

Under the supervision of Richard H. Bales, assistant to the director in charge of music, forty concerts have been given on Sundays in the East Garden Court. These concerts have been financed by funds be-

queathed to the Gallery by William Nelson Cromwell, by grants received from the J. I. Foundation, Inc., and by grants from the Music Performance Trust Fund of the Recording Industry. The National Gallery Orchestra, conducted by Mr. Bales, has played twelve of the concerts. Six of the Sunday concerts during April and May comprised the 26th Annual Music Festival held in the Gallery. All concerts have been broadcast in their entirety by radio station WGMS, AM-FM.

Two National Gallery Orchestra concerts conducted by Mr. Bales were taped for two one-hour color television programs, which were shown with appropriate paintings from the Gallery's collections on WTOP-TV in November 1968 and February 1969.

The full orchestra and the National Gallery Strings, conducted by Mr. Bales, have performed for several special openings at the Gallery and also have performed as part of the 20th Anniversary Celebration of Falls Church, Virginia, and for the Bowie May Festival in Bowie, Maryland. The National Gallery Strings recorded the sound track for the NBC-TV film, *Art and the Bible*, which was televised nationally on Palm Sunday 1969.

The Gallery orchestra and station WTOP-TV have received an award from the American Association of University Women for outstanding contribution in the category of locally produced culture and entertainment programs.

Mr. Bales' activities during the year have included several talks on music, an appearance on WRC-TV to discuss his compositions and his work at the National Gallery of Art, and chairmanship of the Music Sub-Committee for the Governors' and Distinguished Guests' Reception at the Sheraton Park Hotel, one of the pre-Inaugural events in January 1969. A number of Mr. Bales' compositions have been performed by the Gallery orchestra during the season and by orchestras in other cities. The orchestral score of Mr. Bales' *National Gallery Suite No. 3: "American Design"* has been published by Alexander Broude, Inc., of New York City.

## SCIENTIFIC RESEARCH

The Research Project at Mellon Institute, Pittsburgh, Pennsylvania, currently is concentrating on two principal areas of investigation: the damaging effects of light on museum objects and the characterization of artists' pigments. An interest in the development of stable protective coatings, extending over more than a decade, is continued through the current studies of the mechanism by which light causes thermoplastic coatings to become insoluble. Specifications for durable thermoplastics and means for their characterization in terms of three parameters have



been described in the past year: intrinsic viscosity, hardness, and solubility characteristics.

Accompanying the investigation of basic causes for the fading of typical artists' pigments such as alizarin and ultramarine, a program of lightfastness tests on dyes needed in the repair of book papers and bindings has led to the rejection of fugitive varieties and the selection of others having superior fastness. The neglected phenomenon of the light-induced darkening of the important artists' pigment vermilion (mercuric sulfide) has been the subject of a preliminary report earlier this year; latest results from the laboratory now indicate that the darkening may be only partially reversible, with the result that a significant portion of the change is likely to be permanent.

Research on the characterization of artists' vehicles and pigments has received major support through a three-year project designed to explore possible applications of nuclear science, sponsored jointly by the Atomic Energy Commission and the National Gallery of Art.

One goal is the application of neutron activation analysis to "fingerprinting" the pigments used by specific artists or groups of artists by establishing concentration profiles of trace impurities. Initial studies have shown that far greater caution must be exercised in analysis and interpretation of this data than had been implied by previous workers in the field. New methods for sample preparation prior to actual analysis are under development. While data on white lead and ultramarine are being tabulated, preliminary evidence suggests that natural and artificial varieties of ultramarine can be distinguished objectively by this method.

A second goal of the joint project, that of distinguishing between very recent forgeries and pre-World War II paintings, is close to being realized. Data thus far obtained show that large increases in concentrations of Carbon-14 in the atmosphere owing to nuclear weapon tests, are detectable in relatively small samples of linseed oil and other biogenic products that have been produced since the mid 1950s. The construction of a facility to make pertinent measurements in such materials is nearing completion.

A collection of the pigments of known manufacture or mineralogical source is being assembled to facilitate the research on pigment characterization. Samples of more than two thousand specimens of natural and synthetic ultramarine have been cataloged in the past year, and characterization of these and other pigments by activation analysis, emission spectrography, x-ray diffraction, and by adsorption and reflectance spectrography is in progress. Through the application of spectrophotometric methods of analyses, the Research Project recently has demonstrated the presence of Vandyke brown and indigo in Colonial American paintings. Spectral fluorescence characteristics also have been shown



to offer promising means of identifying pigments such as natural madder and Indian yellow, which fluoresce under ultraviolet light.

In a major effort to characterize the pigments employed by a specific painter, the National Gallery of Art has encouraged and sponsored Dr. Hermann Kühn of the Doerner Institut, Munich, in an extensive investigation of the pigments used by the seventeenth-century Dutch master Vermeer. This research, extending over a period of more than two years, provides detailed analytical data concerning twenty-nine paintings by Vermeer (out of a total number of thirty-five attributed to this artist by the Dutch authority A. B. de Vries).

Through many individual requests for information and through service on special committees of the International Council of Museums and the Illuminating Engineering Society, the Research Project continues to provide assistance to museums here and abroad regarding the control of the damaging effects of light. In June 1969 the Senior Fellow was invited by the Louvre Museum to assist in a special conference to consider the potential hazards of photographer's flash and flood lamps.

The Research Project has resulted in the following publications:

- R. L. FELLER. "Studies on the Darkening of Vermilion by Light." Pages 99-111 in *Report and Studies in the History of Art 1967*. Washington, D.C.: National Gallery of Art, 1968.
- . "Problems in Reflectance Spectrophotometry." Pages 257-269 in *1967 London Conference on Museum Climatology*. Revised edition. London, 1968.
- . "Research on Durable Thermoplastic Polymers for the Conservation of Works of Art." Pages 1099-1110 in *Atti della XLIX Riunione SPIS, Siena, 23-27 Sept. 1967* (Rome, 1968).
- . "Polymer Emulsions, III." *Bulletin of the American Group-IIC* (1969), volume 9, number 2, pages 15-17.
- . "Synthetic Resins in the Conservation of Museum Objects." In *1968 AAM Annual Meeting Section Papers*. Washington, D.C.: American Association of Museums, 1968.
- . "Transportation of a Panel Painting by Courier in Winter." Pages 13-14 in *Papers Given at the Annual Meeting of IIC-American Group*, Los Angeles, 1969.

## ADDITION TO THE NATIONAL GALLERY OF ART

In July 1968 the Gallery entered into a contract with I. M. Pei and Partners for their architectural services in connection with the design of a new building or buildings to be constructed on the Mall adjacent to and east of the present National Gallery of Art building for the purposes of housing a Center for Advanced Study in the Visual Arts as

well as exhibition facilities and offices. At the May 1969 meeting of the Trustees, Mr. Pei presented a general design and development concept for the proposed addition, which was subsequently approved in principle.

The firm of Mueser, Rutledge, Wentworth, and Johnston also has been retained to make studies of the subsoil conditions in the proposed site area. That firm completed numerous core drillings and has made its report on subsoil conditions.

Funds for the new building have been donated by Paul Mellon and Mrs. Ailsa Mellon Bruce. Construction was authorized by the Act approved 5 July 1968, Public Law 90-376, 82 Stat. 286.

## PRINTS LOST DURING WORLD WAR II RETURNED TO HEIDELBERG

Six woodcuts, dating from the fifteenth century, which have been in the custody of the National Gallery of Art since shortly after World War II, finally have been identified as the property of the University of Heidelberg in Germany. They were returned to the library of that institution on 23 December 1968. This identification has been the result of several years of study and investigation by Kennedy C. Watkins, deputy secretary, treasurer, and general counsel of the Gallery, and has required on his part extensive negotiations with the Embassy of the Federal Republic of Germany, the Department of State, and eventually the University of Heidelberg. These prints are important as a vital link in the historical development of prints.

## RETIREMENTS

On 30 June 1969 Mr. John Walker, director, and Mr. Perry B. Cott, chief curator, retired from the Gallery staff.

Mr. Walker has been associated with the Gallery since 1938; he helped in the design of the building and supervised the installation of the Andrew W. Mellon Collection and the Samuel H. Kress Collection prior to the opening of the Gallery in 1941. He was chief curator until 1956, when he was appointed director on the retirement of the Gallery's first director, Mr. David E. Finley. Mr. Walker and Mr. Finley, respectively, were given the title of director emeritus at the May 1969 meeting of the trustees.

Mr. Walker is succeeded by the deputy director, Mr. John Carter Brown, who has been on the Gallery staff since 1961.

Mr. Cott has been on the Gallery staff since 1949 and has been chief curator since 1956. During his tenure in that post, the Gallery acquired more than nine hundred paintings.

## AUDIT OF PRIVATE FUNDS OF THE GALLERY

An audit of the private funds of the Gallery will be made for the fiscal year ended 30 June 1969, by Price Waterhouse & Co., public accountants. A report of the audit will be forwarded to the Gallery.

Respectfully submitted.

ERNEST R. FEIDLER  
*Secretary*

Mr. S. Dillon Ripley  
*Secretary, Smithsonian Institution*

JOHN F. KENNEDY CENTER FOR  
THE PERFORMING ARTS

WILLIAM McC. BLAIR, JR.

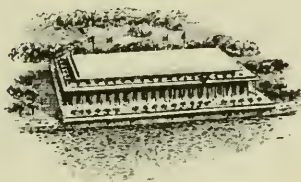
*General Director*





# John F. Kennedy Center for the Performing Arts

WILLIAM McC. BLAIR, JR., *General Director*

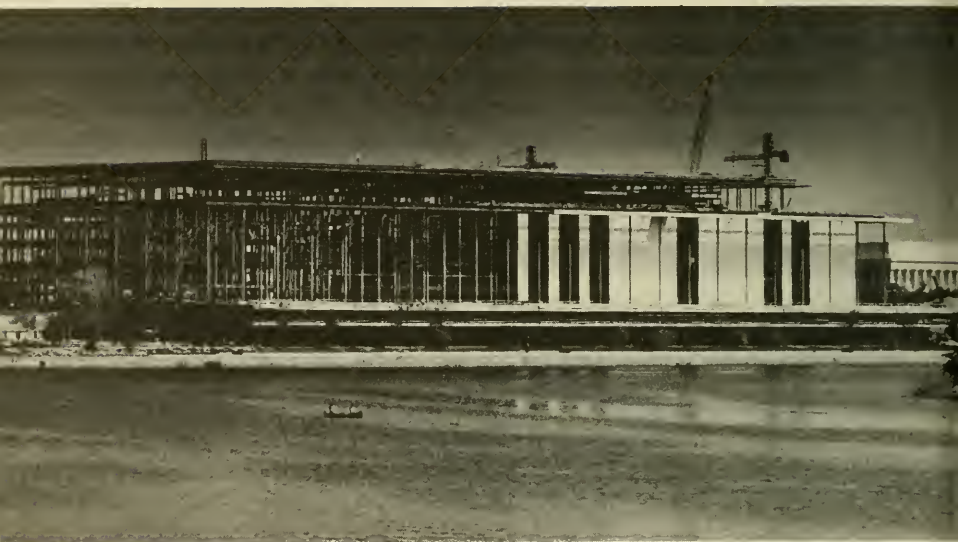


THE "TOPPING OUT" of the Kennedy Center's massive steel framework in September 1968 launched a year of continuing and tangible progress. As the steel contract was completed, the work of erecting hundreds of tons of the marble from Italy for the building's facing began, and the Center took on a new look.

Although construction has proceeded at a good pace, the Kennedy Center has not been immune to the meteoric rise in construction costs. In October 1968, Roger L. Stevens, chairman of the Board of Trustees, announced that the trustees were seeking an additional \$15 million in order to complete the building. In spring 1969, after a private fund-raising campaign was well under way, Representative Kenneth Gray introduced H. R. 11249, providing for an increased matching federal grant to the Kennedy Center and an increased loan from the United States Treasury.

George London assumed his position as artistic administrator in September 1968 and plans for the Center's opening early in 1971 progressed. In December it was announced that the American Ballet Theatre, one of the world's foremost dance companies, would be the Center's resident ballet company.

Perhaps the most historic moment of the year was the announcement in October 1968 that the Center's theater would be named in honor of General and Mrs. Dwight D. Eisenhower. It was President Eisenhower who initiated the Center in 1958.



More than half of the Kennedy Center structure was complete when this view of the site from the Potomac River was taken.

## HISTORY

A national center for the performing arts has been the dream of many people since the city of Washington became the nation's capital. In 1800 President John Adams expressed the hope that the political center of the nation would be its cultural capital as well. Only in recent years, however, has positive action been taken to provide adequate facilities for the performing arts in Washington, D.C.

President Eisenhower signed the Act of Congress creating the National Cultural Center in 1958 (P.L. 85-874, 85th Cong., 2 September 1958) and gave the Center his support. President Kennedy encouraged national support of the Cultural Center and in 1963 signed amending legislation that extended the fund-raising deadline and increased the membership of the Board of Trustees to forty-five.

On 23 January 1964 President Johnson signed into law a bipartisan measure designating the National Cultural Center the sole official memorial in the nation's capital to President Kennedy, renaming it the John F. Kennedy Center for the Performing Arts (P.L. 88-260). In December of that year President Johnson broke ground for the construction.

The law also authorized \$15.5 million in matching federal funds and granted the Trustees the authority to issue revenue bonds to the

Secretary of the Treasury to a value not greater than \$15.4 million. The bonds are designated for construction of the 1600-car underground garage and are payable from the revenues accruing to the Board.

Legislation to increase the matching federal grant to \$23 million and the Treasury loan to \$20.4 million was under consideration by the Congress at the close of the fiscal year (H.R. 11249).<sup>\*</sup> These funds will meet increased construction costs due primarily to the thirty percent rise in building costs since 1964.

Completion of the Kennedy Center, forecast for early 1971, will at last place Washington among the major capitals of the world that provide a focal point for the arts as well as for government.

## BOARD OF TRUSTEES

Pursuant to the John F. Kennedy Center Act, the Board of Trustees is made up of fifteen members who serve ex-officio and thirty general members appointed by the President.

During the past year the terms of six general trustees have expired: Mrs. Thomas W. Braden, Leonard H. Goldenson, Robert I. Millonzi, Edwin Pauley, Arthur Penn, and Frank H. Ricketson, Jr.

Mr. Millonzi and Mr. Goldenson have been reappointed to ten-year terms. Also appointed to ten-year terms by President Johnson: Mrs. Rebekah Harkness, founder of the Harkness Ballet; Mrs. Michael J. Mansfield; Thomas Kuchel, former United States Senator from California; and Lew R. Wasserman, president of Music Corporation of America.

Senator Edward M. Kennedy has been appointed to fill the unexpired term of his late brother, Senator Robert F. Kennedy. Robert W. Dowling has been appointed to the term left vacant by the death of Howard F. Ahmanson, and Harry C. McPherson, Jr., has been appointed to the term of Robert Lehman, who resigned because of ill health. Mr. Dowling's term expires in 1972 and Mr. McPherson's in 1976.

With the change in the national administration, several replacements have taken place in the ex-officio membership of the Board. Robert H. Finch has succeeded Wilbur J. Cohen as Secretary of Health, Education, and Welfare. James E. Allen, Jr., has succeeded Harold Howe II, as Commissioner of Education. John Richardson, Jr., has succeeded Edward D. Re as Assistant Secretary of State for Educational and Cultural Affairs.

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<sup>\*</sup>The House of Representatives passed H.R. 11249 on 8 July 1969.



The Information Center at the construction site is staffed and operated by the Friends of the Kennedy Center. Here visitors can see a scale model of the building, listen to daily slide talks, and obtain materials describing the Center.

Senator Ralph W. Yarborough of Texas has been appointed to fill the Senate vacancy on the Board, replacing former Senator Joseph S. Clark.

At the annual meeting of the Board of Trustees on 13 January 1969 the following officers were elected:

Roger L. Stevens, Chairman  
 Robert O. Anderson, Vice Chairman  
 Sol M. Linowitz, Vice Chairman  
 Ralph E. Becker, General Counsel  
 Robert C. Baker, Treasurer  
 K. LeMoyne Billings, Secretary  
 Philip J. Mullin, Assistant Secretary and Assistant Treasurer  
 Herbert D. Lawson, Assistant Treasurer  
 Kenneth Birgfeld, Assistant Treasurer  
 Paul Bisset, Assistant Treasurer  
 L. Parker Harrell, Jr., Assistant Treasurer  
 Daniel W. Bell continues as Treasurer-Emeritus.

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  
 Ralph E. Becker, General Counsel  
 Robert C. Baker, Treasurer  
 K. LeMoyné Billings, Secretary

From the Board, the Chairman reappointed the following trustees to the Executive Committee:

Abe Fortas	Arthur Schlesinger, Jr.
George B. Hartzog, Jr.	Mrs. Jouett Shouse
Mrs. Albert D. Lasker	Mrs. Stephen E. Smith
Erich Leinsdorf	Jack Valenti
Mrs. Aristotle Onassis	Walter E. Washington
S. Dillon Ripley II	Lew R. Wasserman

At the annual meeting the following Trustees were reappointed to serve on the National Council of the Friends of the Kennedy Center:

Mrs. George Garrett  
 Mrs. Albert D. Lasker  
 Mrs. Jouett Shouse

At the close of the fiscal year the membership of the Board of Trustees of the John F. Kennedy Center is as follows:

Richard Adler	Mrs. Michael J. Mansfield
Floyd D. Akers	Harry C. McPherson, Jr.
James E. Allen, Jr.	George Meany
Robert O. Anderson	Robert I. Millonzi
Ralph E. Becker	L. Quincy Mumford
K. LeMoyné Billings	Senator Charles Percy
Edgar M. Bronfman	John Richardson, Jr.
Mrs. George R. Brown	S. Dillon Ripley II
Robert W. Dowling	Richard Rodgers
Ralph W. Ellison	Arthur M. Schlesinger, Jr.
Robert H. Finch	Mrs. Jouett Shouse
Abe Fortas	Mrs. Stephen E. Smith
Representative Peter H. B. Frelinghuysen	Roger L. Stevens
Senator J. William Fulbright	William H. Thomas
Mrs. George A. Garrett	Representative Frank H. Thompson, Jr.
Leonard H. Goldenson	Jack J. Valenti
Mrs. Rebekah Harkness	William Walton
George B. Hartzog, Jr.	Walter E. Washington
Senator Edward M. Kennedy	Lew R. Wasserman
Senator Thomas H. Kuchel	Edwin L. Weisl, Sr.
Mrs. Albert D. Lasker	Representative James C. Wright, Jr.
Erich Leinsdorf	Senator Ralph W. Yarborough
Sol Myron Linowitz	

Mrs. Richard M. Nixon has accepted the Trustees' invitation to serve as Honorary Chairman of the Center together with Mrs. Lyndon B. Johnson, Mrs. Aristotle Onassis, and Mrs. Dwight D. Eisenhower.



## GENERAL DWIGHT D. EISENHOWER

The Center lost one of its staunchest and most steadfast supporters with the death of General Dwight D. Eisenhower on 27 March 1969. As President he proposed the legislation creating the Center that culminated with his signing of the National Cultural Center Act in 1958 and his appointment of the first trustees.

"The Cultural Center belongs to the entire country," General Eisenhower said. "The challenge of its development offers each of us a noble opportunity to add to the aesthetic and spiritual fabric of America."

In October 1968, it was announced that General and Mrs. Eisenhower had accepted the trustees' wish that the Center's theater be known as the Eisenhower Theater. This dedication will serve to remind visitors of the General's extraordinary career and his role in the creation of the Center.

## CONSTRUCTION PROGRESS

At the end of fiscal year 1969, the Center stands more than fifty percent complete. Marble panels have been erected on the two exterior walls of the Concert Hall and along two thirds of the exterior wall of the Grand Foyer overlooking the River Terrace, completely enclosing the southernmost third of the building.

Concrete work has been completed in the Concert Hall area and in the substructure parking area and is thirty percent complete in the Opera. A carpenter's strike, which began on 1 May 1969, stopped the pouring of concrete until the end of the fiscal year, with thirty percent of the concrete work remaining to be done.

A large amount of masonry, plumbing, air conditioning, elevator, and electrical work also has been accomplished. Erection of structural steel was completed in September 1968.

During the year five subcontracts amounting to over \$4 million have been awarded. Total expenditures for architectural and construction work, representing approximately fifty percent of the total estimated cost, have reached nearly \$33 million, of which \$30.8 million are federal funds, including nearly \$15.4 million of repayable bonds.

New estimates, prepared for the trustees by the General Services Administration, indicate a total construction cost of \$66.2 million. This \$15.8 million increase during the five and one-half year interim since January 1964 is broken down as follows:

Approximately 57 percent of the increase is due to the consistent rise in construction costs, 9 percent to delay in subcontract awards owing to lack of funds available for obligation, 7½ percent to design changes



Principal dancers of the American Ballet Theatre in a performance of "Giselle." This group, which has been selected as the Center's resident dance company, will perform in the Opera House.

necessary to reduce overall cost, 4 percent to strikes and an increase in cost of acoustical insulation owing to jet aircraft traffic nearby, and 22½ percent to underestimating the quantity and cost of structural steel.

Contracts soon to be awarded include tile, terrazzo, wood floors, interior glass, approaches, landscaping, interior painting, and the finishing of administrative and rehearsal spaces. A program for procurement of all furnishings, landscaping, and sound equipment will begin in the immediate future in order to be coordinated with the completion schedule.

The subcontracts awarded during the year are as follows:

Window wall and applicable glass and glazing work: The Southern Plate Glass Company of Baltimore, Maryland; \$1,110,000.

Deliver and erect marble facing: Granite Research Industries of Somerville, Massachusetts (this company had the contract to fabricate the architectural stone); \$378,000.

Sealing, caulking: Joseph F. Murphy, Jr., Inc. of Flourtown, Pennsylvania; \$83,680.

Architectural woodwork: Woodwork Corporation of America of Chicago, Illinois; \$833,700.

Masonry: John B. Kelly, Inc., of Philadelphia, Pennsylvania (replaces contract awarded Costello Company in 1968 which was withdrawn); \$1,756,000.

## REASSESSMENT OF FINANCIAL POSITION

The General Services Administration and the trustees, acting in concert, have administered the construction work and directly related aspects of the project, such as design and contract administration, to ensure that no commitments or scheduled work have been undertaken beyond the total amount reported available for these purposes by the trustees. No additional contracts are awarded until funds are available.

As of 30 June 1969, \$54,719,111.00 had been made available by the trustees and \$51,828,000.00 had been committed or scheduled for commitment to construction.

To fund the construction deficit the trustees requested that the Bureau of the Budget include \$15 million in the federal budget for fiscal 1970. Both the Johnson administration and the Nixon administration have approved the inclusion of \$7.5 million as a contingency item in the federal budget.

A "topping-out" ceremony marked completion of the steel framework on 30 September 1968, coinciding with the tenth anniversary of the legislation which created the Center. A steel replica of the classical Greek masks of comedy (Thalia) and tragedy (Melpomene) was hoisted to the highest steel beam over the Eisenhower Theater.



Authorization and appropriation by Congress will be necessary. Authorization legislation has been introduced requesting \$7.5 million to be matched by private donation. This legislation will also increase the borrowing authority by \$5 million.

The drive for private funds to meet the matching requirements and to provide additional capital for nonconstruction expenses was started in September 1968 and will continue until all the financial needs are met.

## GEORGE LONDON

The appointment of George London as Artistic Administrator was announced on 12 July 1968. Mr. London, internationally known opera and concert singer, assumed his position on 1 September 1968. His responsibilities include the supervision of the programming, booking, and production of the musical activities of the Center.

Mr. London's distinguished musical career began with his professional debut in 1941. He has performed with the San Francisco Opera, the Vienna State Opera, the Glyndebourne Opera, and the Metropolitan Opera, and has appeared at La Scala, the Bayreuth Festival, and the Bolshoi Theater. He is a member of the Board of Directors of New York City's Lincoln Center and President of the American Guild of Musical Artists.

## AMERICAN BALLET THEATRE

The American Ballet Theatre was named as the Center's resident ballet company on 4 December 1968. It is planned that the company will perform two four-week seasons annually in the Center's Opera House, presenting one world premiere each year.

The selection of the American Ballet Theatre is in accordance with the Kennedy Center's policy of recruiting the most distinguished performing arts organizations available. The company has taken major ballet to all fifty of the states and has represented this country abroad on fifteen international tours to forty-five countries.

The National Ballet of Washington also has been invited to use the Center for its performances.

## WATERGATE DEVELOPMENT

The Center's trustees have reached a compromise agreement with officials of the Watergate Development during the year with regard to

the proposed height and design of Building Number 1 of the apartment complex.

This building has been redesigned to lower its height and to open up an additional 350 feet between it and the Kennedy Center, which, in general, meets the Center's esthetic objections to the previously planned relation between the two buildings.

## THE FRIENDS OF THE KENNEDY CENTER

One of the major projects of the Friends of the Kennedy Center during the past year, the first American College Theatre Festival, brought ten of the nation's best college and university theater companies to Washington to perform at Ford's Theatre and the Smithsonian's new Tent Theatre on the Mall.

The Friends were cosponsors of the Theatre Festival with American Airlines and the Smithsonian Institution. The American Educational Theatre Association and the American National Theatre and Academy were producers of the Festival. The Friends provided administrative support for the Festival's selection committees, arranged transportation of the companies and their theater baggage, and promoted the Festival through news media and contact with local groups, area schools, and members of Congress.

The Friends of the Kennedy Center, established as an auxiliary by the trustees in 1966, have almost 3,000 members in forty-eight states, with chairmen in twenty states. Every effort is being made to expand membership in Washington and throughout the country.

On 6 June 1969, the National Council of the Friends met to elect the following new officers:

Mrs. Polk Guest, chairman  
Mrs. Norris A. Dodson, Jr., vice chairman  
Mrs. Eugene Carusi, secretary  
Mr. Henry Strong, treasurer

The third annual meeting of founder members was held 1 and 2 May 1969 at L'Enfant Plaza, Washington's newest building complex. Speakers included former Ambassador Lucius D. Battle, now vice president of the Communications Satellite Corporation, Messrs London, Stevens, and Blair of the Kennedy Center.

Other projects of the Friends this past year have included sponsorship of the Second International University Choral Festival in cooperation with Washington Cathedral and the Lincoln Center for the Performing Arts. Festival performances by choirs from fourteen coun-



tries including the United States were given at the Cathedral on 22 March 1969 and, later, at Lincoln Center and on campuses across the country.

The Information Center for visitors to the site has become an important part of the effort of the Friends to acquaint Americans and foreign guests with the Kennedy Center and its goals. During the year more than 3,500 visitors to the Information Center, including school children, adult groups, ambassadors, and congressmen, enjoyed slide talks by members of the Friends' Speakers Bureau and viewed renderings and the model of the Center. The Speakers Bureau traveled to nine states and the District of Columbia during the past year to present programs to forty-six groups on the Kennedy Center.

## DEVELOPMENT COMMITTEE

The Development Committee, under the chairmanship of Robert O. Anderson, launched a major fund-raising drive in the fall of 1968 in sponse to the trustees' assessment of the deficit in construction funds. The Committee has requested increased gifts from corporate and foundation donors to the Center and has been seeking new sources of support, primarily in industry. Donors to the Kennedy Center may designate their contributions exclusively for endowment of the Eisenhower Theater, one of the Center's many endowment opportunities.

## OPERA SEAT PRIORITY PLAN

A special seat endowment program, similar to the Theater Seat Plan, has been established for the Center's Opera House. A \$3,500 seat endowment in the Opera will carry opening night reservation privileges for twenty-five years. The plan at present is limited to 100 seats.

## GIFT OF AUSTRIA

Austrian Ambassador Ernst Lemberger announced on 16 May 1969 that Austria will be represented in the Kennedy Center by a magnificent crystal chandelier and accompanying accent fixtures for the Opera House. The chandelier, to be manufactured by J. & L. Lobmeyr, is the eighth gift to the Center from a foreign nation.



Austria will be represented in the Center by a magnificent crystal chandelier and associated lighting fixtures for the Opera House. Shown above at the presentation ceremony for this gift on 16 May 1969 are Ralph E. Becker, the Center's general counsel; Roger L. Stevens, Chairman of the Board; and Ambassador Ernst Lemberger, who made a token presentation of a crystal goblet. In the foreground is a model of the chandelier, designed by J & L Lobmeyr of Vienna.

## SOUSA MEMORIAL

Completion of the \$100,000 endowment by the John Philip Sousa Memorial Fund was announced on 11 March 1969 at the American Bandmasters Association Convention. Funds for the project have been raised through donations from 692 high school and community bands, individuals, and commercial firms throughout the country and will be used to endow the stage in the Center's Concert Hall in Mr. Sousa's memory.

Colonel George S. Howard, USAF (Retired), former director of the United States Air Force Band has served as chairman of the Sousa Memorial Fund since its inception in 1964.

## "TOPPING OUT" CEREMONY

Completion of the Kennedy Center's steel framework was marked by a unique "topping out" ceremony on 30 September 1968. In lieu of the traditional raising of the flag, large steel replicas of the Classical Greek masks of comedy (Thalia) and tragedy (Melpomene), prepared by Bethlehem Steel, were hoisted and attached to the top steel girder above the Eisenhower Theater.

The ceremony also marked the tenth anniversary of the signing by President Eisenhower of the National Cultural Center Act.

Walter E. Washington, Mayor-Commissioner of the District of Columbia and a trustee of the Kennedy Center, addressed the audience of more than five hundred, including trustees of the Center, members of Congress, ambassadors of donor nations, other major donors, and members of the Friends of the Kennedy Center.

During the ceremony the oath of office was administered to four new trustees: Senator Edward M. Kennedy, Robert W. Dowling, Mrs. Rebekah Harkness, and Lew Wasserman.

## MOVIE BENEFIT

The world premiere of MGM's *The Shoes of the Fisherman* at Washington's new L'Enfant Theatre on 14 November 1968 was a benefit for the Kennedy Center; it was organized by the Friends of the Kennedy Center under the chairmanship of Mrs. Neylan McBaine. Over \$30,000 was added to the Center's construction fund by this event.

## MINNESOTA FLOWERING CRABAPPLE TREES

The Minneapolis Chamber of Commerce presented the first 12 of 100 Minnesota flowering crabapple trees to the Kennedy Center on 28 April 1969. During the brief presentation ceremony, Mr. Blair predicted that the trees would become a serious rival to Washington's famous cherry trees.



## APPENDIX





## Appendix 1

### SMITHSONIAN FOREIGN CURRENCY PROGRAM GRANTS AWARDED IN FISCAL YEAR 1969

#### Archeology and Related Disciplines

- AMERICAN INSTITUTE OF INDIAN STUDIES, PHILADELPHIA, PENNSYLVANIA. To continue (fourth year) support for the American Academy of Benares, India, an institution for research in archeology and art history.
- AMERICAN RESEARCH CENTER IN EGYPT, CAMBRIDGE, 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 of Luxor, (c) continuation of a field project of a stratified Pharonic site at Mendes, (d) cephalometric and dental analysis of the Old Kingdom skeletal material from the Giza necropolis.
- AMERICAN SCHOOLS OF ORIENTAL RESEARCH, CAMBRIDGE, MASSACHUSETTS. To support excavations at Ai in Israel.
- AMERICAN UNIVERSITY IN CAIRO, NEW YORK CITY. To survey and document (second year) the domed Mausolea of Mamluk, Cairo.
- BROOKLYN COLLEGE OF THE CITY UNIVERSITY OF NEW YORK, NEW YORK CITY. To conduct excavations at Starcevo in Yugoslavia.
- LAWRENCE RADIATION LABORATORY, UNIVERSITY OF CALIFORNIA, BERKELEY. To continue (second year) the project utilizing cosmic rays for the discovery of unknown chambers in the pyramids of Egypt.
- UNIVERSITY OF CALIFORNIA AT LOS ANGELES. To study prehistoric community life through excavations at Anzibegovo, Yugoslavia, in collaboration with the Narodni Muzej at Stip.
- CARNEGIE MUSEUM, PITTSBURGH, PENNSYLVANIA. To continue (fourth year) excavations at Tel Ashdod, Israel.
- DOUGLASS COLLEGE, RUTGERS UNIVERSITY, NEW BRUNSWICK, NEW JERSEY. To support archeological excavations at Salona and on the islands of Salonitan Bay, Yugoslavia.
- DENISON UNIVERSITY, GRANVILLE, OHIO. To continue excavation of the Roman imperial metropolis at Sirmium in collaboration with the Archeological Institute of Belgrade, Yugoslavia.
- DUMBARTON OAKS CENTER, WASHINGTON, D.C. To continue support of excavations leading to the publication of a corpus of ancient mosaics in Tunisia.
- JERUSALEM SCHOOL OF ARCHEOLOGY OF HEBREW UNION COLLEGE, CINCINNATI, OHIO. To excavate (fourth year) an archeological site at Gezer, Israel.
- INSTITUTE FOR ADVANCED STUDY, PRINCETON, NEW JERSEY. To support interdisciplinary research in the Bronze and early Iron Ages in northern Yugoslavia: excavations at the sites of Sticna (second year) and Morkrin.

UNIVERSITY OF MICHIGAN, ANN ARBOR. To continue (third year) a program of research and training in prehistoric archeology in Israel: excavations at the site of Tabun.

To conduct excavations of the middle paleolithic site, Visoko Brdo, in Northern Bosnia, Yugoslavia.

To continue (second year) a study of early neolithic cultures in Poland in collaboration with the University of Krakow.

UNIVERSITY OF MINNESOTA, MINNEAPOLIS. To continue (second year) excavations of the Palace of Diocletian at Split, Yugoslavia, and to study the development of the palace from Roman through medieval times.

To conduct paleoecological studies of early man in southwestern Iran.

UNIVERSITY OF MISSOURI, COLUMBIA. To continue (second year) excavation of a Greek trade site in Israel.

To publish results of investigation of ancient glass-manufacturing sites in Israel.

UNIVERSITY MUSEUM, UNIVERSITY OF PENNSYLVANIA, PHILADELPHIA. To study (third year) the inscriptions of the Dra Abu Naga Tombs in Egypt.

To continue (third year) the study of the remaining stones of the temple of Akhnaten at Luxor by computer methods.

UNIVERSITY OF PITTSBURGH, PENNSYLVANIA. To study early food-producing cultures at Divostin, Yugoslavia.

PEABODY MUSEUM, YALE UNIVERSITY, NEW HAVEN, CONNECTICUT. To continue (second year) development of quarriable sites for earliest hominids in the Siwalik Hills, North India.

Paleontological and stratigraphic studies of the paleocene, eocene, and oligocene deposits in Egypt.

OFFICE OF ANTHROPOLOGY, SMITHSONIAN INSTITUTION, WASHINGTON, D.C.

To conduct a study of ancient urban technologies in Pakistan and Ceylon that will contribute to similar studies carried out in southern Asia.

SOUTHERN METHODIST UNIVERSITY, DALLAS, TEXAS. To continue (second year) study of prehistory of central Egypt.

UNIVERSITY OF WASHINGTON, SEATTLE. To continue (second year) study of the kinship structure among the Veddas of Ceylon.

UNIVERSITY OF WISCONSIN, MADISON. To re-examine the late prehistoric sites of the Fayum and the Kharga oases, Egypt.

## Systematic and Environmental Biology

UNIVERSITY OF COLORADO, BOULDER. Prehistoric paleontologic research in Tunisia.

UNIVERSITY OF MICHIGAN, ANN ARBOR. To continue (second year) study of the cytology of Indian mollusks.

UNIVERSITY OF THE STATE OF NEW YORK AT STONY BROOK, LONG ISLAND.

To continue (second year) study of the ecology of an Eilat coral reef in Israel.

NATIONAL ACADEMY OF SCIENCES, WASHINGTON, D.C. To support research, training, and trips for International Biological Program personnel.

SMITHSONIAN INSTITUTION, WASHINGTON, D.C.

DEPARTMENT OF BOTANY. To study in India the comparative embryology and floral anatomy of the olyroid bambusoid grasses.

DEPARTMENT OF VERTEBRATE ZOOLOGY. To continue (second year) studies in India of the structure and function of the respiratory organs of air-breathing fishes.

DEPARTMENT OF VERTEBRATE ZOOLOGY. To publish (second year) in India a handbook of Indian birds.

DEPARTMENT OF VERTEBRATE ZOOLOGY. To continue (second year) a migratory bird survey in India.

DEPARTMENT OF VERTEBRATE ZOOLOGY. To conduct a serological and ectoparasite survey of migratory birds in northeastern Africa.

OFFICE OF OCEANOGRAPHY AND LIMNOLOGY. To continue (second year) study in Israel of biological interchanges between the eastern Mediterranean and the Red Sea through the Suez Canal.

OFFICE OF OCEANOGRAPHY AND LIMNOLOGY. To continue (third year) to support the Mediterranean Marine Sorting Center at Salammbô, Tunisia.

OFFICE OF OCEANOGRAPHY AND LIMNOLOGY. To conduct a survey of the marine fauna and flora of Morocco.

OFFICE OF OCEANOGRAPHY AND LIMNOLOGY. To hold an international conference on meiofauna in Tunisia.

OFFICE OF ECOLOGY. To continue (second year) the revision of Trimen's *Handbook to the Flora of Ceylon*.

OFFICE OF ECOLOGY. To conduct ecological research planning studies for the International Biological Program in Poland, Yugoslavia, Tunisia, Israel, and India.

NATIONAL ZOOLOGICAL PARK. To conduct comparative studies of the behavior and ecology of Ceylonese primates (Cercopithecidae).

OFFICE OF ECOLOGY. To study the relationship of man and tame elephants in Ceylon.

OFFICE OF ECOLOGY. To continue (second year) a study of the behavior and ecology of the Ceylonese elephant.

NATIONAL MUSEUM OF NATURAL HISTORY. To study the flora of the Hassan District, Mysore State, India.

OFFICE OF THE SECRETARY. To continue studies of the birds of Bhutan.

## Astrophysics

SMITHSONIAN ASTROPHYSICAL OBSERVATORY, CAMBRIDGE, MASSACHUSETTS. To study gamma rays through high-altitude balloon flights in south India.

SMITHSONIAN ASTROPHYSICAL OBSERVATORY, CAMBRIDGE, MASSACHUSETTS. To study in Israel the collective behavior of self-gravitating systems.

SMITHSONIAN ASTROPHYSICAL OBSERVATORY, CAMBRIDGE, MASSACHUSETTS. To continue (second year) in Israel construction of stellar models of evolving stars.

SMITHSONIAN CENTER FOR SHORT-LIVED PHENOMENA, CAMBRIDGE, MASSACHUSETTS. To support reconnaissance missions and field expeditions of the Center.

## Museum Programs

BOSTON MUSEUM OF FINE ARTS, MASSACHUSETTS. To transport an exhibit of Egyptian art treasures.

SMITHSONIAN INSTITUTION TRAVELING EXHIBITION SERVICE, WASHINGTON, D.C. To transport an exhibit of Tunisian mosaics to the United States for exhibition in museums across the country.



## Appendix 2

### MEMBERS OF THE SMITHSONIAN COUNCIL 30 JUNE 1969

- H. HARVARD ARNASON. Vice president for Art Administration of the Solomon R. Guggenheim Foundation, 1071 Fifth Avenue, New York City 10028. Born 1909. BS and MA, Northwestern University; MFA, Princeton University, 1939. Worked with the Office of War Information, 1942–1945, and the State Department, Office of International Information and Cultural Affairs, 1945–1946; from 1947 to 1961 served as professor and chairman of the Department of Art at the University of Minnesota; appointed to present position in 1961. Trustee, American Federation of Arts, and member of many professional organizations. Author of numerous articles on medieval, eighteenth-century, and modern art, *Modern Sculpture* (1962), *Conrad Marca-Relli* (1962), *Alexander Calder* (1966), and *Modern Art* (1968).
- FRED R. EGGAN. Department of Anthropology, University of Chicago, 1126 East 59th Street, Chicago, Illinois 60601. Born 1906. PhB, University of Chicago; PhD, University of Chicago, 1933. Has been with the University of Chicago since 1934 (chairman of the Department of Anthropology, 1961–1963, and director of the Philippine Studies Program since 1953). Has served as the official delegate to the Pacific Science Congresses in Manila (1953), Bangkok (1957), Honolulu (1961), and Tokyo (1967), and is a member of the Pacific Science Board, National Academy of Sciences (1968–), and of research centers on the Indians of western United States and the tribes of the Philippines. Author of *Social Organization of the Western Pueblos* (1959) and *The American Indian: Perspectives for the Study of Social Change* (1966). Editor of *Social Anthropology of North American Tribes* (1937 and 1955).
- DONALD S. FARNER. Professor of zoophysiology and chairman, Department of Zoology, University of Washington, Seattle 98105. Born 1915. BA, Hamline University; PhD, University of Wisconsin, 1941. Washington State University, 1947–1966 (dean of the Graduate School, 1960–1966). Has served as president, International Union of Biological Sciences; as chairman, Division of Biology and Agriculture, National Academy of Sciences-National Research Council; and on the Executive Committee, International Council of Scientific Unions. Contributor to many scientific publications, mainly on avian physiology and control of annual cycles.
- ANTHONY N. B. GARVAN. Chairman, Department of American Civilization, University of Pennsylvania, Philadelphia, 19104. Born 1917. BA and MA, Yale University; PhD, 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) and 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).
- MURRAY GELL-MANN. Robert Andrew Millikan Professor of Theoretical Physics, California Institute of Technology, Pasadena, 91109. Born 1929. BS, Yale University; PhD, Massachusetts Institute of Technology, 1951. Has served as a member of the faculty of the California Institute of Technology since 1955, formerly having taught and conducted research at the University of Illinois, University of Chicago, and Columbia University. Has been a member of the Institute for Advanced Study, Princeton, New Jersey, 1967–1968; fellow of the American Physical Society; and member of the National Academy of Sciences since 1960. Author (with Yuval Ne'eman) of *The Eightfold Way* (1964) and numerous articles on elementary particle physics and related fields.
- 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* (volume 1, 1957; volume 2, 1967), *A Preliminary List of the Writings of Rebecca West 1912–1951* (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 City, 10003. Born 1918. BS, Harvard; MFA, Princeton University; PhD, Harvard University, 1952. Taught at Wellesley College, 1942–1943, 1946–1957 (instructor to associate professor and chairman of the Music Department), professor of music at New York University since 1957. President, American Musicological Society, 1967 and 1968. Editor, *Congress Report, International Musicological Society* (1961–1962), *Festschrift für Otto Erich Deutsch* (1963), *Aspects of Medieval and Renaissance Music* (1966). Author of numerous articles on eighteenth-century music, style analysis, computers and music, ethnomusicology, papyrology, and music bibliography.
- CLIFFORD L. LORD. President, Hofstra University, Hempstead, Long Island, New York 11550. Born 1912. BA and MA, Amherst College; PhD, Columbia University, 1943. Was director of the New York State Historical Association, 1941–1946; organized the Farmers' Museum, Cooperstown, New York, in 1942; director, State Historical Society of Wisconsin, 1946–1958; honorary director of Circus World Museum since 1955; vice president of the National Railroad Museum since 1956; dean of the School of General Studies and professor of history at Columbia University, 1958–1964. Member of many historical associations. Author of *Atlas of Congressional Roll Calls* (1941), *Historical Atlas of the United States* (1943, 1954), *History of U.S. Naval Aviation* (1949), *Teaching History with Community Resources* (1964, 1967), *Clio's Servant* (1967).
- CHARLES D. MICHENER. Watkins Distinguished Professor of Entomology and of Systematics and Ecology, University of Kansas, Lawrence, 66044. Born 1918. BS, University of California at Berkeley; PhD, University of California at Berkeley, 1941. Assistant and associate curator of Lepidoptera, American Museum of Natural History, 1942–1948. Has been with the University of Kansas since 1948 (Watkins Distinguished Professor since 1959). Served as state entomologist, 1949–1961; president of Society for the Study of Evolution, 1967;

and president of Society of Systematic Zoologists, 1969. Author (with Mary H. Michener) of *American Social Insects* (1951), (with S. F. Sakagami) of *Nest Architecture of the Sweat Bees* (1962), and of approximately 200 technical works. Editor of *Evolution* (1963–1965). Work concerns social behavior and ecology (especially of bees), bee systematics, and principles of taxonomy.

PETER M. MILLMAN. National Research Council of Canada, Ottawa 7, Ontario. Born 1906. BA, Toronto; PhD, Harvard University, 1932. Past president of the Royal Astronomical Society of Canada and of the Meteoritical Society. Author of *This Universe of Space* (1962) and editor of *Meteorite Research* (1969). 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. Master, Timothy Dwight College, Yale University, New Haven, Connecticut 06520. Born 1909. BA, Harvard University; MA, 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, Department of Defense, 1946–1952. Author of *Admiral Sims and the Modern American Navy* (1942), *A Study of the Life and Times of Henry L. Stimson* (1960), and *Men, Machines and Modern Times* (1967). Editor of *The Letters of Theodore Roosevelt* (8 volumes, 1951–1954), *Cowboys and Kings* (1954), *The American Style* (1959).

NORMAN D. NEWELL. Curator of fossil invertebrates, American Museum of Natural History, New York City. Born 1909. BS and MA, University of Kansas; PhD, 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) and *Organism Communities and Bottom Facies, Great Bahama Bank* (1959) and organizer of the pelecypod volume of the *Treatise on Invertebrate Paleontology*. Co-editor of the *Journal of Paleontology* (1939–1942). Has visited many parts of North America, Europe, Australia, and Asia in the study of the permians of the world.

NORMAN HOLMES PEARSON. Professor of English and American Studies, Yale University, New Haven, Connecticut 06520. Born 1909. BA, Yale University; PhD, Yale University, 1941. Has been with Yale University since 1941. Editor (with W. R. Benet) of *The Oxford Anthology of American Literature* (1938) and (with W. H. Auden) *Poets of the English Language* (1950). Author of *Some American Studies* (1964), *American Literary Fathers* (1965), and *The History of American Literature* (revised edition, 1969).

GORDON N. RAY. President, John Simon Guggenheim Memorial Foundation, 90 Park Avenue, New York City 10016. Born 1915. BA and MA, Indiana University; MA (1938) and PhD Harvard University, 1940. Taught at Harvard University, University of Illinois (vice president and provost), and New York University (professor of English since 1962). Has been member of the United States Educational Commission in the United Kingdom, 1948–1949; adviser in literature to Houghton Mifflin Company since 1954; chairman, Committee on Institutional Cooperation of the Council of Ten Universities and the University of Chicago, 1958–1960; member of the Board of Trustees, John Simon Guggenheim Memorial Foundation Library Center, 1962–1968 (chairman, 1965–1968); member of the Board of Trustees, Center for Applied Linguistics, since 1965; and trustee of the Modern Language Association of



America since 1966. Author of *The Buried Life* (1952); *Thackeray: the Uses of Adversity* (1955); *Thackeray: the Age of Wisdom* (1958), (with Leon Edel) *Henry James and H. G. Wells* (1958). Editor of *The Letters and Private Papers of William Makepeace Thackeray* (4 volumes, 1945-1946); *Thackeray's Rose and the Ring, History of Henry Esmond, and Contributions to the "Morning Chronicle"*, and *Wells' Desert Daisy and History of Mr. Polly*.

ANDRÉ SCHIFFRIN. Managing director, Pantheon Books, 201 East 50th Street, New York City 10022. Born 1935. BA, Yale University, 1957. Received degree from Cambridge, 1959. Has been with Pantheon Books since 1962. Contributor to various journals on current writing and politics.

FEDERICK SEITZ. President, National Academy of Sciences, 2101 Constitution Avenue, NW, Washington, D.C. 20418. Born 1911. BA, Leland Stanford Jr. University; PhD, 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, 1957-1964; 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. President, the Rockefeller University, 1968-. Author of *Modern Theory of Solids* (1940) and *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. BS, University of Birmingham; DSc, Massachusetts Institute of Technology, 1926. Has been with American Brass Company, 1926-1943; the Los Alamos Scientific Laboratory, 1943-1946; the University of Chicago, 1946-1961; and Massachusetts Institute of Technology as institute professor since 1961. Was a member of the President's Science Advisory Committee in 1959. Co-author of *The Pyrotechnia of Vannuccio Biringuccio* (1942), *Structure and Properties of Solid Surfaces* (1953), *Réaumur's Memoirs on Steel and Iron* (1956), *Treatise on Divers Arts by Theophilus* (1963). Author of *A History of Metallography* (1960) and *Sources for the History of the Science of Steel* (1968). A primary interest is the historical interaction between science and technology. He is a frequent consultant to the Freer Gallery of Art and the Smithsonian Office of Anthropology.

JOHN D. SPIKES. Professor of biology, College of Letters and Science, University of Utah, Salt Lake City 84112. Born 1918. BS, California Institute of Technology; PhD, California Institute of Technology, 1948. Has been with the University of Utah since 1948 (dean of the College of Letters and Science, 1964-1968) except for a period on leave as cell physiologist of the Division of Biology and Medicine of the Atomic Energy Commission. Author of numerous publications in scientific journals and bulletins. Major research is in biophysics, especially photobiology.

STEPHEN E. TOULMIN. Department of Philosophy, Michigan State University, East Lansing 48823. Born 1922. BA, Cambridge University; PhD, Cambridge University, 1948. Has taught at Oxford, University of Melbourne, University of Leeds, New York University, Columbia University, and Brandeis University; from 1960 to 1965 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": *The Fabric of Heavens*

(volume 1, 1961), *The Architecture of Matter* (volume 2, 1962), *The Discovery of Time* (volume 3, 1965); *Night Sky at Rhodes* (1963).

WARREN H. WAGNER, JR. Botanical Gardens and Department of Botany, University of Michigan, Ann Arbor 48105. Born 1920. BA, University of Pennsylvania; PhD, University of California at Berkeley, 1950. Has been a member of the faculty of the University of Michigan since 1951, currently serving as director of the Botanical Gardens, president of the Michigan Botanical Club, and vice president of the American Fern Society. Served as panelist in systematic biology for National Science Foundation (1962-1965), president of American Society of Plant Taxonomists (1966), and vice president, Section G (Botanical Sciences), American Association for the Advancement of Science (1968). Research centers on higher plants, origin and evolution of ferns, methods of accurate deduction of phylogenetic relationship of fossil and living plants.



## Appendix 3

### ACADEMIC APPOINTMENTS 1968-1969

#### Postdoctoral Visiting Research Associates

##### *Program in American Studies*

NICOLAI CIKOVSKY, JR. Studies in the art theories of the Hudson River School, with Dr. David W. Scott, National Collection of Fine Arts, from 1 September 1968 to 30 June 1969.

FREDERICK FRIED. Studies of architectural ornament in America from the mid nineteenth to the early twentieth century, with Dr. Richard H. Howland, National Museum of History and Technology, from 5 August 1968 to 31 July 1969.

IRVING BRINTON HOLLEY, JR. Biographical studies of General John M. Palmer, United States Army, with Frederick C. Durant, III, National Air and Space Museum, from 1 July 1968 to 30 June 1969.

LUDWELL H. JOHNSON, III. Studies of the influence of party politics and pressure groups on the conduct of the Civil War, including contraband trade, with Dr. Philip K. Lundeborg, National Museum of History and Technology, from 1 February to 30 June 1969.

##### *Program in History of Science and Technology*

THOMAS PARKE HUGHES. Study of the evolution of electric light and power systems, national and regional, in the United States, Germany, and Great Britain from 1880 to 1940, with Dr. Bernard S. Finn, National Museum of History and Technology, from 1 February to 31 August 1969.

##### *Program in Evolutionary and Systematic Biology*

WALTER OLIVER CERNOHORSKY. Studies of the systematics of the molluscan family Mitridae, with Dr. Harald Rehder, National Museum of Natural History, from 1 July 1968 to 31 December 1969.

LEO JOSEPH HICKEY. Studies of leaf architecture in the identification of fossil dicotyledons, with Dr. Francis Hueber, National Museum of Natural History, from 15 July 1968 to 14 July 1969.

ELIAS RAMON DE LA SOTA. Studies of the ferns of northwestern Argentina, including taxonomy and evolution of genus *Microgramma* with Conrad V. Morton, National Museum of Natural History, from 1 September 1968 to 31 August 1969.

*Program in Physical Sciences*

KRISHNA MANDA VENKATA APPARAO. Studies of the emission of gamma rays by the sun and theoretical research on their production, with D. G. Fazio, Smithsonian Astrophysical Observatory, from 1 April 1968 to 1 April 1969.

*Program in Museum Studies*

CARROLL GREENE, Jr. Study of methods of developing collections and exhibits in Afro-American cultural history, with Frank A. Taylor, Director of the United States National Museum, from 15 January 1968 to 14 March 1969.

## Predoctoral Visiting Research Associates

*Program in Anthropology and Cultural Studies*

MORRIS ROSSABI. Studies of relations between China and Central Asia during the early Ming Dynasty, with Dr. John A. Pope, Freer Gallery of Art, from 1 July 1968 to 30 June 1969, leading to the award of the PhD from Columbia University.

LORRAINE ELISE WILLIAMS. Studies of contact between Indians and settlers in seventeenth-century New England, with Dr. Richard B. Woodbury, National Museum of Natural History, from 1 July 1968 to 31 March 1969, leading to the award of the PhD from New York University.

*Program in American Studies*

ROBERT HAROLD GETSCHER. Studies of Whistler's etchings, with Mrs. Adelyn Breeskin, National Collection of Fine Arts from 1 September 1968 to 31 August 1969, leading to the award of the PhD from Case Western Reserve University.

PETER CORT MARZIO. Studies of the popularization of the fine arts in America from 1830 to 1860, with Anne C. Golovin and Peter C. Welsh, National Museum of History and Technology, from 1 September 1968 to 31 August 1969, leading to the award of the PhD from the University of Chicago.

HAROLD K. SKRAMSTAD, JR. Teaching activities in support of the Program in American Studies and investigation into the method, theory, and problems of material culture, with Dr. Wilcomb E. Washburn, National Museum of History and Technology, from 1 June 1968 to 31 May 1969, leading to the award of the PhD from the George Washington University.

*Program in History of Science and Technology*

MERRITT ROE SMITH. Studies of the Harper's Ferry armories and the new technology in America from 1794 to 1861, with Edwin A. Battison, National Museum of History and Technology, from 1 December 1967 to 4 June 1969, leading to the award of the PhD from Pennsylvania State University.

*Program in Evolutionary and Systematic Biology*

NANCY M. CRAMER. Studies of the systematics and biogeography of the polychaete family Spionidae, with Dr. Meredith Jones, National Museum of Natural History, from 1 July 1968 to 1 July 1969, leading to the award of the PhD from the George Washington University.

DAVID J. THOMAS. Systematic paleontological studies of Tertiary molluscs from the Gurajira Peninsula, Colombia, with Thomas R. Waller, National Museum of Natural History, from 25 September 1968 to 15 September 1969, leading to the award of the PhD from the State University of New York.

*Program in Evolutionary and Behavioral Biology (Tropical Zones)*

MARK H. BERNSTEIN. Studies of response for "Quirks" in Cebus monkeys, with Dr. Martin H. Moynihan, Smithsonian Tropical Research Institute, from 20 June 1968 to 31 July 1969, leading to the award of the PhD from the University of Pennsylvania.

JEFFREY B. GRAHAM. Studies of the thermal relations of Panamanian fishes, with Dr. Ira Rubino, Smithsonian Tropical Research Institute, from 1 August 1968 to 31 August 1969, leading to the award of the PhD from Scripps Oceanographic Institute.

JAMES R. KARR. A study of habitat and avian diversity in neotropics, with Dr. Neal G. Smith, Smithsonian Tropical Research Institute, from 1 July 1968 to 31 August 1969, leading to the award of the PhD from the University of Illinois.

CHARLES LECK. Studies of the ecology of the avian exploitation of fruit trees, with Dr. Michael Robinson, Smithsonian Tropical Research Institute, from 23 September 1968 to 5 May 1969, leading to the award of the PhD from Cornell University.

NORRIS H. WILLIAMS. Studies of pollinator specificity in the genus *Brassia* (Orchidaceae), with Dr. Robert L. Dressler, Smithsonian Tropical Research Institute, from 1 September 1968 to 31 August 1969, leading to the award of the PhD from the University of Miami.

DONALD WILSON. Observations of the colony of vesperilionid (*Myotis nigriceps*) with Michael Robinson, Smithsonian Tropical Research Institute, from 1 September 1968 to 1 September 1969, leading to the award of the PhD from the University of New Mexico.

*Program in Physical Sciences*

GEORGE H. RIEKE. Studies of cosmic sources of gamma rays, with Dr. C. G. Fazio, Smithsonian Astrophysical Observatory, from 1 September 1968 to 31 May 1969, leading to the award of the PhD from Harvard University.

WILLIAM PATRICK ROBERTS. Studies of the mineralogy of the Patuxent River Basin, with Dr. Jack W. Pierce, National Museum of Natural History, from 1 September 1968 to 15 August 1969, leading to the award of the PhD from the George Washington University.

RICHARD WYATT THOMSEN. Studies of composition of femic materials in southwestern porphyry copper deposits, with Dr. George Switzer, National Museum of Natural History, from 1 October 1968 to 30 June 1969, leading to the award of the PhD from the University of Arizona.

*Program in Museum Studies*

ROGER M. DAVIS. Study of methods of developing educational programs in ecology within the National Museum of Natural History, with Nathaniel R. Dixon, associate director of the Office of Academic Programs, from 30 September 1968 to 30 June 1969.

JANET LOUISE STONE. Study of methods of treating ethnographic materials under tropical conditions, with Dr. Robert Organ, Conservation Analytical Labora-

tory, from 1 June 1968 to 31 July 1969, leading to the award of the PhD from New York University.

## Museum Interns

### *Program in Museum Studies*

C. MEREDITH HERTING, the George Washington University. Study of museum and gallery methods and programs in the fine arts and portraiture, with Robert Stewart, National Portrait Gallery, and William Truettner and Barbara Dunn, National Collection of Fine Arts, from 23 September 1968 to 31 May 1969.

MARIANNE LUNDIG, University of Pennsylvania and National Museum in Copenhagen. Study of methods of design and production, with Mr. John Anglim, Smithsonian Office of Exhibits.

JUDITH SOBOL, the George Washington University. Study of methods of developing educational programs in the fine arts and traveling exhibits between the United States and other countries, with Susan Sollins and Lois Bingham, National Collection of Fine Arts, from 3 February to 31 May 1969.

MARY THIEME, National Humanities Endowment Museum Intern. Study of preservation methods applied to anthropological collections and the development of an exhibit on African textiles with Dr. Gordon Gibson, National Museum of Natural History, from 1 July 1968 to 31 May 1969.

## Cooperative Fellows

### *Program in American Studies*

SHARON BREDARIOL, Georgetown University. Studies in eighteenth-century American material cultural, with C. Malcolm Watkins, National Museum of History and Technology, from 16 September 1968 to 15 June 1969.

THOMAS J. PEYTON, Georgetown University. Study of Thomas Jefferson's Indian policy, with John C. Ewers, National Museum of Natural History, from 12 September 1968 to 12 June 1969.

### *Program in Anthropology and Cultural Studies*

ALICIA ANN SULLIVAN, Northeastern University. Studies of John Wesley Powell, contributing to the preparation of a centennial commemorative exhibit, with John C. Ewers, National Museum of Natural History, from 9 December 1968 to 14 March 1969.

## Summer 1968 Undergraduate Research Participation Appointments

Names marked with an asterisk indicate students whose research was supported through grants from the National Science Foundation's Undergraduate Research Participation Program (grants GY 4240, Social Sciences, and GY 4549, Biological Sciences).



*Program in Anthropology and Cultural Studies*

- \*JOHN C. BEAR, University of Pennsylvania. Research on the human skeletal material excavated at Ag-Kupruk Cave, Afghanistan, with Dr. J. Lawrence Angel, National Museum of Natural History.
- \*WILLIAM CRAWFORD, Yale University. Study of pre-Columbian Mesoamerican religions, with Dr. Robert M. Laughlin, National Museum of Natural History.
- \*RAYMOND J. DEMALLIE, University of Chicago. Descriptive and analytical catalog of Siouan manuscripts in the Smithsonian Archives of Anthropology, with Mrs. Margaret Blaker, National Museum of Natural History.
- \*LYNN ELLEN DIXON, Pennsylvania State University. Study of obsidian hydration dating, with Dr. Clifford Evans, National Museum of Natural History.
- \*WILLIAM HEIMANSON, San Fernando State College. Edited movie film of Himba wedding, South-West Africa, with Dr. Gordon Gibson, National Museum of Natural History.
- \*PRUDENCE E. MACDERMOD, Wake Forest University. Archeological field research on the middle Missouri culture with Dr. Warren Caldwell, River Basins Surveys.
- \*DANIEL G. MALTZ, Cornell University. Compilation of roster of experts on North American Indians, with Dr. Samuel Stanley, National Museum of Natural History.
- \*CHARLES W. MARKMAN, University of North Carolina. Archeological field research on the middle Missouri culture, with Dr. Warren W. Caldwell, National Museum of Natural History.
- \*CHARLES M. MCKINNEY, American University. Analysis of archeological specimens from coastal Ecuador, with Dr. Clifford Evans, National Museum of Natural History.
- CHARLES L. ROXIN, Oberlin College. Study of urban commercial folk music since 1945, with John Fesperman, National Museum of History and Technology.
- \*ROBERT H. SAYERS, University of Illinois. Field study of traditional potteries of North Carolina and Georgia, with Dr. Samuel Stanley, National Museum of Natural History, and Ralph Rinzler, Division of Performing Arts.
- JEROME A. VOSS, Michigan State University. Study of archeological specimens from Lindemeier, Colorado, with Edwin Wilmsen, National Museum of Natural History.

*Program in American Studies*

- CAROL A. COLE, Cornell University. Content analysis of American political symbolism in the nineteenth century, with emphasis on material culture, with Dr. Wilcomb Washburn, National Museum of History and Technology.
- CAROL J. HEINSIUS, Mount Holyoke College. Preparation in all phases of the 1969 exhibit on presidential inaugurations, with Mrs. Margaret Klapthor, National Museum of History and Technology.
- \*FRANCES A. HITCHCOCK, Stanford University. Research involving the Van Alstyne Collection of American Folk Art, with Dr. Richard Ahlborn, National Museum of History and Technology.
- PETER KOFFSKY, Oberlin College. Postal history research on propaganda leaflets of World War II, postal communications in Dahomey and Togoland around 1900, mail from British forces in Palestine, and postal history of plebiscites that followed World War I, with Carl H. Scheele, National Museum of History and Technology.



*Program in History of Science and Technology*

- \*CRAIG BARGER, Union College. The correspondence of Richard Rathbun, with Samuel T. Suratt, Smithsonian Institution Archives.
- \*JAMES FREEMAN, Drew University. Study of logic machines, with Dr. Uta C. Merzbach, National Museum of History and Technology.
- \*LOUIS P. SARNO, Georgetown University. Research for draft of catalog of aerial navigation instruments, with Dr. Philip Lundeborg, National Museum of History and Technology.
- \*DANA M. WEGNER, Elmhurst College. Identification and analysis of half models of federal ironclads, with Dr. Melvin Jackson, National Museum of History and Technology.
- JEFFERY ETHELL, Kings College. Analysis and history of the Grumman F6F Hellcat, with James Mahoney, National Air and Space Museum.
- ROBERT D. LAPIDUS, Ohio University. History of the sputnik and its repercussions, with Frederick C. Durant III, National Air and Space Museum.
- ELLEN C. SCHWARTZ, Brandeis University. Research in techniques of graphics and printing through the study of Smithsonian collections, with Dr. Elizabeth Harris, National Museum of History and Technology.

*Program in Environmental Biology*

- \*SHERRILL ADAMS, George Washington University. Study of mediated responses of plants, with Dr. Robert L. Weintraub, Radiation Biology Laboratory.
- \*PEGGY JEAN ARPS, Cornell University. Study of the optimum growing conditions for the production of the best pollen by *Tradescantia paludosa*, with Dr. William Klein, Radiation Biology Laboratory.
- \*MARY ALICE FEAGIN, Otterbein College. Study of the ecology of freshwater streams, with Dr. Francis Williamson, Chesapeake Bay Center for Field Biology.
- \*MARGARET HOWELL, Mount Holyoke College. Study of photomorphogenesis in *Arabidopsis*, action spectrum for floral induction, with Dr. John A. M. Brown, Radiation Biology Laboratory.
- \*DAYLE LONG, Pennsylvania State University. Studies of algal floristics of Delaware, with Ernani Menez, Oceanographic Sorting Center.
- \*MARILYN MILLER, Otterbein College. Study of functions of the primate tail, with Dr. John Napier, National Museum of Natural History.
- \*GEORGE F. SPRAGUE, JR., North Carolina State University. Experimentation with chloroplastic proteins, with Dr. Maurice Margulies, Radiation Biology Laboratory.

*Program in Evolutionary and Systematic Biology*

- \*DAVID E. EBY, Franklin and Marshall College. Study of sedimentation in some submarine canyons off the east coast of the United States, with Dr. Daniel J. Stanley, National Museum of Natural History.
- \*BETTY JEAN GRAY, Mount Holyoke College. Study of the skeletal morphology and systematics of two forms of peregrine falcon, with Dr. George Watson, National Museum of Natural History.
- \*LARRY E. MORSE, Michigan State University. Use of computers in preparing botanical identification keys and identifying specimens, with Dr. Stanwyn G. Shetler, National Museum of Natural History.
- \*JOHN R. PYZNER, Southwestern State College. Study of starch grains in bambooid grasses, with Dr. Thomas Soderstrom, National Museum of Natural History.

*Program in Evolutionary and Systematic Biology*

- \*JOSEPH R. THOMASSON, Fort Hays Kansas State College. A comparative study of the distribution of starch grains of tropical *Olyra latifolia*, with Dr. Thomas Soderstrom, National Museum of Natural History.
- \*JANA VELDERMAN, University of Michigan. Studies of relationships within the suborder of fishes of the Ammodytoidae and comparison of series of artificial hybrid catfish, with Dr. Stanley Weitzman and Dr. W. Ralph Taylor, National Museum of Natural History.
- \*ROBERT E. WEEMS, Randolph Macon Men's College. Restoration and study of the remains of turtles representing twelve individuals from the Calvert Formation (Miocene), with Dr. Nicholas Hotton, National Museum of Natural History.
- \*JANICE C. WHITE, University of Maryland. Comparative morphology of the *figurator* group of *Ataenius* (Coleoptera: Scarabaeidae), with Dr. Oscar Cartwright, National Museum of Natural History.
- \*CYNTHIA K. WARNER, Clemson University. Studies of anatomy of flowers and fruits of Araliaceae, and floral anatomy of Oragraceae and Rhizophoaceae, with Dr. Richard H. Eyde, National Museum of Natural History.

*Program in Evolutionary and Behavioral Biology (Tropical Zones)*

- \*HEATH MIRICK, Bennett College. Studies of predatory behavior of one species of spider on Barro Colorado Island, with Dr. Michael Robinson, Smithsonian Tropical Research Institute.
- \*JOHN P. OWEN, University of California at Davis. Analysis of nitrogen count in marine animals, with Dr. Peter W. Glynn, Smithsonian Tropical Research Institute.
- \*WAYNE L. SMITH, University of California at San Diego. Investigation of speciation and isolation mechanisms in sea urchins of the Atlantic and Pacific oceans along the Isthmus of Panama, with Dr. Ira Rubinoff, Smithsonian Tropical Research Institute.

*Program in Physical Sciences*

- \*BARBARA BREWSTER, Marietta College. Acquiring laboratory techniques in various aspects of mineralogy, with Paul Desautels, National Museum of Natural History.
- \*BARBARA RADOVICH, Duke University. Correlation between worldwide volcanic activity and earth tides, with Dr. William Melson, National Museum of Natural History.
- \*MARY T. WARD, St. Joseph's College. Chemical analysis of meteorites, with Dr. Roy S. Clarke, Jr., National Museum of Natural History.

*Program in Museum Studies*

- \*MARGARET L. KLEIN, Dickinson College. Study and analysis of Mayan pigment, with Mrs. Jacqueline Olin, National Museum of History and Technology.

## Summer 1968 Graduate Research Participation Appointments

*Program in Anthropology and Cultural Studies*

- FORREST W. MEADER, Arizona University. Survey of folklife traditions in communities of the Baltimore-Washington area, with James Morris, Division of Performing Arts.

DAVID GENTRY STEELE, University of Kansas. Estimation of stature from fragmentary long bones, with Dr. T. Dale Stewart, National Museum of Natural History.

CATHERINE WIMSATT, University of Washington. Skeletal material from the Shannon site, Montgomery County, Virginia, with Dr. Lucile St. Hoyme, National Museum of Natural History.

*Program in American Studies*

KAREN M. BASRALIAN, University of Maryland. Nineteenth-century fashion plates, with Claudia Kidwell, National Museum of History and Technology. PAUL DOUGLAS, the George Washington University. The Potomac Canal Company, with Samuel T. Suratt, Smithsonian Archives.

KENNETH J. HAGAN, Claremont Graduate School. "Response to Imperialism," American naval diplomacy in the semicivilized world, 1877-1889, with Dr. Philip Lundeberg, National Museum of History and Technology.

*Program in History of Science and Technology*

CAROLYN FAWCETT, Somerville College. International inventory of scientific instruments, with Silvio Bedini, National Museum of History and Technology. RONALD L. NUMBERS, University of California. Study of the nebular hypothesis in American thought, with Samuel T. Suratt, Smithsonian Archives.

GEORGE T. SHARRER, Maryland University. Study of indigo production in South Carolina, 1776-1783, with Dr. John Schlebecker, National Museum of History and Technology.

*Program in Environmental Biology*

PAUL FINE, University of Pennsylvania. Study of the avian fauna of the Chesapeake Bay Center for Field Biology, with Dr. Helmut Buechner, National Museum of Natural History.

*Program in Evolutionary Systematic Biology*

THOMAS BIFFAR, University of Miami. Studies of species of the genus *Callianassa* in the collection of the National Museum of History and of the western Atlantic species of *Callianassa* (Crustacea: Decapoda), and a survey of thalassinid specimens in the collection of the National Museum of Natural History, with Dr. Raymond Manning, National Museum of Natural History.

ROBERT DIETZ, Cornell University. A revision of the species included in the genus *Horama* (Ctenuchidae: Lepidoptera), with Dr. Donald Duckworth, National Museum of Natural History.

JEREMY B. C. JACKSON, Yale University. Studies of spatial distribution and population ecology of Mollusca of Carib Thalassa community, with Dr. Erle Kauffman, National Museum of Natural History.

DAVID KIRTLEY, Florida State University. Study of sabellariid wormreefs, with Dr. Marian Pettibone, National Museum of Natural History.

MARIO PICHARDO, Virginia Polytechnic Institute. Study of Pleistocene mammalian remains from Puebla, Mexico, with Dr. Clayron Ray, National Museum of Natural History.

WILLIAM SMITH-VANIZ, University of Miami. Studies of new genera and species of salarine blennies, with a key and synopsis of the genera (Blenniidae: Blenniinae: Salariini), with Dr. Victor Springer, National Museum of Natural History.

ALV D. YOUNGBERG, University of California. Studies of the willows of North America, with Dr. Mason Hale, National Museum of Natural History.

*Program in Evolutionary and Behavioral Biology (Tropical Zones)*

MARK H. BERNSTEIN, University of Pennsylvania. Studies of abnormal behavior in caged groups of Cebus monkeys, with Dr. Martin Moynihan, Smithsonian Tropical Research Institute.

RONALD P. LARKIN, Rockefeller University. Studies of behavior and ecology of Neotropical small rodents, with Dr. Martin Moynihan, Smithsonian Tropical Research Institute.

*Program in Physical Sciences*

JAY M. PASAGHOFF, Harvard University. Analysis of data on the spectra of dynamical features in the solar chromosphere, with Dr. Robert Noyes, Smithsonian Astrophysical Observatory.

*Program in Museum Studies*

MICHAEL YOST, Nova University. Study of user reactions to unscreened subject requests, with Mr. David Hershey, at the Science Information Exchange.

## Art Resources Inventory Project (summer 1968)

VIRGINIA T. BOYD, Oberlin College. Preparation of a directory of resources in the Washington, D.C. area for the study of traditional African art, with Carroll Greene, United States National Museum.

NATHANIEL KNIGHT, Howard University. Preparation of a directory of resources for the study of architecture of the Washington, D.C., area with Carroll Greene, United States National Museum.

BARBARA N. ROSEN, University of Maryland. Preparation of a summary of art activity in the Washington, D.C., area in the 1920s and 1930s, exclusive of governmental activities, with Carroll Greene, United States National Museum.

RICHARD E. SAITO, Oberlin College. Preparation of a directory of art historical resources in Oriental art in the Washington, D.C., area, with Carroll Greene, United States National Museum.

LARRY WHITTAKER, Johns Hopkins University. Preparation of a directory of resources for nineteenth-century American genre painting in the Washington, D.C., area, with Carroll Greene, United States National Museum.

## Appendix 4

### STAFF OF THE SMITHSONIAN INSTITUTION 30 JUNE 1969

#### Secretary's Office and Related Activities

The Secretary	S. Dillon Ripley
Office of the Secretary	
Executive Assistant	John H. Dobkin
Assistant to the Secretary	Charles L. Clapp
Assistant Secretary	James Bradley
Office of the Assistant Secretary	
Special Assistant	Robert Engle
Administrative Officer	Mrs. Dorothy Rosenberg
Director General of Museums and Director, United States National Museum	Frank A. Taylor
Assistant Secretary (Science)	Sidney R. Galler
Assistant Secretary (History and Art)	Charles Blitzer
Assistant Secretary (Public Service)	William W. Warner
Treasurer	T. Ames Wheeler
Office of Academic Programs	
Director	Philip C. Ritterbush
Director (Division of Elementary and Secondary Education)	Nathaniel Dixon
Assistant Director for Institutional Research (Division of Graduate Study)	Peter H. Wood
Director (Division of Seminars)	Wilton S. Dillon
General Counsel	Peter G. Powers
Assistant General Counsel	H. Crane Miller
Office of Personnel and Management Resources	
Director	Leonard B. Pouliot
Personnel Management Specialists	Vincent J. Doyle
	Samuel D. Falbo
	Carl E. Grant
	Ladd E. Hamilton
Employee Relations and Training Officer	Joseph P. Eberly



Special Projects, Office of the Secretary	
Special Assistant to the Secretary	Richard H. Howland
Equal Employment Opportunity Officer	Joseph A. Kennedy
Editor, Joseph Henry Papers	Nathan Reingold
Office of Assistant Treasurer	
Assistant Treasurer	Mrs. Betty J. Morgan
Office of Programming and Budget	
Director	John F. Jameson
Contracts Office	
Contracting Officer	Elbridge O. Hurlbut
Administrative Systems Division	
Chief	Mrs. Ann S. Campbell
Buildings Management Department	
Director	Andrew F. Michaels
Supply Division	
Chief	Fred G. Barwick
Photographic Services Division	
Chief	O. H. Greeson
Travel Services Office	
Chief	Mrs. Betty V. Strickler
Honorary Research Associates	Charles G. Abbot, Secretary Emeritus
	Leonard Carmichael, Secretary Emeritus
	Paul H. Oehser
	Alexander Wetmore, Secretary Emeritus
	John A. Graf
Honorary Fellow	

## Science

Assistant Secretary	Sidney R. Galler
Assistant (Science Affairs)	Mrs. Helen L. Hayes
Assistant (Science Resources)	Harry Hyman

## National Museum of Natural History

Director	Richard S. Cowan
Assistant Director	Paul K. Knierim
Special Assistant, Tropical Biology	F. Raymond Fosberg
Botanist	Marie-Helene Sachet <sup>1</sup>
Administrative Officers	Mrs. Mabel A. Byrd
	John J. Prenzel
Special Assistant to the Director	Joseph C. Britton

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<sup>1</sup> Appointment effective 29 June 1969.

*Anthropology*

Chairman	Saul H. Rosenberg
Senior Physical Anthropologist	T. Dale Stewart
Senior Archeologist	Waldo R. Wedel
Senior Ethnologist	John C. Ewers
Archivist	Mrs. M. Blaker
Latin American Anthropology	
Supervisor and Associate Curator	William H. Crocker <sup>2</sup>
Curator	Clifford Evans, Jr.
Associate Curator	Robert M. Laughlin
Old World Anthropology	
Supervisor and Curator	Gordon D. Gibson
Associate Curators	Eugene I. Knez
	Gus W. Van Beek
	William B. Trousdale
North American Anthropology	
Supervisor and Curator	Richard B. Woodbury
Curator	William C. Sturtevant
Associate Curator	Paul H. Voorhis
Physical Anthropology	
Supervisor and Curator	J. Lawrence Angel
Associate Curator	Lucile E. St. Hoyme
River Basin Surveys <sup>3</sup>	
Director	Warren W. Caldwell
Archeologists	George H. Smith
	Richard B. Johnston
	Lionel A. Brown
	John J. Hoffman
	Wilfred M. Husted
	Richard E. Jensen
	Oscar L. Mallory
Honorary	W. Montague Cobb (Physical Anthro- pology)
	Henry B. Collins (Archeology)
	Wilson Duff (Ethnology)
	Marcus S. Goldstein (Physical Anthro- pology)
	Sister Inez Hilger (Ethnology)
	C. G. Holland (Archeology)
	Neil M. Judd (Archeology)
	Ralph K. Lewis (Archeology)
	Olga Linares de Sapi (Archeology)
	Betty J. Meggers (Archeology)
	Philleo Nash (Ethnology)
	Victor A. Nunez Regueiro (Arche- ology)
	Matthew W. Stirling (Archeology)

<sup>2</sup> Replaced by Robert M. Laughlin, effective 19 February 1969.<sup>3</sup> River Basin Surveys transferred to National Park Service 28 June 1969.

## Honorary—Continued

Douglas Taylor (Ethnology)  
 William J. Tobin (Physical Anthropology)  
 Theodore A. Wertime (Archeology)  
 William S. Willis, Jr. (Ethnology)  
 Edwin F. Wilmsen (Archeology)  
 Nathalie F. S. Woodbury (Archeology)  
 Robert Young (Cinematography)

*Botany*

Chairman  
 Senior Botanist

Mason E. Hale  
 Lyman B. Smith

## Phanerogams

Supervisor and Associate Curator  
 Curators

Dan H. Nicolson  
 John J. Wurdack  
 Velva E. Rudd

Associate Curators

Stanwyn G. Shetler  
 Wallace R. Ernst

Assistant Curator

Dieter C. Wasshausen

## Ferns

Supervisor and Associate Curator  
 Curator

David B. Lellinger  
 Conrad V. Morton

## Grasses

Supervisor and Associate Curator

Thomas R. Soderstrom

## Cryptogams

Supervisor and Associate Curator  
 Curator

Harold E. Robinson  
 Mason E. Hale, Jr.

## Plant Anatomy

Supervisor and Associate Curator  
 Associate Curator

Richard H. Eyde  
 Edward S. Ayensu

Fungi<sup>4</sup>

Research Associates

Chester R. Benjamin  
 John A. Stevenson  
 Francis A. Uecker  
 John L. Cunningham  
 Paul Lewis Lentz  
 Marie L. Farr  
 Kent H. McKnight  
 L. R. Batra

## Honorary

Andrew W. Archer (Flowering Plants)  
 Paul S. Conger (Diatomaceae)  
 José Cuatrecasas (Flora of Tropical South America)  
 James A. Duke (Flora of Panama)  
 F. Raymond Fosberg (Tropical Biology)  
 Howard S. Gentry (Economic Plants of Northwestern Mexico)

<sup>4</sup> National fungus collections are curated by Department of Agriculture staff.

## Honorary—Continued

William H. Hatheway (Flora of Central America)  
 Frederick J. Hermann (North American Flora; Carex)  
 Elbert L. Little, Jr. (Dendrology)  
 Floyd A. McClure (Bamboos)  
 Judy T. Morgan (Plant Anatomy)  
 Kittie F. Parker (Compositae)  
 Julian G. Patiño (Flora of Colombia)  
 Clyde F. Reed (Ferns)  
 William L. Stern (Plant Anatomy)  
 C. Earle Smith (Ethnobotany)  
 Egbert H. Walker (Myrsinaceae, Eastern Asian Floras)

*Entomology*

Chairman  
 Senior Entomologist  
 Neuropteroids  
 Supervisor and Curator  
 Lepidoptera and Diptera  
 Supervisor and Assistant Curator  
 Associate Curators  
 Coleoptera  
 Supervisor and Associate Curator  
 Curator  
 Hemiptera and Hymenoptera  
 Supervisor and Assistant Curator  
 Associate Curator  
 Myriapoda and Arachnida  
 Supervisor and Curator  
 Honorary

Karl V. Krombein  
 J. F. Gates Clarke  
 Oliver S. Flint, Jr.  
 William D. Field  
 W. Donald Duckworth  
 Donald R. Davis

Paul J. Spangler  
 Oscar L. Cartwright  
 Gerald I. Stage  
 Richard C. Froeschner

Ralph E. Crabill, Jr.  
 William H. Anderson (Coleoptera)  
 Mrs. Doris H. Blake (Coleoptera)  
 Franklin S. Blanton (Diptera)  
 Frank L. Campbell (Insect Physiology)  
 K. C. Emerson (Mallophaga)  
 Frank M. Hull (Diptera)  
 William L. Jellison (Siphonaptera, Anoplura)  
 Harold F. Loomis (Myriapoda)  
 Carl F. W. Muesebeck (Hymenoptera)  
 Thomas E. Snyder (Isoptera)  
 Robert Traub (Siphonaptera)

*Invertebrate Zoology*

Chairman  
 Senior Zoologists

Raymond B. Manning  
 Fenner A. Chase, Jr.  
 Horton H. Hobbs, Jr.  
 Harald A. Rehder

## Crustacea

Supervisor and Curator  
Curators

Thomas E. Bowman  
J. Laurens Barnard  
Louis S. Kornicker  
Roger F. Cressey

Associate Curator

## Echinoderms

Supervisor and Curator  
Associate Curator

David L. Pawson<sup>5</sup>  
Klaus Ruetzler

## Worms

Supervisor and Associate Curator  
Curators

W. Duane Hope  
Meredith L. Jones  
Marian H. Pettibone  
Mary E. Rice

Associate Curator

## Mollusks

Supervisor and Associate Curator  
Curator  
Associate Curator

Clyde F. E. Roper  
Joseph Rosewater  
Joseph P. E. Morrison  
Frederick M. Bayer (Lower Invertebrates)  
Willard W. Becklund (Helminthology)  
S. Stillman Berry (Mollusks)  
J. Bruce Bredin (Biology)  
Isabel C. Canet (Crustacea)  
Maybelle H. Chitwood (Worms)  
Ailsa M. Clark (Marine Invertebrates)  
Elisabeth Deichmann (Echinoderms)  
Mary Gardiner (Echinoderms)  
Roman Kenk (Worms)  
Anthony J. Provenzano, Jr. (Crustacea)  
Waldo L. Schmitt (Marine Invertebrates)  
Frank R. Schwengel (Mollusks)  
I. G. Sohn (Crustacea)  
Donald F. Squires (Echinoderms)  
Gilbert L. Voss (Mollusks)  
Mrs. Mildred S. Wilson (Copepod Crustacea)

## Honorary

*Mineral Sciences*

Chairman  
Curator

Brian H. Mason  
George S. Switzer

## Meteorites

Supervisor and Curator  
Chemist

Kurt Fredriksson<sup>6</sup>  
Joseph A. Nelen<sup>7</sup>

<sup>5</sup> Replaced by Klaus Ruetzler in January 1969.

<sup>6</sup> Replaced by Roy S. Clarke, Jr., October 1968

<sup>7</sup> Appointment effective 29 June 1969.



## Meteorites—Continued

Associate Curator

Roy S. Clarke

Geochemist

Robert F. Fudali

Chemist

Eugene Jarosewich

## Mineralogy

Supervisor and Associate Curator

Paul E. Desautels

## Petrology

Supervisor and Associate Curator

William G. Melson

## Honorary

Howard J. Axon (Meteorites)

Edward P. Henderson (Meteorites)

John B. Jago (Mineralogy)

Peter Leavens (Mineralogy)

Rosser Reeves (Mineralogy)

Thomas E. Simkin (Petrology)

Harry Winston (Mineralogy)

*Paleobiology*

Chairman

Porter M. Kier

Senior Paleobiologists

G. Arthur Cooper

C. Lewis Gazin

## Invertebrate Paleontology

Supervisor and Curator

Richard Cifelli<sup>8</sup>

Curators

Richard S. Boardman

Alan H. Cheetham

Erle G. Kauffman

Martin A. Buzas

Richard M. Benson

Thomas R. Waller

Associate Curator

Kenneth M. Towle

Staff Specialist (Electron-microscopy)

## Vertebrate Paleontology

Supervisor and Curator

Clayton E. Ray

Curator

Nicholas Hotton III

## Paleobotany

Supervisor and Associate Curator

Francis M. Hueber

Associate Curators

Leo J. Hickey<sup>9</sup>

Walter H. Adey

## Sedimentology

Supervisor and Curator

Daniel J. Stanley

## Associate Curators

M. Grant Gross<sup>10</sup>

Jack W. Pierce

## Honorary

Invertebrate Paleontology

Arthur J. Boucot

Anthony C. Coates

C. Wythe Cooke

J. Thomas Dutro

Robert M. Finks

Mackenzie Gordon, Jr.

Richard E. Grant

<sup>8</sup> Replaced by Martin A. Buzas 12 May 1969.<sup>9</sup> Appointed 29 June 1969.<sup>10</sup> Resigned 31 August 1968.

## Honorary—Continued

## Vertebrate Paleontology

## Sedimentology

*Vertebrate Zoology*

Chairman

Senior Zoologist

## Fishes

Supervisor and Curator

Curator

Curator

Curator

Associate Curator

## Reptiles and Amphibians

Supervisor and Curator

Associate Curator

## Birds

Supervisor and Curator

Associate Curator

## Mammals

Supervisor and Curator

Curator

## Honorary

John W. Huddle

Ralph W. Imlay

Harry S. Ladd

N. Gary Lane

Kenneth E. Lohman

Sergius H. Mamay

William A. Oliver, Jr.

Axel A. Olsson

Norman F. Sohl

Margaret Ruth Todd

Wendell P. Woodring

Ellis L. Yochelson

Douglas Emlong

Remington Kellogg\*

Frank C. Whitmore, Jr.

Gilbert Kelling

Frederic R. Siegel

George W. Watson

Leonard P. Schultz<sup>11</sup>

Stanley H. Weitzman

Ernest A. Lachner

Victor G. Springer

Robert H. Gibbs, Jr.

William R. Taylor

James A. Peters

George R. Zug<sup>12</sup>

Richard L. Zusi

Paul Slud

Charles O. Handley

Henry W. Setzer

John W. Aldrich (Birds)

Richard C. Banks (Birds)

James E. Böhlke (Fishes)

Leonard Carmichael (Psychology,  
Animal Behavior)

Daniel M. Cohen (Fishes)

Bruce B. Collette (Fishes)

John F. Eisenberg (Mammals)

Herbert Friedmann (Birds)

Crawford H. Greenewalt (Birds)

Arthur M. Greenhall (Mammals)

Jack P. Hailman (Birds)

\*Died 8 May 1969.

<sup>11</sup> Retired 31 July 1968.<sup>12</sup> Appointed 3 January 1969.

## Honorary—Continued

Philip S. Humphrey (Birds)  
 David H. Johnson (Mammals)  
 E. V. Komarek (Mammals)  
 Roxie C. Laybourne (Birds)  
 Richard H. Manville (Mammals)  
 J. A. J. Meester (Mammals)  
 Edgardo Mondolfi (Mammals)  
 Russell E. Mumford (Mammals)  
 Dioscoro S. Rabor (Birds)  
 S. Dillion Ripley (Birds)  
 Leonard P. Schultz (Fishes)  
 Frank J. Schwartz (Fishes)  
 Alexander Wetmore (Birds)  
 David B. Wingate (Birds)

## Astrophysical Observatory

## Director

Assistant Director (Science)

Assistant Director (Management)

## Scientific Staff

Fred L. Whipple  
 Charles A. Lundquist  
 Carlton W. Tillinghast<sup>13</sup>  
 Arthur C. Allison  
 Eugene H. Avrett  
 Prabhu Bhatnagar  
 Nathaniel P. Carleton  
 Jerome R. Cherniack  
 Giuseppe Colombo  
 Matthias F. Comerford  
 Allan F. Cook  
 Derek M. Cunnold  
 Alex Dalgarno  
 Robert J. Davis  
 James C. DeFelice  
 William A. Deutschman  
 John S. Dickey, Jr.  
 Dale F. Dickinson  
 Giovanni G. Fazio  
 Edward L. Fireman  
 M. Raymond Flannery  
 Giuseppe Forti  
 Fred A. Franklin  
 Manfred P. Friedman  
 Edward M. Gaposchkin  
 Owen Gingerich  
 Antanas Girnius  
 Mario D. Grossi  
 Salah E. Hamid  
 Gerald S. Hawkins

---

<sup>13</sup> Died 27 July 1969.

## Scientific Staff—Continued

Henry F. Helmken  
Paul W. Hodge  
Luigi G. Jacchia  
Wolfgang Kalkofen  
Walter Köhnlein  
Yoshihide Kozai  
Kurt Lambeck  
Myron Lecar  
Carlton G. Lehr  
Hiram Levy II  
A. Edward Lilley  
Robert H. McCorkell  
Richard E. McCrosky  
Brian G. Marsden  
Ursula B. Marvin  
George H. Megrue  
Donald H. Menzel  
Lawrence W. Mertz  
Henri E. Mitler  
Paul A. Mohr  
Carl S. Nilsson  
Yasushi Nozawa  
Robert W. Noyes  
Costas Papaliolios  
Cecilia H. Payne-Gaposchkin  
Michael R. Pearlman  
Douglas T. Pitman  
Benjamin Powell  
Annette Posen  
George Rieke  
George B. Rybicki  
Winfield W. Salisbury  
Kenneth M. Sando  
Mario R. Schaffner  
Ladislav Schnal  
Zdenek Sekanina  
Chen-Yuan Shao  
I. Shapiro  
Ashok Sharma  
Jack W. Slowey  
Richard B. Southworth  
Stephen E. Strom  
Wesley A. Traub  
Sachiko Tsuruta  
George Veis  
Richard B. Wattson  
Trevor C. Weekes  
Charles A. Whitney  
John A. Wood

Scientific Staff—Continued	Frances W. Wright
	James P. Wright
Consultants	Christian E. Coulman
	John Danzinger
	John Denes
	Donald Hall
	Paul Horowitz
	Stephen Knowles
	David Nava
	Deane M. Peterson
	Rudolph Schild
	Gordon Snyder
Fellows	M. V. Krishna Apparao
	Gordon W. F. Drake
	David R. Hearn
	Robert H. G. Reid
	Noam Sack
Central Bureau for Satellite Geodesy	Jan Rolff, Executive Director
Central Bureau for Astronomical Telegrams	Brian G. Marsden, Director

### Smithsonian Tropical Research Institute

Director	Martin H. Moynihan
Deputy Director	Edward H. Kohn
Assistant Director, Marine Biology	Ira Rubinoff
Administrative Officer	Adela Gomez
Biologists	Robert L. Dressler
	Peter W. Glynn
	Egbert Leigh
	A. Stanley Rand
	Michael H. Robinson
	Roberta W. Rubinoff
	Neal G. Smith
Honorary	Charles F. Bennett, Jr.
	John Eisenberg
	Carmen Glynn
	Carlos Lehmann
	Robert H. MacArthur
	Ernst Mayr
	Giles W. Mead
	Barbara Robinson
	Patricio Sánchez
	W. John Smith
	C. C. Soper
	Paulo Vanzolini
	Martin Young



## Radiation Biology Laboratory

Director	William H. Klein
Assistant Director	Walter A. Shropshire, Jr.
Biochemists	David L. Correll
	Homer T. Hopkins
	Maurice M. Margulies
	Robert L. Weintraub
Biologist	Elisabeth Gantt
Cytogeneticist	Te-Hsiu-Ma
Anthropologist	Robert Stuckenrath
	Bernard Goldberg
Physicist	Helga Drumm
Plant Physiologists	Victor B. Elstad
	Leonard Price

## National Zoological Park

Director	T. H. Reed
Assistant Director	John Perry
Office of the Director	
Pathologist	Robert M. Sauer
Engineer	Frank A. Maloney
Acting Head, Information and Education	
Administrative Officer	Sybil E. Hamlet
Special Assistant to the Director	Joseph J. McGarry
Personnel Management Specialist	Warren J. Iliff
Department of Living Vertebrates	Robert H. Artis
Head of Department	Donald D. Bridgwater
Manager, Bird Division	Kerry A. Muller
Manager, Reptile Division	Jaren G. Horsley
Scientific Research Department	
Resident Scientist	John F. Eisenberg
Zoologist	Larry R. Collins
Animal Health Department	
Veterinarian	Clinton W. Gray
Operations and Maintenance Department	
Head of Department	James H. McAllister
Associates in Ecology	Helmut K. Buechner
	S. Dillon Ripley
	Lee M. Talbot
Research Associates	Jean Delacour
	Suzanne Ripley
	Richard Fiennes
Collaborators	F. M. Garner
	Leonard Goss
	J. Lear Grimmer

## Collaborators—Continued

Carlton Herman  
 Werner P. Heuschle  
 Paul Leyhausen  
 Charles R. Schroeder  
 Constance P. Warner

## Office of Oceanography and Limnology

Head	I. Eugene Wallen
Deputy Head	William I. Aron
Supervisor, Smithsonian Oceanographic Sorting Center	H. Adair Fehlmann
Director, Mediterranean Marine Sorting Center	Robert P. Higgins

## Office of Ecology

Acting Head	I. Eugene Wallen
Director, Chesapeake Bay Center for Field Biology	Francis S. L. Williamson

## Center for the Study of Man

Acting Director	Sol Tax
Program Coordinator	Samuel Stanley
Urgent Anthropology Coordinator	Priscilla Reining

## Center for Short-Lived Phenomena

Director	Robert Citron
----------	---------------

## History and Art

Assistant Secretary	Charles Blitzer
Director, Special Projects	Ervin S. Duggan

## National Museum of History and Technology

Director	Robert P. Multauf
Assistant Director	Silvio A. Bedini
Administrative Officers	Virginia Beets
	Robert G. Tillotson
Section of Mathematics	
Supervisor and Associate Curator	Uta C. Merzbach

*Applied Arts*

Chairman

Carl H. Scheele

Graphic Arts and Photography

Supervisor and Curator

Eugene Ostroff

Assistant Curator

Elizabeth Harris

Numismatics

Supervisor and Curator

Vladimir Clain-Stefanelli

Curator

Elvira Clain-Stefanelli

Postal History

Supervisor and Associate Curator

Carl H. Scheele

Assistant Curator

Reidar Norby

Textiles

Supervisor and Curator

Grace R. Cooper

Associate Curator

Rita J. Adrosko

Honorary

Mrs. Emery May Norweb (Numis-  
matics)

R. Henry Norweb (Numismatics)

*Cultural History*

Chairman

C. Malcolm Watkins

Costume and Furnishings

Supervisor and Associate Curator

Rodris C. Roth

Assistant Curator

Claudia B. Kidwell

Ethnic and Western Cultural History

Supervisor and Curator

Richard E. Ahlborn

Curator

C. Malcolm Watkins

Honorary

Mrs. Arthur M. Greenwood

Elmer C. Herber

Ivor Noël Hume

Mrs. Anne W. Murray (Curator  
Emeritus, Costume)

Mrs. Joan Pearson Watkins

Edward B. Jelks

*Musical Instruments*

Supervisor and Associate Curator

John T. Fesperman

Associate Curator

Cynthia A. Hoover

*Preindustrial History*

Supervisor and Curator

C. Malcolm Watkins

Associate Curator

Anne C. Golovin

*Industries*

Chairman

John H. White, Jr.

Senior Historian

Howard I. Chapelle

Agriculture and Mining

Supervisor and Curator

John T. Schlebecker

Associate Curator

John N. Hoffman

Ceramics and Glass

Supervisor and Curator

Paul V. Gardner

Associate Curator

J. Jefferson Miller II

Manufacturing

Supervisor and Curator

Philip W. Bishop

Transportation

Supervisor and Curator

John H. White, Jr.

Curator

Melvin H. Jackson

Honorary

Hans Syz (Ceramics)

*National and Military History*

Chairman	Edgar M. Howell
Historic Archeology	
Supervisor and Curator	Mendel L. Peterson
Military History	
Supervisor and Curator	Edgar M. Howell
Associate Curator	Craddock R. Goins, Jr.
Naval History	
Supervisor and Curator	Philip K. Lundeberg
Curator	Harold D. Langley
Political History	
Supervisor and Associate Curator	Keith E. Melder
Associate Curator	Margaret B. Klapthor
Assistant Curator	Herbert R. Collins
Honorary	William Rea Furlong (Flag History)
	Frederick C. Lane (Naval History)

*Science and Technology*

Chairman	Bernard S. Finn
Electricity and Nuclear Energy	
Supervisor and Curator	Bernard S. Finn
Mechanical and Civil Engineering	
Supervisor and Curator	Robert M. Vogel
Associate Curator	Edwin A. Battison
Medical Sciences	
Supervisor and Curator	Sami K. Hamarneh
Assistant Curator	Audrey B. Davis
Physical Sciences	
Supervisor and Curator	Jon B. Eklund
Curator	Walter F. Cannon
Assistant Curator	Deborah J. Warner
Honorary	Anthony R. Michaelis (Scientific Instruments)
	Derek J. De Solla Price (Scientific Instruments)

## Freer Gallery of Art

Director	John A. Pope
Assistant Director	Harold P. Stern
Associate Curator, Chinese Art	Thomas Lawton
Assistant Curator, Chinese Art	Hin-cheung Lovell
Head Conservator, Technical Laboratory	W. Thomas Chase
Research Consultant, Technical Laboratory	Rutherford J. Gettens
Research Assistant, Far Eastern Ceramics	Josephine H. Knapp
Research Assistant, Herzfeld Archives	Joseph M. Upton
Honorary Associates	Richard Edwards
	Calvin French
	Oleg Grabar

## National Collection of Fine Arts

Director	David W. Scott <sup>14</sup>
Acting Director	Robert Tyler Davis <sup>15</sup>
Registrar	Elizabeth Strassmann
Librarian (NCFA-NPG)	William B. Walker
Conservator (NCFA-NPG)	Charles H. Olin
Editor	Georgia M. Rhoades
Administrative Officer	Harry W. Zichterman
Painting and Sculpture	
Associate Curator	William H. Truettner
Coordinator of Special Projects, Ren-	
wick Gallery	Donald R. McClelland
Prints and Drawings	
Curator	Jacob Kainen
Contemporary Art	
Curator	Mrs. Adelyn B. Breeskin
Exhibits	
Curator	Harry Lowe
Assistant	Abigail V. Booth
International Art Program	
Chief	Lois A. Bingham
Deputy Chief	Margaret P. Cogswell
Exhibits Officer	William M. Dunn
Museum Programs	Susan C. Sollins
Smithsonian Art Commission	Charles H. Sawyer, Chairman
	Walker Hancock, Vice Chairman
	S. Dillon Ripley, Secretary
	Leonard Baskin
	William A. M. Burden
	H. Page Cross
	David E. Finley
	Martin Friedman
	Lloyd Goodrich
	Walker Hancock
	Bartlett H. Hayes, Jr.
	August Heckscher
	Thomas C. Howe
	Mrs. J. Lee Johnson III
	Samuel C. Johnson
	Wilmarth S. Lewis
	Henry P. McIlhenny
	Ogden M. Pleissner
	Edgar P. Richardson
	Charles H. Sawyer
	Mrs. Otto L. Spaeth
	Leonard Carmichael
	Alexander Wetmore
Members Emeritus	

<sup>14</sup> Resigned 30 May 1969.<sup>15</sup> Appointed 30 May 1969.



## National Portrait Gallery

Director	Charles Nagel <sup>16</sup>
Assistant Director	Vacant
Historian	Vacant
Curator	Robert G. Stewart
Assistant Curator	Monroe Fabian
Exhibits Curator	Riddick Vann
Keeper of the Catalogue	Vacant
Research Assistants	Mrs. Genevieve Stephenson
	Mrs. Mona Dearborn
Administrative Officer	Joseph A. Yakaitis
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Conservator (NPG-NCFA)	Charles H. Olin
Registrar	Jon D. Freshour
NPG Commission	John Nicholas Brown, Chairman
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	Lewis Deschler
	David E. Finley
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	Jules D. Prown
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	Secretary, Smithsonian Institution
	Director, National Gallery of Art

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Director	Abram Lerner
Assistant Curator	Cynthia J. Jaffee
Historian	Frances R. Shapiro
Registrar	Thomas J. Girard

## Cooper-Hewitt Museum of Design

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Administrator	Christian Rohlfing
Curator, Drawings and Prints	Mrs. Elaine E. Dee
Curator, Textiles	Alice B. Beer
Assistant Curator, Textiles	Milton F. Sondag
Curator, Decorative Arts (Acting)	Janet D. Thorpe
Assistant Curator, Decorative Arts	Mrs. Catherine L. Frangiamore
Librarian	Edith E. Adams
Registrar	Mrs. Mary F. Blackwelder
Museum Specialist	Mary A. Noon

<sup>16</sup> Retired 30 June 1969. Replaced by Marvin Sadik 1 July 1969.

## National Air and Space Museum

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 Acting Assistant Director (Aeronautics)  
     Aircraft Propulsion  
     Assistant Director (Astronautics)  
     Assistant Director (Information)  
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 Paul E. Garber <sup>17</sup>  
 Louis S. Casey <sup>18</sup>  
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     (ex-officio)  
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     USA  
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     USMC  
 Rear Admiral Roderick Y. Edwards,  
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 (Three civilian vacancies)  
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 Assistant Director  
 Administrative Officer  
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 David Lloyd Kreeger  
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 Secretary of Defense  
 Secretary, Smithsonian Institution

Ex officio

<sup>17</sup> Retired 28 February 1969.

<sup>18</sup> Appointed 28 February 1969.

## Woodrow Wilson International Center for Scholars

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Benjamin H. Read

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Wilcomb E. Washburn

Associate in American Studies

Harold K. Skramstad

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Lloyd E. Herman

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Deputy Director, Foreign Currency  
Program  
Grants Technical Assistants, Foreign  
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Deputy Director  
Technical Director

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P. Timothy Jecko  
Richard P. Lusher

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Project Managers	Ruri Sakai
	Marian A. Hope

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Sales Manager	Mrs. Virginia Durbeck
Book Shops Manager	Mrs. Florence Lloyd
Exhibits Specialist	J. Michael Carrigan

## Belmont Conference Center

Director	David B. Chase
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Research and Design Coordinator	Larry Erskine Thomas
Exhibit Specialist	James E. Mayo
Artist in Residence	Georgia Mills Jessup

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Acting Archivist	Nathan Reingold <sup>20</sup>
Assistant Archivist	Maurice Callahan
Historian	Betty L. Plummer

## Smithsonian Institution Libraries

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Assistant Director of Libraries	Mrs. Mary A. Huffer
Special Assistant to the Director of Libraries for Biological Science Pro- grams	Jean C. Smith
Library of Congress Liaison Librarian	Ruth E. Blanchard

<sup>19</sup> Resigned 21 April 1969.

<sup>20</sup> Appointed 21 April 1969.



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Public Service Advisor  
Assistant to the Director  
Acquisitions Division

Chief  
Assistant Chief  
Serials Librarian  
Catalog Division  
Chief  
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Reference Librarians

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National Portrait Gallery  
National Museum of History and  
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tory  
Smithsonian Tropical Research Insti-  
tute  
Department of Anthropology  
Department of Botany  
Department of Entomology

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Reference Librarians  
Technical Information Specialists  
(Art)

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## International Exchange Service

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<sup>21</sup> Resigned 20 December 1968.

<sup>22</sup> Resigned 2 June 1969.

<sup>23</sup> Resigned 30 August 1968.

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<sup>24</sup> Retired 30 June 1969; replaced by J. Carter Brown.

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<sup>25</sup> Retired 30 June 1969.

<sup>25</sup> Retired 30 June 1969.

























