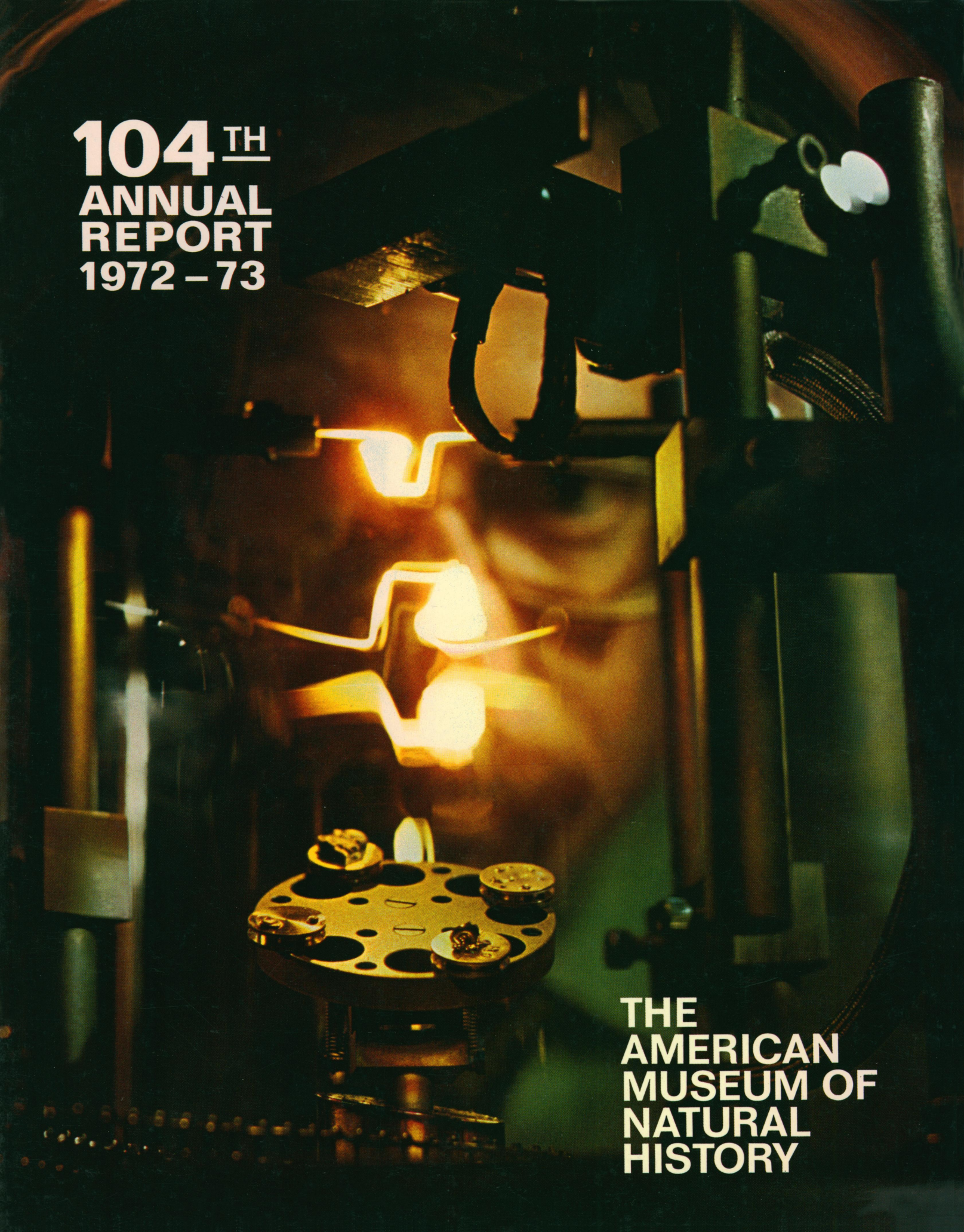
104TH ANNUAL REPORT 1972–73



THE AMERICAN MUSEUM OF NATURAL HISTORY

104TH ANNUAL REPORT/JULY 1972, THROUGH JUNE 1973
THE CITY OF NEW YORK

THE AMERICAN MUSEUM OF NATURAL HISTORY

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ONE-HUNDRED-AND-FOURTH ANNUAL REPORT OF THE PRESIDENT
To the Trustees of The American Museum of Natural History
and to the Municipal Authorities of the City of New York

I have often been asked to describe and define The American Museum of Natural History. My response is that this Museum is the repository for a great range of knowledge of the natural world. It is a measure of the past, the present and the future.

The past is represented by a strong tradition that sets excellence as the minimum standard for research in the biological sciences. The research program is implemented by a staff of brilliant scientists and supplemented by a scientific collection that ranks among the largest and most prestigious in the world.

The present is exemplified by our many programs of education and exhibition which bring the public into partnership with this Museum in a dynamic, continuing exploration of the natural sciences and their relevance to mankind.

The future, I venture to say, might be symbolized by our recently acquired scanning electron microscope, an instrument which epitomizes today's rapid rate of scientific advancement. It is likely that this instrument will expand our horizon of understanding beyond anything we can imagine. In fact a modern scientist seeking to unravel a problem in evolutionary biology may regard the scanning electric microscope as Galileo might have regarded the great telescope on Mount Palomar.

These three themes of scientific research, exhibition and education are so interrelated in our institution that they have come to be the very heart of The American Museum of Natural History. Keeping the heart beating is the job of our Trustees; their enthusiastic efforts help raise the money on which many of our programs depend.

In this regard Mr. David D. Ryus, Vice-President, has integrated all development and communications activities and has accepted the responsibility of Publisher of *Natural History* Magazine, a growing source of financial support for the Museum. He has undertaken special projects which are bringing about increased awareness, among many corporations, of the nature and scope of our Museum. The prospect for greater support from these corporations brightens in direct ratio to their understanding that this Museum serves not only the cultural and educational needs of New York but also those of scientists and society elsewhere in the nation and the world. In response to invitations extended by Trustee Howard L. Clark, corporation representatives have come to the Museum to meet members of our curatorial staff engaged in varied research projects. As representatives of organizations with deep economic involvement in advanced technologies, they must know that the most basic research can prove to be the foundation on which future technology is developed.

In our quest for support predicated on understanding we cite the Museum's world-renowned collections assembled and cataloged over more than a century—some 23 million specimens and artifacts. The collections—specific parts of which have been designated as a national resource by the National Science Foundation—are in constant use by staff scientists and their assistants currently conducting 380 research projects. The collections are a resource, as well, for scientists from other institutions in this country and abroad.

The staff recognizes and carries out its obligation to train future scientists. Many staff members serve as graduate advisors for students seeking Masters and Ph.D. degrees. Through cooperative programs with several universities, we have directed the training of more than one hundred scientists, many of whom hold leading positions in institutions throughout the country.

Among our visitors are large numbers of children. Because their degree of learning is more advanced than previously, we have created teaching facilities that are more interesting and challenging. These include the People Center and the new Natural Science Center now under construction. These children come in organized groups from a wide geographic radius and represent the diverse populations of our neighboring states as well as metropolitan New York City. I think it is fair to say that no child who goes through the Museum is ever quite the same. His or her mind has been lighted by perceptions never before experienced. This surely is equally true of adults.

With these insights into the nature and scope of The American Museum, the corporate and business communities have responded. At year's end, I am pleased to note that our Annual Giving Program has produced $751,000—$250,000 more than was realized the previous year. Within this program, $207,000 has come from the corporate area while gifts through the Contributors Program, many of them reflecting efforts of the Trustees and the Men's and Women's Committees, amounted to $468,000. The balance, $76,000, resulted from an inspired *tour de force* of the Men's and Women's Committees, chaired respectively by Mr. Thomas McCance, Jr., and Mrs. John Macomber. The Committees, implemented by dozens of tireless volunteers, held an extravaganza called the Rites of Spring. The gala benefit offered fun for every one

Mr. Gardner D. Stout, Museum President, (left) and His Excellency U Thant, former Secretary General of the United Nations, attend one of the Museum's Corporate Drive receptions held in the fall. The gatherings were arranged to introduce the business community to the work of the Museum.

of the more than 2,000 people who attended; there was music by Peter Duchin's Orchestra, entertainment by talented dancers and singers, and prizes including a free round trip to India and a seemingly endless variety of intriguing gifts. The Rites of Spring reflected the dedication of the women and men who created it and saw it through. It was pure magic!

Mr. Suydam Cutting, a former Trustee, died August 4, 1973. He was one of the first Westerners to go into the "forbidden" region of Llasa in Tibet, where he visited the Dalai Lama. He returned with [illegible] which enormously enriched our anthropological collections. Mr. Harold Boeschenstein, an Honorary Trustee, died during the year leaving behind him a record of achievement and generosity which we will always remember with warmth and affection. Mr. Alexander E. Eltz retired after distinguished service to the Board.

New trustees elected to the Board are Mr. Alan V. Tishman, Mr. Henry G. Walter, Jr., Mrs. John Macomber, Mr. Jack Rudin and Mr. Alfred Stern.

Gardner D. Stout, *President*

REPORT OF THE DIRECTOR

A museum is much, much more than bricks and mortar, construction and renovation. It is people, programs and activities; publications, lectures, classes, research in progress and completed; school class visits, gallery tours, visitors services and community relations. The record of these and other important elements of this Museum's work is told elsewhere in the Annual Report. But the message that I have chosen to highlight this year is also important. The work and activities of which this or any institution is capable depend to an important extent on the quality and scope of its building facilities and on the degree to which these facilities are built or modified to accommodate programming requirements and opportunities.

I am impressed by the pace of construction and renovation taking place this year in the Museum's facilities: projects started, completed, in progress or in planning. The work we have undertaken is vast, and it touches almost every aspect of the Museum's functions, including exhibition, collection storage, research facilities and educational service. I do not mean to imply that changes in bricks and mortar are the more important achievements of a year. But on reviewing those that we are undertaking, completing or planning, I am equally impressed by what they imply for our work and how the improvements relate to our ability or our potential for realizing the Museum's objectives and for carrying out its functions. To the extent that our renovations program does this, it represents real progress. Measured by this standard, the year's accomplishments are substantial indeed.

One of the great responsibilities faced by the Museum is to provide for the proper housing of its vast scientific collections under conditions that will protect specimens from damage and decay, and will make them readily available to scholars and students. This year, after many years of planning, we began the installation of automatic fire detecting equipment in a system that will extend to all laboratories, offices and storerooms in which scientific specimens are kept or used. Such a system was installed in the Childs Frick Wing, our new 66,000 square foot structure built for the Museum's fossil mammal collection.

The Frick Building was completed in August, and occupation progressed through the year. Personnel and students of the Department of Vertebrate Paleontology have already moved into their new quarters, and the process of transferring the collection has started. Before moving, each specimen is inspected, cleaned, labelled, checked against the catalog and placed in new storage drawers and cabinets. The task of moving these 600,000 specimens is expected to take five years. But, in the meantime, the quarters vacated by personnel, students and collections have become available for other use. In consultation with the scientific staff, a comprehensive plan was developed during the year for renovating and allocating these areas to better consolidate and to expand facilities for other scientific departments. This plan will be implemented next year.

Additional spaces were made available and renovated in other parts of the Museum this year to solve other long-standing problems with collections. A new temperature, humidity and dust-controlled storage room was constructed for housing the entire collection of textiles, costumes and furs, guaranteeing the preservation of these fragile materials. Another new area, formerly a garage adjacent to the Frick Building, was renovated and equipped to house the fossil fish collection. The unused generator room in the old Power House was renovated for the storage and study of our marine mammal skeleton specimens—large, bulky, heavy materials that require special conditions for housing and handling. New facilities were constructed and purchased for the collections in South American and Southwest Indian archeology and ethnology, which had to be relocated from old exhibit halls undergoing renovation. And plans were developed and approved for converting the relatively little used lecture hall on the fifth floor into a storage and study area that, when completed in 1974, will centralize the entire collection of 14.5 million insects and spiders.

One of the great services provided by this Museum is in education. It devotes more of its resources than any similar institution in the world, and probably teaches more people, in a wide variety of communities, than any other private agency in our country. This year we completed and placed in operation the latest of our teaching facilities, the People Center. Modern, handsome in appearance, and effective, the People Center is an activity center, designed to offer school classes as well as other visitors opportunities to participate in learning experiences in anthropology and related fields, much in the way that the Natural Science Center offered opportunities in the biological sciences. In the People Center, children and adults take part in a wide variety of activities, handling fabrics, weaving, grinding corn, learning and performing ethnic dancing and music, and seeing film

and slide presentations. Programs are scheduled and conducted regularly during school hours and on weekends. At other hours, Museum personnel are on hand to assist and counsel visitors.

Construction was also started during the year on a new and enlarged Natural Science Center, in which the emphasis will be on the natural history of the urban environment. Expanded by more than 50 percent and with all new exhibits, the new center will be completed in 1974. When finished, it will be the last step in developing a wholly new teaching facility begun two years ago on the second floor of the Education Building. Elements of this renovated facility include the already completed Calder Laboratory for young people, two exhibition areas —the Center Gallery and Education Gallery—and the People Center. All units of this facility were designed to encourage participating educational activities for children and adults, in class groups and as individuals.

Among the great resources of the Museum are its exhibition galleries. No natural history museum in the world devotes more space or a greater share of its space to exhibition. The reputation of the Museum as a public institution and its effectiveness as a teaching agency are built substantially on the quality, variety, excellence and scope of its exhibition halls. And at no time in our history have we been engaged in a greater effort at improving and renovating our exhibits.

Gallery 77 was completed and opened during the year. It is the first exhibit hall in the Museum planned and designed to accommodate temporary and changing displays. This air-conditioned hall can be used in its entirety for large-scale exhibits, or divided conveniently into a number of smaller display areas.

Progress in planning, completing and constructing permanent exhibition halls continued at a rapid pace. Six major halls are under way. Construction started during the year on the new Hall of Minerals and Gems and the Hall of Mollusks and Mankind. Construction and installation of exhibits continued in the Hall of the Biology of Reptiles and Amphibians, in which the architectural renovation is already complete. Construction contracts were let for the Hall of Peoples of Asia, and the physical renovation for the exhibit will begin in Fall 1973. Final plans were completed and approved for the Hall of the Biology of Mammals, and preliminary plans were approved for the exhibition concept in a new section of the Hall of the Biology of Man. Taken in total, these exhibition projects involve

Dr. Thomas D. Nicholson, Museum Director, examines the Star of Sierra Leone, the third largest diamond ever found. Loaned to the Museum by Mr. Harry Winston, the stone was featured in a special temporary exhibition in the winter. It has since been cut into smaller stones by Mr. Winston.

complete renovation and reconstruction with entirely new displays in more than 60,000 square feet of space, almost one-sixth of the total exhibition space in the Museum.

Less extensive renovations or modernizing is going on or planned in other halls. In an ongoing program to improve acoustic conditions throughout our public spaces, new ceilings were hung in three halls this year. In another continuing program, dioramas in our major habitat exhibits are, one-by-one, being cleaned, repainted and relighted. Some of these large dioramas have not been opened since they were constructed decades ago. New wood-panelled walls are planned for the Felix M. Warburg Hall. Complete rearrangement of specimens and cases and a new ceiling, floor and lighting are in progress in the Hall of Late Mammals.

Other construction projects undertaken or completed during the year will also have important consequences for our work. Major renovations were completed in the greenhouse research area serving the Department of Animal Behavior. Construction was completed in a new inter-departmental research facility, where major research instruments, applicable in the work of all or several departments, will be operated. The first such instrument, a scanning electron microscope, was installed during the year. Planned for next year is an electronic spectrophotometer and an associated medium-scale digital computer.

A new building, the Perkin Memorial Wing, was started this year and will be completed within a few months. The building will add 5000 square feet of space on two floors to the facilities of the Planetarium; it will house its library and sales shop and provide a major new area for exhibition in astronomy. Construction was started during the year on a new elevator and emergency stair tower connecting three buildings on all levels of the Museum, greatly improving the vertical traffic flow of visitors and employees in the southwest section of the complex. Construction also began on a new rare book storage and display area that will considerably improve library facilities. And major renovations were completed in administrative office spaces, centralizing most of the Museum's administrative personnel on two floors of Section Two and immediately adjacent areas.

All told, it is an extensive and ambitious program of construction and renovation, and it is going to have important implications for our work in the years ahead. It does not, of course, exhaust our needs. But, for the present, it stretches our capacity to absorb, both financially and logistically. We have been fortunate in obtaining several important grants and gifts to relieve the financial burden. Logistically, we must keep some limits on the effects that renovation and construction produce in closing down exhibit halls, interfering with traffic flow, shifting of collections from place-to-place and disrupting offices and laboratories. These inconveniences raise burdensome secondary problems of their own. Despite careful planning and coordination, ongoing programs are sometimes badly treated. But on balance, it is worth the inconvenience. Our collections will be better protected, more easily managed and used. Our personnel can work more efficiently and in surroundings that will make them more productive. Our exhibits and exhibit halls will be enriched with handsome new additions and replacements. And our public will be better served.

Harkening back to my years as a professional mariner, I know that a ship is not finished at the time it is launched. Through its years of service, every ship is modified, rebuilt, renovated and added to, as the conditions of its service and its changes require. And so it is and must be with this Museum. Its programs and services must change and adapt in response to changes in the society and communities it serves. And the physical structure of the Museum must also adapt to the needs, evolution and growth of its program. Our record for this year shows that it is.

Thomas D. Nicholson, *Director*

The distinctions and honors bestowed upon the Museum staff during the year included the following:

Administration: Dr. Thomas D. Nicholson was elected President of the New York State Association of Museums. He was reelected as a member of the Council of the American Association of Museums. He received the Alumni Award for Outstanding Professional Achievement from the United States Merchant Marine Academy.

Department of Animal Behavior: Dr. Ethel Tobach was reelected to the Board of Governors of the New York Academy of Sciences. Dr. Howard Topoff was reelected President of the New York Entomological Society.

Department of Anthropology: A conference devoted to the subject of pre-colonial fabrics was named "The Junius B. Bird Pre-Columbian Textile Conference." It was held at Dumbarton Oaks, and in the Textile Museum in Washington, D.C., on May 19-20. Dr. Margaret Mead received an Honorary Doctor of Science Degree from Harvard University on June 14. She also received the Wilder Penfield Award, presented by the Vanier Institute of the Family, on September 28, in Quebec. She was appointed on January 1 as an Honorary Consultant to the Library of Congress.

Dr. Frederick H. Rindge was appointed a Research Associate in Entomology of the Natural History Museum of Los Angeles County. He was elected by the members of the Lepidopterists' Society to be one of Karl Jordan Medal Representatives of the group. Dr. Cyril F. dos Passos and Mr. F. Martin Brown were elected Honorary Members of the Lepidoterists' Society; Dr. Alexander B. Klots had previously been elected. This is the highest honor that the Lepidopterists' Society can give and is limited to ten people.

Department of Herpetology: Dr. Charles W. Myers was appointed a Visiting Scientist at the Gorgas Memorial Laboratory in Panama City.

Department of Living Invertebrates: Dr. William K. Emerson received the Western Society of Malacologists' Award of Merit, "in recognition of outstanding contributions to the study of Mollusca" in June, 1972.

Department of Mammalogy: Dr. Richard G. Van Gelder was appointed Scientific Advisor to the Foundation for Environmental Education. Mr. Hobart M. Van Deusen was made an Honorary Member of the Explorers Club.

Department of Mineralogy: Dr. D. Vincent Manson was elected first President of the newly formed Mineral Museums Advisory Council and was appointed by the Mineralogical Society of America as its representative on that council.

Department of Ornithology: Dr. Dean Amadon was elected an Honorary Member of the Cooper Ornithological Society. Dr. Charles Vaurie was appointed a Corresponding Member of the Musee d'Histoire Naturelle in Paris.

Department of Vertebrate Paleontology: Dr. Malcolm C. McKenna was elected to the Faculty of Pure Science, Columbia University, in February.

Archbold Biological Station: Dr. James N. Layne was appointed to the Technical Consultant Committee of the State of Florida Environmentally Endangered Land Management Study Committee.

Staff changes are recorded below, including those effective July 1, 1973:

Administration: Dr. James A. Oliver was appointed Director Emeritus.

Department of Animal Behavior: Dr. Lee Ehrman was appointed Research Associate.

Department of Anthropology: Dr. Enid Schildkrout was appointed Assistant Curator of African Ethnology, Dr. Junius B. Bird was appointed Curator Emeritus of South American Archeology and Dr. Jean-Claude Quilici was appointed Research Associate.

Department of Astronomy and The American Museum-Hayden Planetarium: Dr. Kenneth L. Franklin was promoted to Chairman and Astronomer, Dr. Franklyn M. Branley was appointed Astronomer Emeritus and Mr. Richard C. Hoagland was appointed Public Affairs Coordinator.

Department of Entomology: Dr. Lee H. Herman was appointed Acting Chairman and Associate Curator and Miss Linnae Christensen was appointed Scientific Assistant.

Department of Herpetology: Dr. Charles W. Myers was promoted to Associate Curator.

Department of Ichthyology: Mrs. Lynne M. Hirsch was appointed Scientific Assistant.

Department of Invertebrate Paleontology: Mr. G. Robert Adlington was appointed Specialist and Miss Julia Golden was promoted to Assistant Editor, Micropaleontology Press.

Department of Living Invertebrates: Mr. Harold S. Feinberg was promoted to Scientific Assistant.

Department of Mammalogy: Miss Marie A. Lawrence was appointed Scientific Assistant.

Department of Mineralogy: Dr. Martin Prinz was appointed Research Associate.

Department of Ornithology: Dr. Wesley E. Lanyon was promoted to Chairman and Curator, Mr. John

Bull was appointed Scientific Assistant and Dr. Ernst Mayr, Mr. Charles E. O'Brien and Dr. Charles Vaurie were appointed Curators Emeriti.

Department of Vertebrate Paleontology: Mr. Morris F. Skinner was appointed Frick Curator Emeritus and Dr. Robert M. Hunt, Jr., was appointed Research Associate.

Archbold Biological Station: Dr. Thomas Eisner was appointed Research Associate.

Department of Education: Dr. Donald Hill was appointed Assistant Curator; Mr. Kenneth A. Chambers, Miss Catherine M. Pessino and Mrs. Marjorie M. Ransom were promoted to Supervising Museum Instructors, Miss Juanita M. Munoz was promoted to Senior Museum Instructor and Mr. Nathaniel Johnson, Jr., was appointed Museum Instructor.

Exhibition and Graphics: Mr. George S. Gardner was appointed Chairman and Mr. Raymond H. de Lucia was promoted to Chief Preparator.

Library: Mr. Kevin P. McShane was appointed Serials Librarian, Miss Sheila Burns was appointed Librarian—Reference and Miss Mary V. Wissler was appointed Librarian Emeritus.

Development: Mr. Gregory R. Long was appointed Manager, Development Office.

Natural History Magazine: Mr. Alan Ternes was promoted to Editor, Miss Sally Lindsay was appointed Senior Editor, Miss Toni I. Gerber was promoted to Associate Editor, Mr. Christopher Hallowell was appointed Associate Editor, Mrs. Florence G. Edelstein was appointed Copy Editor, Mr. Leo T. Kelly was appointed Business Manager and Miss Ann Brown was appointed Circulation Manager.

Public Affairs: Miss Carol E. Patterson was appointed Assistant Manager and Miss Daphne Prior was appointed Public Affairs Correspondent.

Accounting: Mr. Louis Mileo was appointed Assistant to the Controller and Miss Ethel Brill was appointed Manager, General Accounting.

Administrative Services: Miss Donna E. Brion was appointed Assistant to the Director, Mr. Robert J. Dombroski was promoted to Assistant to the Deputy Director for Administration, Mr. Robert J. Koestler was appointed Scientific Assistant, Inter-departmental Facilities Laboratory, Mrs. Andrea Murphy was appointed Assistant to the Deputy Director for Research, Mr. Joseph R. Saulina was appointed Assistant Manager, Division of Photography, and Mr. Martin Tekulsky was appointed Manager, Museum Shop.

Personnel: Mrs. Norma L. Lozada was promoted to Personnel Assistant.

Plant Operations, Maintenance and Construction: Mr. Walter F. Koenig was promoted to Manager of Construction and Maintenance, Mr. William J. Barbieri was promoted to Superintendent of Shops and Mr. William A. Graham was promoted to Assistant to the Manager of Construction and Maintenance.

It is with profound regret that the deaths of two eminent scientists long connected with the Museum are recorded. Daniel S. Lehrman, Research Associate in the Department of Animal Behavior and Director of the Rutgers University Institute of Animal Behavior, died on August 29, 1972; Robert Cushman Murphy, Lamont Curator Emeritus of Birds, died on March 19, 1973. Dr. Lehrman, whose association with the Museum began in 1938 when he served as a volunteer aid for Dr. G. Kinsley Noble, was a member of the National Academy of Science and a fellow of the American Academy of Arts and Sciences, and he held one of the rare lifetime grants of the National Institute of Mental Health. His unexpected death interrupted his brilliant research into the effect of hormones on human behavior, studies which were of particular significance to the field of psychosomatic medicine. Dr. Murphy, a splendid raconteur endowed with enormous physical energy, was a world authority on marine birds and a pioneer conservationist whose distinguished Museum career spanned almost 67 years. His specific contributions are detailed in the Department of Ornithology report.

Dr. C. Lavett Smith explores a Bahamian coral reef on a recent dive off the coast of Freeport. The Museum scientist's long-range study of coral reef fish community life has taken him on numerous underwater expeditions.

SCIENCE, EDUCATION AND EXHIBITION

Natural history museums can be evaluated by the size of their scientific collections, numbers of visitors per year and amount of floor space devoted to exhibitions. However, a museum as a dynamic institution responsive to the needs of the community, the nation and the world must also be measured in terms of its success in fulfilling its primary functions—research, education and exhibition. So measured, The American Museum of Natural History stands among the great establishments of our times. Significant progress was made in these areas during the year.

Exhibition

A new trend in the exhibition work of the Museum is the short-term exhibit which permits the public to view and consider that which is pertinent, newsworthy or simply interesting. While short-term displays are not new to this institution, there are now two active projects to accommodate them—the Temporary Exhibition Program and the Exhibit of the Month Program. During the year fourteen temporary exhibitions were shown in eight areas of the Museum. Their duration varied from several weeks to over a year and they ranged from a large comprehensive exhibition on Greenland to a single exhibit case containing the largest uncut diamond in the world then extant. Among other topics Exhibits of the Month treated the Brazilian honeybee and its possible threat to beekeeping and man in North America, recent gold acquisitions by the Museum, and a display of miniature Japanese carvings, an ancient art form being displaced by a changing culture in Japan.

A number of the temporary exhibits featured objects from the collections that may be shown in planned new halls and served to remind visitors that despite the emphasis on short-term displays, the Museum has by no means abandoned the construction of major permanent exhibition halls. Indeed four major halls are under construction— Amphibians and Reptiles, Mollusks and Mankind, Minerals and Gems and the Natural Science Center—and scripts for five others were completed or are being written. Each hall requires hundreds of thousands of dollars and years of time to complete but provides enjoyment, inspiration and information for more than a quarter of a century.

Education

Anyone entering The American Museum of Natural History realizes that it is an educational institution. Visitors cannot walk through an exhibition hall without learning something new. Furthermore, they see both classes of students being instructed by teachers from the Department of Education, and individual students, worksheets in hand, concentrating on exhibits.

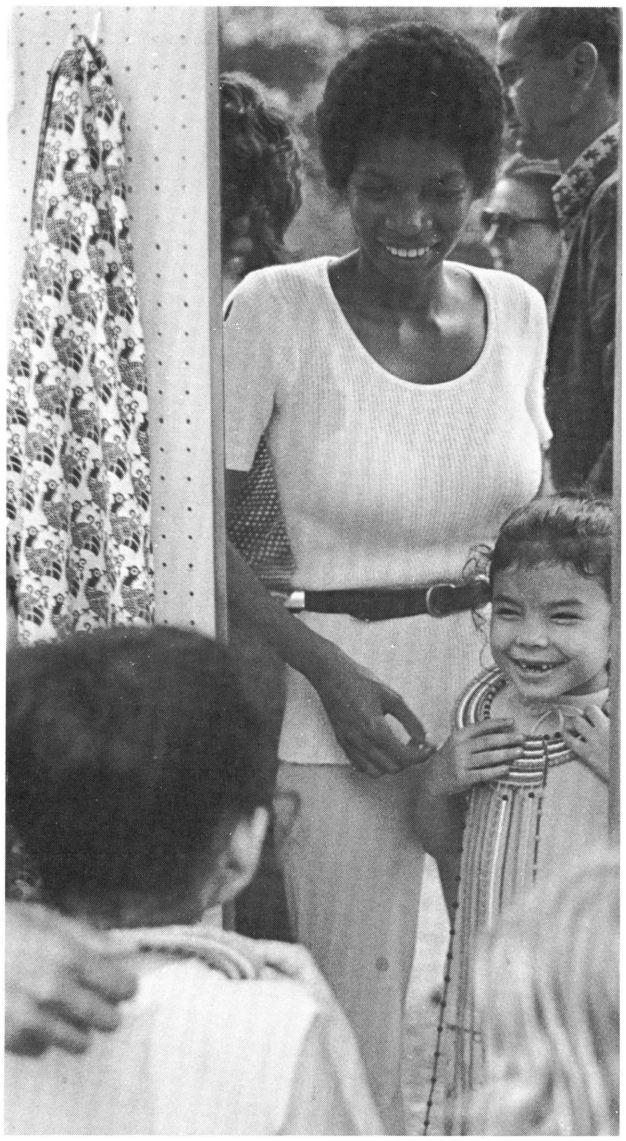
Perhaps less obvious to the visitor are the more recent efforts of the Department of Education to bring the urban community into the Museum and the Museum out to the urban community through its special African-American and Caribbean programs. These programs, initiated last year, have grown appreciably. Now the new People Center, opened in October, contributes substantially to these and other educational programs. The People Center is an entirely new approach to educating Museum visitors. It is a combined teaching-theater-exhibition space where visitors learn by doing and by watching lecture-demonstrations, slide and film shows, and live performances by dancers, musicians, singers and actors.

But almost certainly most visitors are not aware of the impact of the Museum and the staff in the area of higher education. Of the 58 members of the curatorial staff, 27 hold the position of professor at nearby universities. They not only teach advanced courses but serve as major professors for graduate students working toward Masters or Ph.D. degrees in paleontology, systematic-evolutionary zoology, animal behavior and anthropology. Many of these students become the leading authorities required by society to carry out basic and applied research in the natural sciences. At the undergraduate level since the inception of the program, curators have guided 487 students in developing professional interest in the natural sciences through the Undergraduate Research Participation Program supported by a grant from the National Science Foundation.

Science

Long recognized as a leader in anthropology, paleontology, systematic zoology, animal behavior and mineralogy, the Museum strives to maintain this leadership. With funds supplied by the National Science Foundation, the Charles E. Merrill Trust and the Thorne Foundation, it purchased a Kent Cambridge scanning electron microscope and associated equipment. Because of high magnification capability (150,000x), extreme depth of focus and high resolution, this instrument will open new research vistas in most of the Museum's scientific

Miss Anne Jennings, Instructor in Education, helps a youngster try on Masai jewelry in a New York City park. Such street teaching activities reflect a new effort by the Museum to reach out into the urban community.



departments and is already being used for studies in paleontology, mammalogy, entomology and mineralogy. The SEM has been installed in a new Inter-departmental Facilities Laboratory which will accommodate other major pieces of equipment as demanded by the Museum's research program.

A measure of the Museum's research accomplishment is the approximately 145 scientific papers and scholarly books published by the 85 members of the curatorial staff during the year. These contributions range in subject from status and spatial range of marriages in a north Indian area to stinging hairs of tarantulas, from an overview of anthropology and education to Patagonian fossil penguins, from the evolution of behavior of social insects to plate tectonics, and from the ecology of a coral reef fish community to chromosomal variation of North American fence lizards. Many of these contributions will be the authoritative references on their subjects.

Not all research that is carried out by the curators was done at the Museum itself. With the world to study, curators ventured far to pursue their investigations: flycatchers were studied in Peru and Colombia; fish, off the Cape Verde islands; arachnids, in Pakistan; lemurs, in Madagascar; rats, in Indonesia; and fossil mammals, in Australia.

Recently St. Catherine's Island, a Georgia coastal island, became available for research studies. Ten miles long and two miles wide, the island presents scientists from this Museum and other institutions with welcome opportunities to conduct a wide range of field investigations. Generous support from the Noble Foundation has made the work possible. The Museum is coordinating the scientific use of the island, and during the year a biological survey of the island was completed by the staff.

Work with the collections is of great importance, for they are the ultimate source of information for most of the Museum's research. Only a miniscule part of the artifacts and specimens housed in the Museum are visible to the visitor. By far the largest bulk—from minute marine worms to whale skeletons and from ancient Peruvian fabrics to meteorites—is housed in areas inaccessible to the public. These collections are actively studied not only by the curatorial staff but by scientists and advanced students in universities and museums throughout the world. Important additions were made during the year, outstanding among which were a major arachnid collection presented by the University of Utah, a new group of Devonian fossils which modified scientists' understanding of horseshoe crab evolution, and some exceptional mineral specimens that will be displayed in the new Hall of Minerals and Gems. Not only did the collections increase but substantial progress was made in improving their availability and usefulness to the scientific community through major support from the National Science Foundation. Perhaps the most notable examples of such work this year were the relocation of the cetacean and fossil fish collections into quarters that made them accessible to the Museum staff and other scientists.

Jerome G. Rozen, Jr.
Deputy Director for Research

DEPARTMENT OF ANIMAL BEHAVIOR

Behavioral research has been conducted over the years on an impressive variety of animal forms. This past year, studies of fish behavior were a highlight. Dr. Lester R. Aronson and Dr. Pushpamangalam Thomas, a recent graduate of New York University, studied parental behavior in the West African black-chinned mouthbreeder, a species in which the male parent picks up freshly-laid eggs and incubates them in his mouth for ten to twenty days. Their research has revealed that the males treat eggs from a strange pair in the same way as their own, and that the age of eggs or embryos is not important to picking-up and carrying behavior. At the same time, they found that prior spawning experience, as well as the interval between spawning and the presentation of eggs in the nest, are important factors in determining the effectiveness of parental behavior.

The African elephant fishes give off very weak electric discharges that can only be detected when they are strongly amplified. Dr. Peter Moller has shown that such discharges nonetheless form an effective means of communication between individuals. They are used for orientation and the location of objects or other individuals, and are probably used in various forms of social behavior.

Dr. William N. Tavolga has continued his work on sound production in fishes. Low frequency sounds are involved in reproductive, territorial and schooling behavior; they also serve as an effective sonar system in marine catfishes, helping them to detect nearby obstacles.

Working with insects, Dr. Howard R. Topoff is studying the process of socialization in the harvester ant. He has discovered that immature ants must gain many experiences in the colony before they are capable of participating in adult activities. This finding challenges the widespread belief that insects which have just emerged from the cocoon can exhibit all the patterns of behavior typical of adults.

Dr. Carl J. Berg is studying a group of marine snails that prey on other mollusks by drilling holes in their shells to get at the fleshy parts, which they eat. He has also been involved in a study of reproduction in the common conch of the Caribbean. This large snail is an important source of protein for human inhabitants of the region.

Dr. Ethel Tobach is continuing her study of factors involved in species formation through comparisons of behavioral development in desert rodents. In his studies of bird navigation, Dr. Helmut E. Adler is questioning current theories which propose that navigation is based primarily on visual orientation to the sun and stars. By studying the neural mechanisms of feeding behavior in pigeons, Dr. H. Philip Zeigler has been able to homologize specific areas of the bird and mammalian brain. Dr. John Wayne Lazar is studying the development of social behavior in European ferrets. Mrs. Madeline L. Cooper and Dr. Aronson are pursuing their long-term work on the sensory control of mating behavior in domestic cats.

The Animal Behavior-Biopsychology Program, a joint research and teaching venture of The American Museum and the Graduate Division of The City University of New York, has now completed its second year. In this short period, it has become the outstanding program in the East for studies of the development and evolution of animal behavior. This program and others make the department one of the most active in educating young scientists. Three students who did their dissertation research here received Ph.D. degrees; 22 students are now at work on their doctorates and another four are earning their M.S. degrees. At the same time, 44 undergraduates and four high school students participated in the ongoing research activities of the department.

Lester R. Aronson, *Chairman*

Undergraduate Research Participation Program

Thirty-one undergraduates from schools around the country were chosen to take part in the Undergraduate Research Participation Program for 1972-1973. Twenty-five were summer participants; six carried out projects during the academic year. The results of research in which students from past years participated appeared in three scientific papers. Six others are in press or in preparation.

Allowing undergraduates to work side by side with highly qualified scientists at the Museum and in the field, the program has generated great enthusiasm since its inception fourteen years ago. Unfortunately, next year will see a drastic curtailment of the program's activities due to cutbacks in the funding of the National Science Foundation's Division of Undergraduate Education in Science. While all three of the Museum's projects—anthropology, field biology and experimental biology—were approved, only one was funded. This will provide for just five students, to be supervised by the Department of Anthropology. In the past, participants have been able to work in numerous fields ranging from animal behavior to paleontology.

Lester R. Aronson

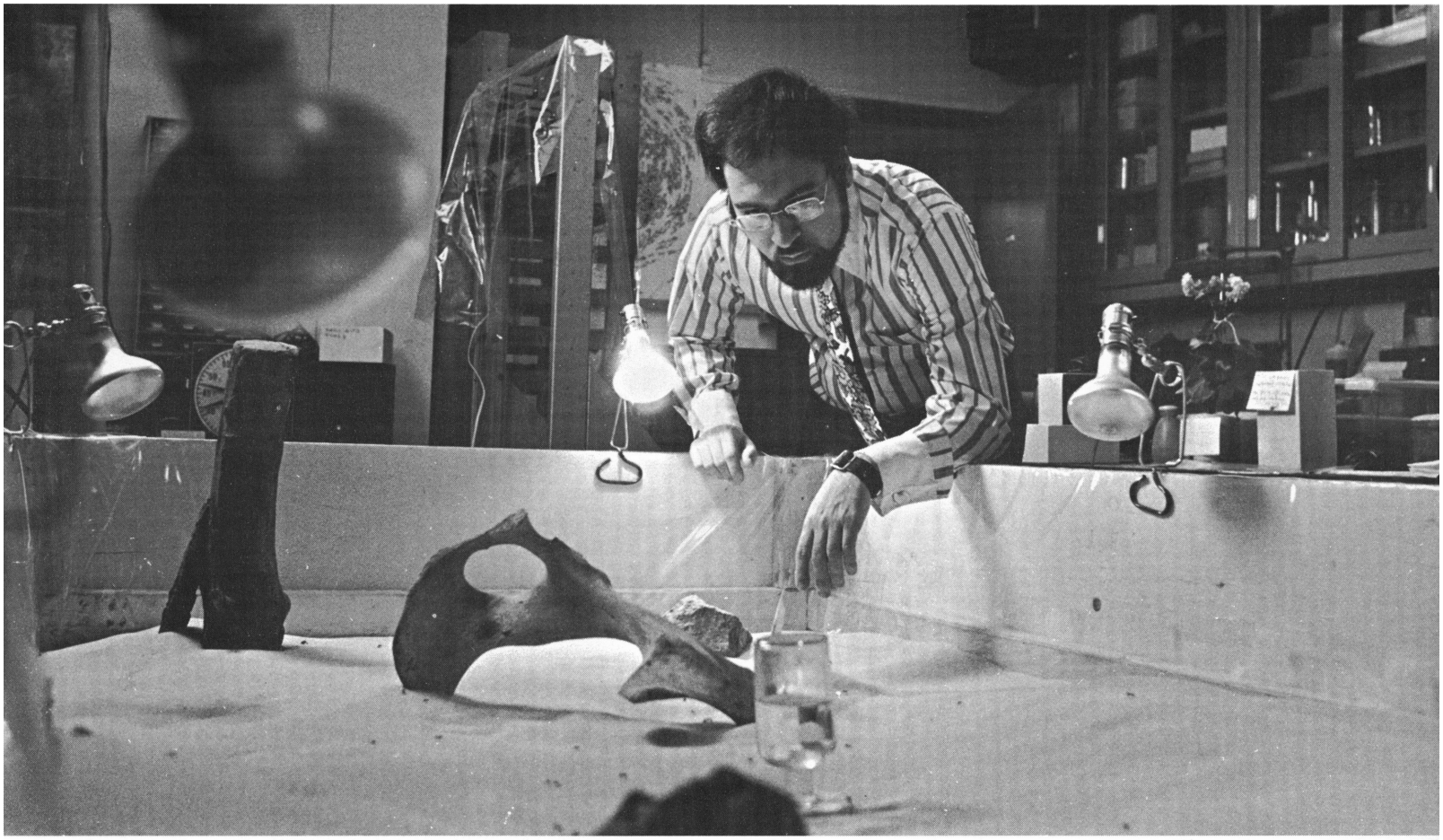
Dr. Howard R. Topoff peers into the large, sand-filled box used to provide a foraging area for the harvester ants he is studying. His research is on the process of socialization in these insects.

DEPARTMENT OF ANTHROPOLOGY

The research activities of the department covered an exceptionally broad area and ranged from far-flung archeological field expeditions to analyses of important theoretical problems of interest to all anthropologists.

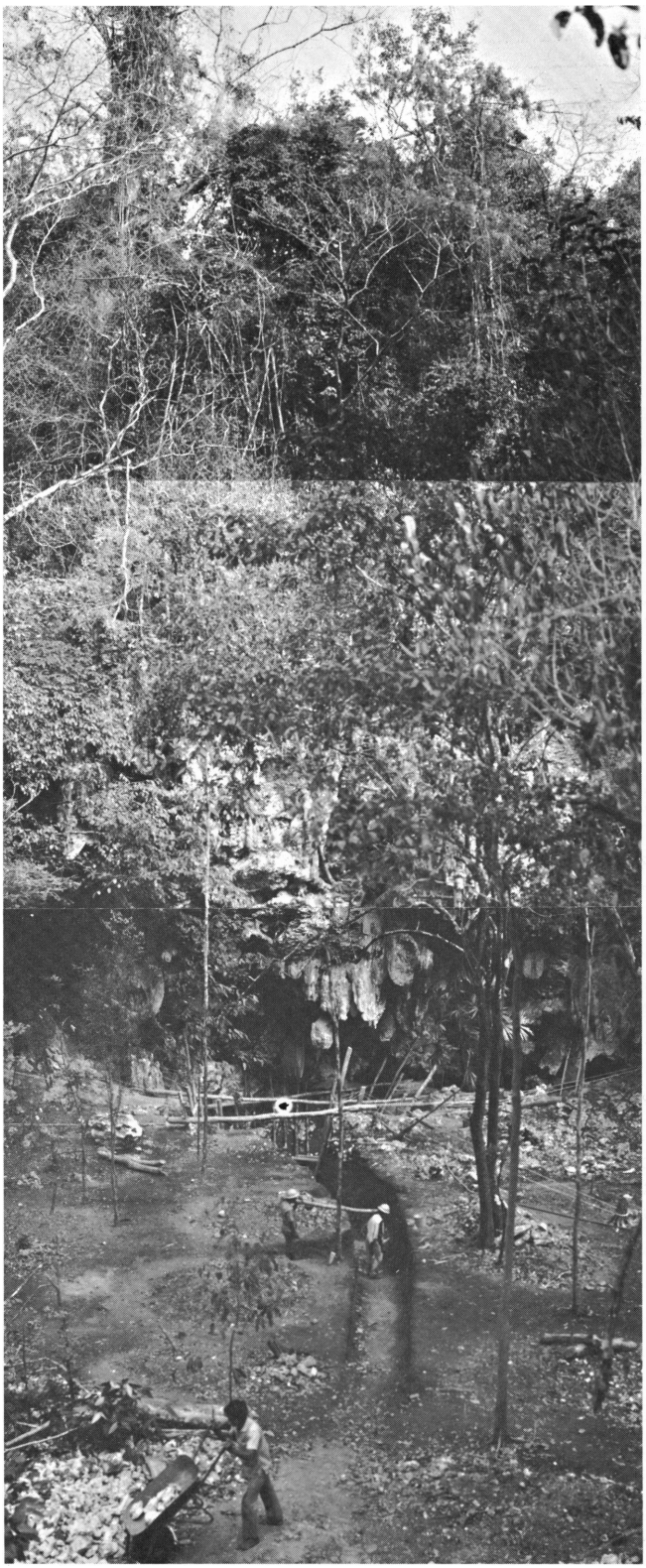
Dr. Stanley A. Freed, in collaboration with Dr. Ruth S. Freed of Seton Hall University, continued to prepare a monograph based on their field study of the effects of urbanization on traditional life in a north Indian village. Dr. Junius B. Bird spent a second season in the Madden lake area of the Panama Canal Zone and in the Bayano Valley of central Panama excavating for remains of late Pleistocene nomadic hunters. Dr. Gordon F. Ekholm traveled to recently-excavated archeological sites in Yucatán for his comprehensive study of trans-Pacific influences on the development of New World civilizations.

Dr. Robert L. Carneiro is analyzing the role played by population size in village-splitting in Amazonia. He is also working on a regional ethnology of Amazonia and on an appraisal of cultural evolutionism in contemporary anthropology. Miss Michiko Takaki continued her ethnographic research of Kalinga society in northern Luzon, the Philippines. Dr. Ian Tattersall pursued his work on the functional anatomy and systematics of the subfossil Malagasy lemuroids and on hominid phylogeny. He also undertook a theoretical review of strategies of phylogenetic reconstruction, as well as studies of the phylogenetic significance of *Ramapithecus* and of the mechanics of mandibular elevation in mammals.



Dr. David Hurst Thomas, who joined the department as Assistant Curator of North American Archeology in September, analyzed material exca-

In this composite photograph, archeologists explore the entrance to a cave located at the base of a verdant cliff near Madden Lake, Panama. Dr. Junius B. Bird has been exploring the area for artifacts of late Pleistocene nomadic hunters.



vated from three sites in central Nevada and studied microscopic wear patterns on a large series of ethnographic Eskimo end-scrapers. In May he began four months of excavations at Gatecliff Shelter, Nevada.

On April 1, Dr. Margaret Mead returned to Papua New Guinea for a brief restudy of a Mountain Arapesh group. She is also in the process of preparing a monograph on the Mundugumor, a people she originally studied on The American Museum expedition to New Guinea in 1931-1933. In addition to her field and research activities, Dr. Mead is active in the Institute for Intercultural Studies, Inc., which has its headquarters at the Museum. Founded in 1944, the institute supports research on the behavior, customs, psychology and social organization of various peoples and nations of the world. Dr. Mead, a founder of the non-profit organization, serves as Secretary of the Board of Directors.

Dr. Harry L. Shapiro is writing a book on the Peking man fossils and has also been engaged in a study of the Ipiutak skulls from Alaska. Mr. Philip C. Gifford completed his study of the iconology of the Uli figure of central New Guinea. Dr. Walter A. Fairservis, Jr., continued his work on the origin and early character of civilization in Asia. During the summer he will return to Pakistan to pursue a study of the Harappan civilization of the Indus Valley.

Dr. Rhoda Metraux made her third trip to New Guinea to study the Iatmul people of the middle Sepik River. Mrs. Carin Burrows continued her research on Tibetan-Lamaist paintings. Dr. Doranne Jacobson, Ogden Mills Fellow, did research and writing on the status of women in India. The other Ogden Mills Fellow, Mr. William Divale, worked on his doctoral dissertation, a cross-cultural study of the causes of matrilocal residence.

The department is planning a number of permanent exhibitions, including Mollusks and Mankind, Peoples of South America, Peoples of Asia, and a third and final section of the Hall of the Biology of Man. Two major temporary exhibits on textiles and Asian puppets are also in progress. During the year the department presented three Exhibits of the Month: "Gold, Frankincense and Myrrh," "Recent Gold Acquisitions," and "Old Japan, a World in Miniature."

Considerable progress has been made on storage problems. Two foundation grants totalling about $64,000 will permit the construction of a facility for storing furs, textiles and other materials requiring temperature and humidity control. An-

other sum of $50,000 is providing for the conversion of part of Education Hall to anthropological storage.

Stanley A. Freed, *Chairman*

DEPARTMENT OF ASTRONOMY & THE AMERICAN MUSEUM-HAYDEN PLANETARIUM

Dr. Franklyn M. Branley retired as Chairman and was appointed Astronomer Emeritus. He continually brought credit to the Planetarium through his development of the educational programs and his highly successful children's books on astronomy. With his retirement, the professional staff is now short by two positions, leaving only Drs. Kenneth L. Franklin and Mark R. Chartrand, III. Dr. Franklin was appointed Chairman on October 16.

Construction on the Perkin Wing began during the winter. A natural stream found at the planned location of one of the foundation footings required the redesign and construction of the footing, causing a delay and a substantial increase in costs. However, the structure of the building was successfully completed in April. It is expected to be ready for occupancy this winter.

A detailed concept for the building's second floor, which will contain the Hall of the Sun, has been accepted and funds for a design study have been granted by the Billy Rose Foundation. Featuring displays on current solar-terrestrial relationships, the hall will be a significant addition to the educational facilities of the Planetarium.

The Guggenheim Space Theater continues to attract many visitors, but its success has been marred by a succession of equipment failures. A crucial element of the control system is being redesigned to cure a major cause of trouble.

The Copernicus Society of America chose the Planetarium for the New York showing of Copernicus's original instruments as well as other materials relating to the life and times of the great Polish scientist. The collection was on view from May 23 to June 8. In conjunction with the exhibit, which marked the 500th anniversary of the birth of Copernicus, the Planetarium arranged for an all-Chopin concert by pianist Mieczyslaw Horszowski on May 22. The formal evening event, the first live concert ever held in the Sky Theater, was arranged in cooperation with the League of American Poles.

Paid attendance at the Planetarium was 458,004. This is a drop of 30,846 or 6.4 percent from last year and is in the same downward direction noted since 1969. Economy measures and the temporary reduction of staff have helped to control losses. There are also plans for vigorous public relations activity and careful examination of programs, shows and course offerings with an eye to reversing the trend.

The 34 courses offered during the year had an enrollment of 790. Directed by Dr. Chartrand, the course program continues to be a valuable educational activity. A new policy of free parking for course participants has had a positive effect on attendance.

Kenneth L. Franklin, *Chairman*

DEPARTMENT OF ENTOMOLOGY

The American Museum's arachnid collection is now the world's largest. It grew to more than one million specimens with the gift from the University of Utah of 250,000 spiders gathered over the past 60 years by the late R. V. Chamberlin. The new collection includes more than 700 arachnid type specimens as well as many species from geographical areas previously unrepresented in the department's holdings.

A total of 22,325 Himalayan butterflies from the collection of the late F. M. Bailey were added to the Lepidoptera collection. When the new material is mounted, the Museum will have one of the best collections of Himalayan butterflies in this hemisphere.

Research activities continued at a vigorous pace. Pursuing their work on black flies, Drs. Pedro Wygodzinsky and Sixto Coscarón collected the hitherto unknown pupa of *Cnesiamima atroparva* on a field trip to southern Chile; this enabled them to theorize on the systematic position of the genus. They also worked on black flies from northeastern Argentina, some of which are pests. Dr. Wygodzinsky has published a study on a new, geographically-isolated black fly from the high Andes of Colombia. Copies of his earlier paper on the silverfish of the United States and the Caribbean were in wide demand by economic entomologists; their interest reflects the pertinence of systematic studies to applied science.

Dr. Frederick H. Rindge continued his extensive studies of geometrid moths from the New World. He also continued to assist the entomology program of the Colombian Institute of Agriculture and Animal Husbandry in identifying geometrid defoliators of coniferous trees in Colombia. His curation of the Lepidoptera collection has been limited by a lack of expansion room, a continuing problem confronting the department.

Dr. Jerome G. Rozen, Jr., made substantial progress in his long-range analysis of the phylogenetic relationships among the major groups of bees through studies of their immature stages and life histories. He completed two studies on the Chilean genus *Neofidelia,* and embarked on a systematic-evolutionary study of the mature larvae of the Melittidae with the assistance of Mr. Ronald J. McGinley.

Dr. John A. L. Cooke continued his research into the urticating hairs of theraphosid spiders and on the systematics of the Ricinulei. He described eight new species belonging to this rare and little-studied order.

Dr. Lee H. Herman, Jr., had published a revision of the Staphylinid genus *Charhyphus* and the first part of a study of the rove beetle genus *Bledius.* He is now completing a revision of *Pseudopsis,* analyzing its phylogenetic and distributional history as well as its taxonomic position.

Dr. Willis J. Gertsch pursued his taxonomic work on spiders and scorpions, and Dr. Mont A. Cazier studied the behavior of bees and wasps of the southwestern United States. Dr. Alexander B. Klots continued his revisionary studies of the North American Crambinae moths (Pyralidae), and Dr. Cyril F. dos Passos his studies of the North American butterfly fauna.

Dr. F. Christian Thompson completed a catalog of neotropical hover flies (Syrphidae) and revisionary studies of the two Syrphidae genera, *Sterphus* and *Spheginobaccha.* He also conducted an entomological survey of St. Catherine's Island, where he discovered a number of new Diptera species.

A temporary exhibit on the Brazilian honeybee explored the real and imagined threats posed by this aggressive new hybrid, which may eventually find its way to the United States.

Pedro Wygodzinsky, *Acting Chairman*

DEPARTMENT OF HERPETOLOGY

Work on the Hall of the Biology of Reptiles and Amphibians, scheduled to open in 1974, continued to dominate department activities. Staff involvement took many forms: researching the literature to assure that exhibits will be both accurate and up-to-date, selecting specimens from the collections, collecting animals and background materials, and consulting with the designer as he translates original concepts into specific plans for exhibits. This painstaking work cannot be rushed, but the finished hall is expected to be well worth the wait.

With the new hall occupying much of their time at the Museum, the curators were largely restricted in their research to field work. Dr. Richard G. Zweifel spent several weeks at the Southwestern Research Station conducting experiments on the tolerance of frog and toad embryos to elevated temperatures. Closer to home, he worked at the Kalbfleisch Field Research Station on his long-term study of the ecology of local amphibian and reptile populations.

Dr. Charles J. Cole continued his research at the Southwestern Research Station on evolutionary relationships among populations of fence lizards. A highlight was the discovery that hybridization is occurring between two distinctive subspecies of these lizards. The exchange of genes has been conclusively documented by analysis of the animals' chromosomes, which are recognizably different.

Dr. Charles W. Myers spent nearly three months in Colombia and Panama. Here he and Dr. John W. Daly of the National Institutes of Health continued their collaborative studies of poison-dart frogs. Chemical and pharmacological studies of the skin toxins of the frogs are producing important data that are of use to neuromuscular physiologists as well as to taxonomists. In the Pacific lowlands of Colombia, Dr. Myers lived with the Embera Chocó Indians, who use the most toxic of these frogs in poisoning their blowgun darts. He also collected specimens of more than 100 species of amphibians and reptiles, representing a significant addition to the Museum's holdings from this region.

In cooperation with the Gorgas Memorial Laboratory in Panama, Dr. Myers also initiated a survey of the amphibians and reptiles of a future island, which will be formed by the damming of the Río Bayano. This survey presents the opportunity to document possible changes in a fauna under insular conditions, a subject of broad interest to ecologists. Knowledge of the fauna is also aiding epidemiological studies of arboviruses.

Lack of continued grant support forced the curtailment of the main activities of the Genera of Reptiles Project (Herpetological Information Search Systems). The project, begun in 1968, was headed by Dr. Herndon G. Dowling and provided bibliographic and related services to the scientific community. The publication of one journal, *HISS News-Journal,* is expected to continue to the end of 1973.

Service to scientists and students at other institutions continued at its usual high rate, with more than 2000 specimens loaned out. However a shortage of personnel, diversion of time to exhibition

work and disruption associated with construction in the department curtailed curation of the collection significantly.

Richard G. Zweifel, *Chairman*

DEPARTMENT OF ICHTHYOLOGY

The four curators were sole or joint authors of 21 published scientific reports and thirteen additional papers that are in press or in preparation. Ordinarily such productivity would demand that the staff's research form the core of this report. However, of greater importance than the details of the research, or its quantity and diversity, is the fact that it was carried out within the framework of a new approach to studying the interrelationships of organisms that may eventually revolutionize the entire science of systematics.

The new approach has its roots in the writings of a German entomologist, Dr. Willi Hennig. In essence, it calls for greater precision in the field of systematics through more rigorous methods of analyzing data, through the application of new concepts concerning the interrelationships of organisms, and by ridding the science of the authoritarianism, passive consensus and artfulness which have come down from 19th century academicians.

Recently Dr. Gareth J. Nelson, among others, has enlarged and expounded upon Dr. Hennig's methods and philosophy in theoretical reviews which have contributed to a major conceptual change in Anglo-American systematics. This change is now making it possible to extract more precise information from the differences and similarities observed in the members of a group of organisms. It is also eliminating from systematics the element of subjectivity in considerations of both phylogenetic and biogeographic interpretations of plant and animal evolution.

In recognition of Dr. Hennig's fundamental contributions to systematics, the members of this department and of the Departments of Entomology and Vertebrate Paleontology jointly sponsored him as a Corresponding Member of the Museum.

Along with their research at the Museum, which was conducted in the new climate of thought generated by Dr. Hennig, the curators were also active in field projects. Drs. Donn E. Rosen and Reeve M. Bailey made progress in their faunal survey of Guatemalan fishes, bringing back more than 11,000 specimens for study. Dr. C. Lavett Smith, who is pursuing a long-range study of coral reef fish communities, lived for a week on the ocean bottom in the Bahamas in the Hydrolab habitat, a submerged laboratory-residence built especially for scientists investigating the life of the sea. Dr. Nelson continued his study of the fishes of New York and Connecticut.

The Zoological Record of the Zoological Society of London, the world's largest and most comprehensive source of zoological bibliography, has agreed to incorporate the *Dean Bibliography of Fishes.* Headed by Dr. James W. Atz, the *Bibliography* will appear in forthcoming volumes in lieu of the Pisces section. In addition, the computerized storage and retrieval system for bibliographic data, developed by Dr. Atz in cooperation with the Biological Sciences Information Service of Philadelphia, has been adopted by *The Zoological Record* to mechanize its service.

Donn E. Rosen, *Chairman*

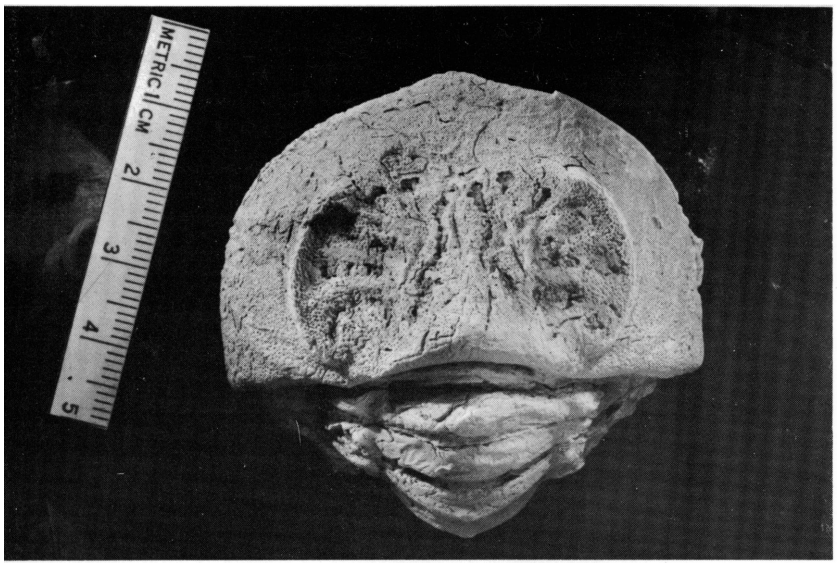
DEPARTMENT OF INVERTEBRATE PALEONTOLOGY

The subject matter of this department, which ranges broadly over systematic, evolutionary and ecological biology as well as stratigraphic geology, provides an extensive number of research topics. Members of the staff have therefore limited themselves to certain specialties, at the same time emphasizing the broad principles of historical zoology and geology.

A highlight of the year was a survey by Dr. Niles Eldredge of an extinct suborder of fossil horseshoe crabs, the Synziphosurina. The work was prompted by acquisition of three remarkable Devonian specimens from Bolivia that are providing new information on this poorly understood group of animals. Dr. Eldredge also continued his studies of the interrelationships between animal environments and speciation. In connection with his investigation of methodologies used to reconstruct evolutionary history, he continued his work on Devonian trilobites and aided a project to analyze the phylogeny of early man.

Dr. Roger Lyman Batten supervised the installation of the Museum's new scanning electron microscope. This instrument and a similar one at Columbia University's Lamont-Doherty Geological Observatory have allowed Dr. Batten to discover previously unknown ultramicroscopic details of fossil and living molluscan shells. Such details have an important bearing on interpretations of an animal's evolutionary history and ecology. Dr. Batten

This newly-acquired specimen is one of the best-preserved Paleozoic horseshoe crabs ever found. Discovered in Bolivia, the fossil dates back about 380 million years and is helping Dr. Niles Eldredge to trace the evolution of this poorly understood group of animals.



also continued his investigation of Permo-Triassic faunas. The work is an attempt to elucidate phylogenetic interrelationships during this transitional period characterized by stress environments.

Drs. Norman D. Newell and Donald W. Boyd completed their comprehensive manuscript on early representatives of a suborder of bivalve mollusks, the Trigonioida. Special attention was given to parallel evolutionary trends and to the problems of classifying animals displaying such trends. In an address to the American Philosophical Society, Dr. Newell analyzed a controversy between evolutionists and creationists over instruction policies in California and Tennessee public schools. He proposed that the controversy is the result of popular misunderstanding of the methods of science as well as an opportunistic invasion of the school system by religious dogmatists. In addition to his duties as Chairman, Dr. Newell has also taken over the responsibilities of Acting Chairman of the Department of Mineralogy.

Besides their research activities, department members contributed to education through popular writing, semiprofessional and professional lectures and conferences, and services to amateurs and amateur groups. In addition, Drs. Newell, Batten, Eldredge and Tsunemasa Saito, and Mr. Sidney S. Horenstein hold academic appointments at universities and colleges in the metropolitan area; many of their students carry out research at the Museum under their supervision.

Micropaleontology Press, headed by Dr. Saito, continued to serve the micropaleontology community through its publication of *Micropaleontology,* the Bibliography and Index of Micropaleontology, and the catalogs of Polycystine Radiolaria, Foraminifera and Ostracoda. Over 4200 pages of illustrated text were published on these subjects during the year.

Norman D. Newell, *Chairman*

DEPARTMENT OF LIVING INVERTEBRATES

The temporary exhibit "Shells, A Pictorial Tribute" was a highly successful treatment of one of the most widely studied forms in nature. It marked the publication by the Viking Press of "Shells," with text by Dr. William K. Emerson and photographs by the well-known nature photographer Andreas Feininger. The permanent identification exhibition, "Shells of New York State," opened in the early fall, and "The Pink Conch: Ocean Treasure," the Museum's special summer exhibit, opened in June. Looking to the future, the department continued its collaboration with the Anthropology Department on the Hall of Mollusks and Mankind. Construction on this permanent exhibition is scheduled to begin August I.

In the realm of research, Dr. Dorothy E. Bliss, Dr. Penny M. Hopkins and their associates are attempting to isolate several hormones which appear to play a role in limb regeneration and molting in the small land crab *Gecarcinus lateralis.* Some of these hormones are products of neurosecretory cells. The neurosecretory cells and systems which control hormonal activity in many different animals are comparable both in structure and function. Therefore, the studies of Dr. Bliss and her associates should result in greater insight into the workings of some of these systems. Dr. Bliss's work has been supported for the past fifteen years by the National Science Foundation.

Dr. Linda Habas Mantel continued her studies of blood and gut fluid physiology in *Gecarcinus lateralis* and of certain enzymes in the animal's gills and gut which allow it to maintain normal salt and water balance. She is also analyzing how mechanical and electrical stimulation of regenerating limbs affects growth and molting in the fiddler crab, and how low external oxygen influences respiration and metabolism in the horseshoe crab.

Dr. Emerson, with Dr. Walter O. Cernohorsky of the Auckland Institute and Museum of New Zealand, completed a monograph on the gastropod genus *Drupa.* The fossil record suggests that

drupine snails have inhabited the entire Indo-Pacific faunal region since the end of the Tertiary period; however, only two out of the eight drupine species are established in the tropical eastern Pacific Ocean. This distributional pattern supports the thesis that the wide expanse of deep water separating Polynesia and the west American tropics is a major barrier to the dispersal of most shallow-water, benthonic, tropical organisms.

Dr. Ernst Kirsteuer pursued his long-term study of marine nemertean worms and spent three weeks in British Honduras on a biological survey of local coral reefs, which form the second largest barrier reef in the world. Collaborating with Dr. Klaus Rützler of the Smithsonian Institution, Dr. Kirsteuer did a scanning electron microscope analysis of the morphology of the cuticular structures of *Tubiluchus corallicola.* This species is the only known meiobenthic representative of the marine worm phylum Priapulida.

Dr. George A. Schultz made progress on his continuing taxonomic review of New World land isopods of the family Armadillidae. Dr. Horace W. Stunkard continued his studies of trematode larvae —particularly those infesting marine fish—and his work on sporozoan infections of first year winter flounders.

Mr. William E. Old, Jr., continued his studies of conacean gastropods and Recent Amphineuran mollusks. Mr. Harold S. Feinberg worked on the systematics of the gastropod family Polygyridae and made a field expedition to Luquillo National Forest, Puerto Rico, to study the ecology of two species of mountain land snails. Messrs. Old and Feinberg also contributed to departmental exhibits and reduced the backlog of accessioned specimens requiring curation and incorporation into the collection.

William K. Emerson, *Chairman*

DEPARTMENT OF MAMMALOGY

The entire collection of Cetacea, which includes some 300 specimens of whales, dolphins and porpoises, was relocated to new quarters in the powerhouse with the aid of a grant from the National Science Foundation. As a result, several other collections of large-sized species—including the elephants and rhinoceroses—could be rearranged and are now much more accessible to research workers.

Dr. Sydney Anderson's major monograph, "Mammals of Chihuahua, Taxonomy and Distribution," was published in September. Dr. Karl F. Koopman completed the first draft of his large work on the bats of Sudan. Dr. Guy G. Musser continued his studies of the rats of the Indo-Malayan region, publishing five papers on the subject. He also continued to prepare for a long-term field study of the rodents of Celebes, scheduled to begin July. Mr. Hobart M. Van Deusen continued his investigations of the mammalian fauna of New Guinea and Australia.

Dr. Richard G. Van Gelder returned to Mozambique to continue his study of the nyala antelope with game biologist José Tello. He also began a feasibility study to determine whether the scanning electron microscope can distinguish the hairs of endangered species. If it turns out to be a suitable identification tool, the instrument could be effective in reducing the importation of certain furs into the United States.

In addition to their research activities the staff continued to provide visitors, teachers, the media and other institutions with information on endangered species. Threatened mammal species tend to attract more concern than others.

During the year the department received 2030 specimens and made considerable progress in processing materials. The handling of loans was greatly enhanced by support provided by the National Science Foundation for a curatorial assistant.

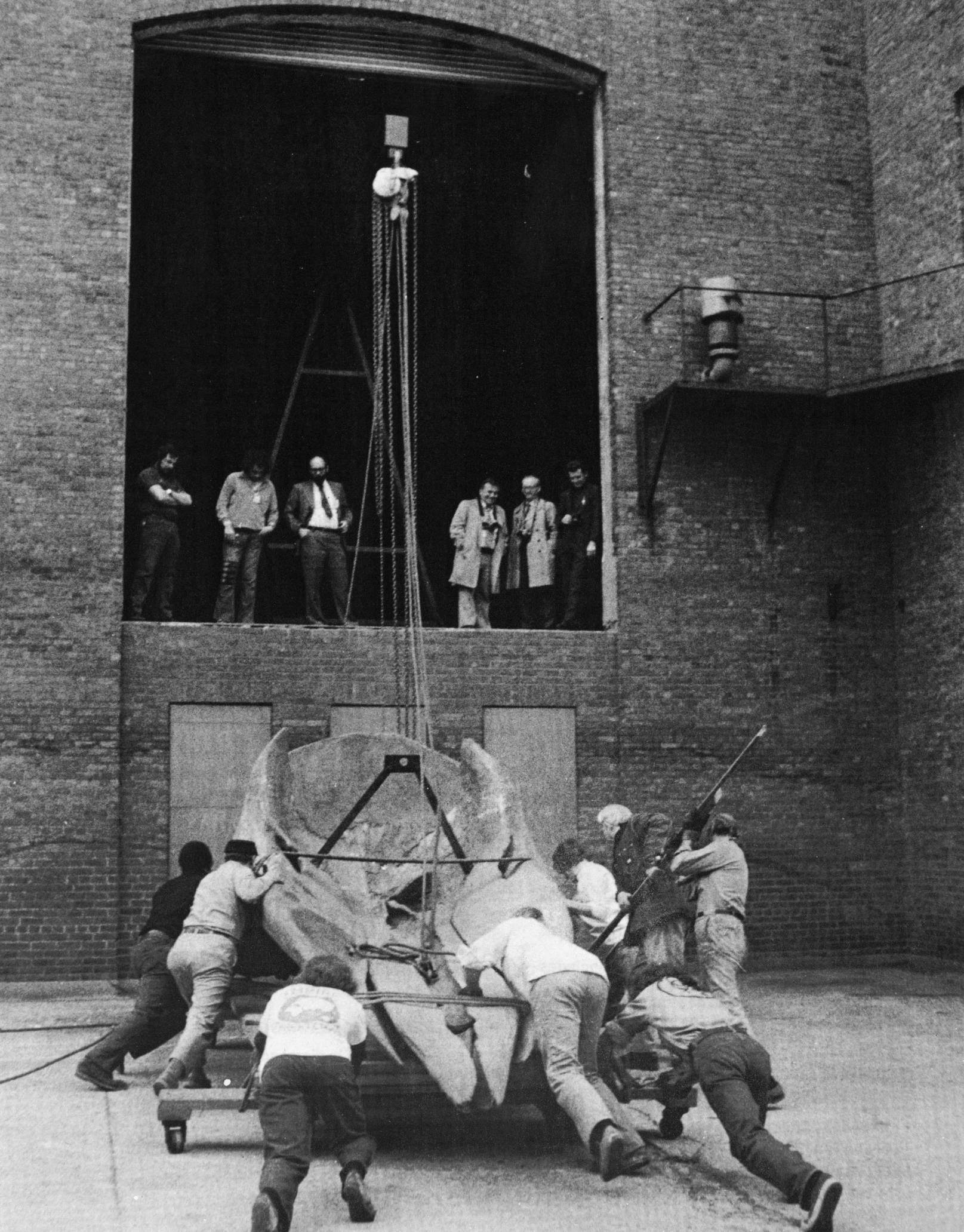
The department prepared two temporary exhibits as well as new labels for the Akeley Memorial Hall of African Mammals. Meanwhile, planning for the new Hall of the Biology of Mammals continued.

Drs. Van Gelder and Anderson continued their teaching activities at the State University of New York and The City University of New York respectively. The entire staff served on numerous committees of the American Society of Mammalogists. In addition, Drs. Anderson and Musser edited Society publications and Mr. Van Deusen served as a Trustee, Dr. Anderson as Recording Secretary and Dr. Van Gelder as Past President.

Richard G. Van Gelder, *Chairman*

DEPARTMENT OF MINERALOGY

Mineral inclusions in diamonds continued to be the principal research topic of Dr. D. Vincent Manson. He is working with Dr. Martin Prinz, who joined the department in November. Inclusions are imperfections or flaws generally considered to be undesirable in the finest gemstones. However, they



Workmen push a three-ton whale skull into position for hoisting up to the powerhouse, the new quarters for the 300 specimens of whales, dolphins and porpoises which make up the Museum's outstanding collection of Cetacea.

are important to geologists because they shed light on the formation of diamonds.They also provide one of the only means available for documenting the composition of the earth's mantle and for identifying the geological processes at work 150 miles beneath the surface, where inclusions are formed.

Dr. Manson also continued to apply multivariate analysis—the mathematical analysis of numerical data—to the systematic sciences. He is using the techinque to study chemical variation found in stony meteorites and lunar rock types. In another project Dr. Manson, working with Dr. Marshall Kay of Columbia University, documented a suite of igneous rocks from the Dunnage Melange in northeastern Newfoundland. This area is a subduction zone, where plate tectonic activity took place 400 million years ago.

Along with his research activities, Dr. Manson supervised two highly successful temporary exhibits. One displayed crystals of the magnificent gem mineral, tourmaline. The other exhibit featured the third largest diamond ever found, the Star of Sierra Leone. It was the largest diamond in existence until it was cut into smaller stones at the close of the exhibit by Mr. Harry Winston, who loaned it to the Museum.

Substantial progress was made in preparations for the new Hall of Minerals and Gems, and construction has begun. This major exhibition will enable the Museum to use its unique collections in an exciting and dramatic manner that will explain the significance of mineral resources.

Mineral collecting is enjoying an unprecedented popularity throughout the world; the seemingly unlimited demand for fine specimens has also encouraged the mining of a greater volume than ever before. As a result, the department was able to acquire a total of 800 new specimens with a value in excess of $70,000. Gifts also augmented the collections. They included a collection of minerals and facetted gemstones from Mr. Sidney Singer, Jr., and East African rough and cut gemstones and mineral specimens from Mr. Hyman Saul.

The importance of the collections continued to be reflected in the many requests for assistance and information from other institutions. The department also handled 2500 inquiries from the public.

Dr. Norman D. Newell, Chairman of the Invertebrate Paleontology Department, was appointed Acting Chairman. Mr. David Seaman retired in January after nineteen years of dedicated service.

Norman D. Newell, *Acting Chairman*

DEPARTMENT OF ORNITHOLOGY

Dr. Robert Cushman Murphy, Lamont Curator Emeritus of Birds and a former Chairman of the department, died on March 19 at the age of 85. He was known throughout the world for his contributions to the field of marine ornithology. As an author and explorer he will be remembered for such works as the two-volume "Oceanic Birds of South America," published by the Museum in 1936, and "Logbook for Grace," an account of his experiences aboard a whaling vessel. Long before efforts to conserve the natural environment became common, Dr. Murphy, a staunch conservationist, brought one of the first suits against the federal government to halt the use of DDT. Retired since 1955, Dr. Murphy nonetheless remained an active and familiar figure at the Museum until the time of his death.

Dr. Dean Amadon resigned as Chairman of the department on June 30; he continues his research activities as Lamont Curator of Birds. Dr. Wesley E. Lanyon was appointed Chairman on July 1.

Mr. Charles E. O'Brien, associated with the department for over 40 years, retired. His loss will be felt; he had an unparalleled knowledge of the collection. The retirement of Dr. Charles Vaurie also became effective. Among his major works are a two volume standard reference on the birds of Eurasia and a book on the birds of Tibet. Both men have been named Curator Emeritus.

The first year in a five-year program of assistance from the National Science Foundation for collection activities was marked by much progress in improving the organization, storage and availability of department holdings. Both staff members and associates are aiding the program: Mr. James C. Greenway, Jr., is curating the type specimens; Dr. Eugene Eisenmann, Mrs. Ruth Trimble Chapin and Mr. G. Stuart Keith are providing consultation on the bird groups with which they are familiar; and Mrs. Lowrie S. Flagg is curating the department archives.

Field research took Dr. Lanyon to Peru and Colombia and Dr. Lester L. Short to the Dominican Republic. Dr. Lanyon is involved in a long-term study of the role vocalization as a species-isolating mechanism in flycatchers. Dr. Short's research continues to center on woodpeckers, and he is now drawing together a general reference work on these specialized birds.

Dr. Amadon began work on a list of diurnal birds of prey. "Curassows and Related Birds" by Dr. Jean Delacour and Dr. Amadon will be published by

the Museum in September. Mr. John Bull has submitted the manuscript and illustrations for the first book on New York State birds to appear since 1915.

Dr. Robert W. Dickerman studied Mexican birds in relation to viruses. Mrs. Mary LeCroy traveled to Venezuela in late spring to study what are presumed to be the southernmost nesting Common Terns in this hemisphere. The data will permit useful comparisons with the long-term studies of these sea birds being carried out on Great Gull Island. A report on this field station, which is headed by Miss Helen Hays and is under the general supervision of the department, appears elsewhere. Projects conducted at Kalbfleisch Field Research Station, of which Dr. Lanyon is Resident Director, are also covered in another section.

The Frank M. Chapman Memorial Fund, administered by a committee of staff members, considered applications from about 150 individuals, chiefly graduate students. It made cash grants to support the basic research of approximately 50 investigators.

Plans were made for several new permanent exhibits which will occupy a section of the Hall of the Biology of Birds. They will deal with the only member of the stork family found in the United States, endangered species and their conservation, and the work on Great Gull Island. A temporary exhibit on bird eggs, prepared for the Easter season, was well received.

Dean Amadon, *Chairman*

DEPARTMENT OF VERTEBRATE PALEONTOLOGY

The normal activities of the department were partly interrupted during the year by the move into the new Childs Frick Wing. The occupation of the offices, laboratories and library was completed during the winter, but the transfer of the combined collection of Frick and departmental fossil mammals will probably require about five years to complete. Numbering more than a quarter of a million specimens, this collection is being renovated and arranged systematically with the aid of a grant from the National Science Foundation. Groups of mammals that have been identified and well studied, such as the camels, have been organized with comparative ease. It will be more difficult to arrange groups that have not been investigated for many years. The ultimate purpose of the grant is to provide for the rapid retrieval of all specimens so that their research potential can be fully realized.

New quarters for the small but valuable fossil fish collection were obtained during the year, but the famous and important assemblage of fossil amphibians and reptiles is still in need of modern and improved storage facilities.

In research Drs. Malcolm C. McKenna and Richard H. Tedford, collaborating with staff members of the Mammalogy Department, made significant progress in their new classification of the mammals. Dr. McKenna also continued his studies of the biological implication of continental drift and of early Tertiary rocks and mammals.

Dr. Tedford and Mr. Beryl E. Taylor pursued their investigations of the dog-like carnivores. In addition, Dr. Tedford made progress on his long-range study of the history of the Australian marsupials, and completed a description of the earliest known fossil sea lions. He has nearly completed a manuscript on all known Neogene sea lions. Mr. Taylor, in collaboration with Dr. Thomas H. Patton, Florida State Museum, completed the revision of the family Protoceratidae.

Messrs. Morris F. Skinner and Theodore Galusha were again involved with providing stratigraphic documentation for major parts of the Frick fossil mammal collection. To gain more precise data on certain specimens, they visited areas where the specimens were first discovered many years ago.

Dr. Eugene S. Gaffney began a long article on turtle skull morphology for the "Biology of Reptiles," a multi-volume series published by Academic Press. He also continued his work on several shorter papers concerning Jurassic turtles.

Dr. Bobb Schaeffer completed several short papers on chondrostean fishes and on general topics related to systematics and evolution. He also continued his research on Triassic and Jurassic fish assemblages from various localities.

The Osborn Memorial Hall of Late Mammals continued to undergo renovation, but it is once again open to the public.

Bobb Schaeffer, *Chairman*

ARCHBOLD BIOLOGICAL STATION LAKE PLACID, FLORIDA

Dr. James N. Layne assisted by Mr. Chet E. Winegarner, Mr. Fred E. Lohrer and several undergraduate students, continued his studies of the station's environmental and vertebrate populations, especially mammals. Dr. A. L. Rand completed a study of

Graduate students in the joint Columbia University-American Museum program of advanced studies in vertebrate paleontology attend a lecture by Dr. Eugene S. Gaffney in the classroom of the new Childs Frick Wing.

Experiments at the Lerner Marine Laboratory by Dr. William F. Herrnkind (center) and his assistants are providing clues to the migratory behavior of spiny lobsters. Here the three Florida State University investigators examine specimens kept in the outdoor tanks at the Laboratory.

the behavior of the Purple Gallinule and continued his observations of seasonal characteristics of the fauna and flora of southern Florida. Dr. Glen E. Woolfenden obtained further detailed demographic data on the Florida Scrub Jay; during the nesting season, he concentrated on the growth and development of the young and on the role of helpers.

One of several projects conducted by Dr. John M. Kinsella, the station's new Research Fellow, was a study of the ecology of parasitic helminth infections in three species of rodents living in four major habitats of the station. Mr. Winegarner carried out a study of the breeding biology of the Great Crested Flycatcher, and Mr. Lohrer a similar study on the Screech Owl. Mr. Bruce Barbour, University of South Florida, continued his thesis research on vocalizations of the Scrub Jay. Four students in the Museum's Undergraduate Research Participation Program—Martha Noble, Wellesley College, John Fitzpatrick and William Haas, Harvard University, and Debra Glover, Beloit College—aided station research.

Forty-two visiting scientists and their assistants from seventeen institutions worked at the station, many of them on projects begun in previous years. Dr. Frank E. Kurczewski, Syracuse University, spent a sabbatical leave studying the comparative behavior of solitary wasps. He succeeded in making observations on a number of species whose behavior was previously unknown. Dr. Ronald M. Nowak, University of Kansas, used the station as a base to conduct a preliminary study of the endangered Florida panther.

Mr. Jeffrey W. Lang, a graduate student at the University of Minnesota, studied the activity patterns and thermoregulatory behavior of juvenile alligators under both controlled laboratory and semi-natural field conditions. Mr. Ronald Rutowski, a graduate student at Cornell University, investigated the chemical defense mechanisms of the caterpillars of the pierid butterfly *Eurema lisa.* These larvae have hairs which produce a secretion that is repulsive to predatory ants.

Dr. Thomas Eisner, Professor of Neurobiology and Behavior at Cornell University and a frequent visiting investigator, was appointed a Research Associate of the station.

Thirteen papers and two theses based on work at the station by visiting investigators appeared during the year. Seven papers by staff members were also published.

Two hundred and sixty individuals and thirty-two groups totaling some 628 persons visited the station. Thirteen of the groups were from colleges and universities, and most of them came in connection with environmental studies. The University of Tennessee and Cornell and Harvard Universities conducted four courses at the station.

Richard Archbold, *Resident Director*

GREAT GULL ISLAND
LONG ISLAND SOUND, NEW YORK

The first hybrids ever reported between mixed pairs of Roseate and Common Terns were discovered during the summer. Miss Helen Hays is preparing a paper on the finding, which was made by a group of investigators who have been monitoring the effects of chemical pollution on the tern colony of the island.

The number of abnormal young found this year has decreased since 1970, but whether this represents a temporary fluctuation or a real drop in pollutants (possibly related to reduced use of DDT in the area) remains to be determined.

In addition to her tern studies, Miss Hays continued her observations of Spotted Sandpipers and published a paper on their polyandrous mating patterns. She also delivered a paper on the subject before a shore bird symposium of the American Ornithologists' Union. At the same meeting the organization made her an elective member, an honor restricted to 150 people.

Visiting investigators included Dr. Kenneth C. Parkes, Chairman of the Section of Birds at the Carnegie Museum, who spent four weeks continuing his work with the pollution monitoring team, and Dr. Robert Ricklefs of the University of Pennsylvania, who studied the growth rate of Common Terns.

Mr. David Duffy and Miss Catherine La Farge, two college students, compiled a list of bird species recorded on the island between 1966 and 1972; the list is scheduled for publication.

Photographs taken of Great Gull Island by Miss Joan Black were exhibited at Cornell University and the Cape Cod Museum of Natural History. One photograph from the group appeared on the cover of the May issue of *On The Sound.*

During the summer more volunteers than ever before worked on the island. They came from local high schools as well as Bryn Mawr College, Cornell and Harvard Universities, the University of Colorado and the Rhode Island School of Design. Their presence enabled the undertaking of an extensive program to trap adult terns of both species for the purpose of determining longevity and the age classes of breeding adults.

Helen Hays, *Chairwoman,*
Great Gull Island Committee

KALBFLEISCH FIELD RESEARCH STATION
HUNTINGTON, LONG ISLAND, NEW YORK

During its fifteenth year of operation the station again provided the Museum staff with the opportunity for integrated field and laboratory research in the biological sciences at a location within reasonable commuting distance of Manhattan. The five curators from four departments who used the station's resources were Dr. Donn E. Rosen, Dr. Lester L. Short, Jr., Dr. Richard G. Van Gelder, Dr. Richard G. Zweifel and Dr. Wesley E. Lanyon. Their research is concerned with the behavior and ecology of fishes, birds, mammals, reptiles and amphibians that are both captive and living free.

Three graduate students participating in the Museum's Evolutionary Biology Program, which is jointly sponsored by The City University of New York, continued to use the station as the site for their doctoral research: Mrs. Jacqueline Madden, Mr. Robert Madden and Mr. David Ewert. A fourth graduate student, Mr. Joseph M. Wunderle, Jr., of the University of Minnesota, again conducted research under Dr. Lanyon's supervision. His work as well as that of Mr. Ewert was initiated several years ago when the two students worked at the station in the Undergraduate Research Participation Program.

During the summer there were seven undergraduates in the program, which stresses training in field oriented biology. They represented the following institutions: Bard College, The City College of New York, Fairleigh Dickinson University, Mount Holyoke College, Oberlin College and the State University of New York at Geneseo. Unfortunately the program, which is sponsored by the National Science Foundation, was not fully funded for 1973 and thus there will be no undergraduates at the station during the coming year.

Two manuscripts and one doctoral thesis based on work at the station are now in preparation.

Wesley E. Lanyon, *Resident Director*

LERNER MARINE LABORATORY
BIMINI, BAHAMAS

Research conducted at the laboratory continued to provide new knowledge about the marine life of the Bahamas. Dr. William Hamner, a visiting zoologist from the University of California at Davis, completed a major survey of the blue water plankton living in the waters near Bimini. With the use of scuba equipment, Dr. Hamner and his associates were able to conduct the first close studies of these abundant organisms in their free-floating state. Numerous papers on their discoveries have been published, and a popular report on their work is scheduled to appear in the *National Geographic* Magazine.

A long-term program of experiments on the neurological basis of visual learning in nurse sharks also came to an end. It was directed by Drs. Sven O. E. Ebbesson and John Jane of the Neurosurgical Laboratory of the University of Virginia Medical School.

Members of the staff continued their work on numerous projects. Dr. M. Michael Sigel, a pioneer investigator of immune responses in marine fishes, has recently concentrated his efforts on the main agents of the immune system, the lymphocytes. He is also studying an as yet unknown mechanism in nurse sharks that exists in addition to lymphocytes and appears to cause the rejection of allografts.

Drs. Edward S. Hodgson, Arland L. Carsten and Robert F. Mathewson have continued their research on the sensory physiology of sharks. Drs. James Tyler and C. Lavett Smith are pursuing their long-range study of coral reef fish ecology. In addition, Dr. Tyler is collecting data on sponge-dwelling

fishes and studying the biology of pearlfishes.

Numerous visiting investigators from institutions around the country continued to rely on the laboratory for their field studies. For several years, Dr. William F. Herrnkind of Florida State University has been studying the mass migrations of spiny lobsters which occur near Bimini. Where the lobsters originate and where they migrate is still not certain, but Dr. Herrnkind and his associates are discovering some of the physiological mechanisms which control the migrations.

Dr. Francis J. Schmitz of the University of Oklahoma worked on the pharmacological properties of fluids extracted from marine organisms; the extracts appear to have inhibitory effects on neoplastic cell growths. Dr. Leon Goldstein of Brown University returned to continue his research on drug metabolism in fishes. Dr. I. Kaufman Arenberg of Washington University School of Medicine pursued his study of inner ear fluid dynamics in sharks and rays. Dr. H. David Baldridge, Jr., of the Mote Marine Laboratory carried out studies on the effects of anoxia on shark behavior.

The laboratory continued to serve a variety of educational needs. The Tropical Marine Biology Course, supervised by Dr. Hodgson, was held for the third successful year. Dr. William Hay of the University of Illinois led two short courses on introductory marine biology in April and June. Dr. Goldstein supervised the research of six students from Brown University on fish physiology. Mr. Marvin Greenbaum, a recent graduate of Johns Hopkins University, spent six months at the laboratory on a Thomas J. Watson Fellowship photographing the tropical marine environment.

A 40-foot-high radio tower was set up to support a new antenna that is improving communications between the laboratory and the mainland. New equipment purchased included two dissecting microscopes, a compound microscope and a new compressed air system to fill the scuba tanks used by the many diver-scientists who work at the laboratory.

Robert F. Mathewson, *Resident Director*

SOUTHWESTERN RESEARCH STATION PORTAL, ARIZONA

The total number of visitors who used the station dropped this year to 578, but an increase in income indicates that they tended to stay for longer periods of time than previous investigators. Among the group were representatives of 54 institutions around the country; they worked mainly in the fields of herpetology, entomology and ornithology.

Messrs. Vincent D. Roth and Darrell Ubick, a student from San Francisco State College in the Undergraduate Research Participation Program, worked on a revision of the genus *Cesonia* (Gnaphosidae). This genus of spiders has never been revised although approximately a dozen species have been described. Working with Miss Wynne Brown from Skidmore College, Mr. Roth pursued an investigation of the terrestrial fauna of the intertidal zone of the Gulf of California. Most studies of this area have concentrated on marine life. Aided by various specialists, Mr. Roth is also involved in the creation of an illustrated catalog of nearctic spiders.

The work of visiting investigators covered many subjects. Dr. John Pinto, University of California at Riverside, studied the courtship behavior of blister beetles belonging to the genus *Epicaudata.* He has found that such behavior provides a useful taxonomic tool. Dr. F. Reed Hainsworth, Syracuse University, made comparative studies of hummingbird foraging efficiency. As might be expected, larger hummingbirds were found to have a higher rate of nectar intake from a given corolla length than smaller hummingbirds. However, rate of intake decreased as nectar concentration increased.

Mr. Stephen Hansen, a graduate student at the University of Michigan, studied the adaptations to aridity of four desert ant species: *Pogonomyrmex barbatus, P. imberbiculus, Novomessor cockerelli* and *Acrmyrmex versicolor.* In three out of the four, low transpiration rates combine with an ability to withstand high water loss and a corresponding reduced fluid level. These factors enable the species to meet highly desiccating situations in their daily foraging and nesting. The fourth species, *A. versicolor,* which could not withstand high water loss, avoids severe desiccation by foraging only in the cooler portions of the day.

Mr. Mark Dimmit, a graduate student at the University of California at Riverside, studied the emergence cues of spadefoot toads. He found that emergence is stimulated mainly by heavy rainfall and that emergences were greater on nights with loud thunder than on rainless and thunderless nights.

There has been a significant increase in the number of student groups using the Chiricahua Mountains and paying visits to the station. To accommodate these groups, which come from as near as Portal and as far as New York, Mr. Roth

A replica of a 19th-century courtyard in Puerto Rico was the setting for an exhibition showing the influences of diverse cultures on the people of Puerto Rico. The temporary exhibition was staged in a new display area called Education Gallery.

gave sixteen talks on the station's activities.

Fifteen scientific papers based on work at the station were published during the year. A small herbarium with 340 species of local plants was created; it has been a valuable addition to the station's collections and facilitates the identification of plants in the field.

Vincent D. Roth, *Resident Director*

DEPARTMENT OF EDUCATION

The year's highlight was the October opening of the new People Center, located on the second floor. This colorful and innovative exhibit-teaching area quickly became a major attraction for Museum visitors. More than 2000 persons came every weekend to experience dance, music and craft demonstrations and to discuss with staff the artifacts and art forms of other cultures. The People Center, with its main focus on anthropology, is complemented by the Natural Science Center adjacent to it. The latter closed for major renovations during the winter and will reopen in early 1974, doubled in size and with a new emphasis on urban ecology.

The department opened its new Education Gallery in September with an exhibition entitled "Never Say Die," about five endangered North American animals. "Roots of Puerto Rico/Raíces de Puerto Rico," which illustrates the multi-cultural heritage of that island, was the Gallery's second exhibition, opening in June. The Center Gallery leading to the People Center, and the People Center itself, housed several other departmental exhibits.

Instruction was given to more than 56,000 students through the one-day teaching programs, The World We Live In and Exploring Man and Nature.

Museum employees who retire are honored at teas given in the Audubon Gallery. Here Mr. Gordon R. Reekie (left), retiring Chairman of Exhibition and Graphic Arts, says good-bye to Dr. Donn E. Rosen, Chairman of Ichthyology, and Mrs. Francis H. Low, Trustee. Mr. Reekie had been with the Museum twenty years; his successor is Mr. George S. Gardner.

Additional courses were given to 3000 youngsters, double the number of any previous year.

Activities held at schools and for community groups were expanded. Museum programs on ecology and anthropology reached many thousands in their school assemblies; workshops and lectures in African-American and Caribbean studies were given in classrooms, libraries and community centers.

More than 100 volunteers again gave generously of their time, working with school classes, at the information desks and in the People Center, as well as assisting other Museum departments in many beneficial ways.

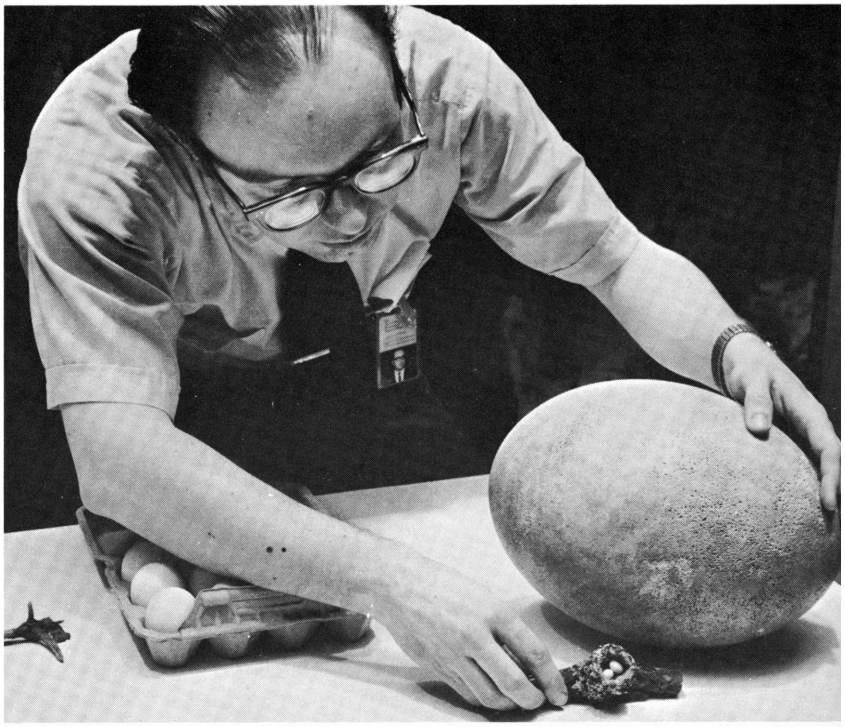
Several new lecture series were given in the Adult Evening School, and field study tours and nature walks continued to draw heavy public response. Courses for New York City school teachers and special teacher-training workshops reached new levels in enrollment. More than 700 teachers received instruction. In addition, approximately 900 student nurses took special classes at the Museum.

For the third year, the Teaching-Intern Program placed its part-time staff in the Halls of Man in Africa, Mexico and Central America, Indians of the Eastern Woodlands, Indians of the Plains and the Biology of Man. During its three years, this program has employed over 100 persons who have worked in these halls, adding richness to the Museum-going experience of many visitors.

A number of special cultural events arranged by the department were held in the Auditorium and the People Center. These included performances by the Puerto Rican Dance Theater and the Chamber Orchestra of the Harlem Philharmonic, an African Heritage Week, a Haitian Cultural Festival and a special Golden Age Day. Nearly 20,000 persons participated in these and other cultural events during the year.

Malcolm Arth, *Chairman*

Eggs were the subject of the April Exhibit of the Month. Mr. Eugene B. Bergmann, Exhibition, was photographed by United Press International preparing the exhibit and the picture appeared in newspapers throughout the country.



DEPARTMENT OF EXHIBITION AND GRAPHICS

A great increase in temporary exhibition activity, noted as starting last year, characterized this year's work. Two new galleries were opened and another renovated; and more timely exhibits, of greater variety than ever before, were put on display throughout the Museum.

The People Center, opened in October, accounted for the two new exhibition areas. One in the Center itself has housed a display on how to look at exhibits, "Behind Objects: What Do You See?" The corridor leading from the Hall of Man in Africa to the People Center has been converted into another display area, now known as the Center Gallery. This area housed two small exhibits: "North American Indian Portraits," poignant photographs by Mr. Edward S. Curtis and "The Man and the Bay," color photographs by Mr. Arthur Swoger of the Jamaica Bay Wildlife Refuge in New York City.

The 3800-square-foot area known as Section 1A, adjacent to the Seventy-Seventh Street Foyer, was remodeled and opened to the public as Gallery 77 in April. The first exhibition in this new air-conditioned area was "Greenland: Arctic Denmark," which was prepared by the Danish government and circulated by the Smithsonian Institution.

In the African Gallery two shows were mounted. "Shells—A Pictorial Tribute," consisting of splendid photographs by Mr. Andreas Feininger from the book, "Shells," by Dr. William K. Emerson, chairman of the Department of Living Invertebrates, and Mr. Feininger, was opened in November. An elaborate retrospective exhibition, "The Life and Times of Carl Akeley," which opened in April, covered the career of the remarkable artist and scientist who was so closely associated with the Museum. Both of these exhibitions were put together by Mr. Joseph M. Sedacca.

Two displays were prepared for the newly-named Education Gallery, the exhibit area near the entrance to Education Hall on the first floor. The first, "Never Say Die," traced the survival history of five endangered North American species and opened in September. It was succeeded in June by "Roots of Puerto Rico/Raíces de Puerto Rico," an exhibition depicting the Spanish, African and Taino Indian influences on Puerto Rican culture.

A significant exhibition development of the past year was the design and construction of a flexible exhibit system consisting of cases and panels that can easily be assembled and disassembled for temporary use in any Museum location. This new exhibit system was first used in Theodore Roosevelt Memorial Hall for the March opening of "Gem Pocket," an exhibition which previewed one aspect of the new Hall of Minerals and Gems scheduled to open late in 1974.

Exhibits of the Month and special exhibits included Christmas displays of insect toys and of gold, frankincense and myrrh; an Easter display of eggs, real and fanciful; a celebration in The American Museum-Hayden Planetarium of the 500th anniversary of the birth of Copernicus; an informative exhibit entitled "Marsupials: The Other Mammals" and a decorative summertime display, "Colorful Scallops, Scampering Butterflies of the Sea."

Work progressed on the new Hall of the Biology of Reptiles and Amphibians under the direction of Mr. Eugene Bergmann and included the creative efforts of Mr. Raymond de Lucia and Mr. David Schwendeman. Two smaller exhibits were completed: "Mollusks of New York State," and the Lincoln Ellsworth memorabilia, the latter a reinstallation featuring new maps and a mural by Mr. Matthew Kalmenoff.

Designing was completed by Mr. Henry Gardiner for the new Hall of Mollusks and Mankind and for the expanded Alexander M. White Natural Science Center; it was begun for the third section of the Hall

of the Biology of Man. Renovation of the Hall of Late Mammals was also started. Fire damage to the John Lindsley Hall of Earth History necessitated replacement of its six "Processes of the Earth" displays.

There was an increase in requests for fossil reproductions, which are produced by the Exhibition Division. Most notable was the duplication of the 20-foot-long *Stegosaurus* skeleton on display in the Hall of Early Dinosaurs. The replica was commissioned by the Municipal Museum of Natural Sciences, Osaka, Japan. The reproduction of *Stegosaurus* was a community project, with members of the Exhibition staff directed by Mr. Martin Cassidy supervising the work of volunteers and New York City high school students in the six-month-long, bone-by-bone reproduction of the rare dinosaur fossil.

The Graphics Division was involved in much of the year's exhibition activities. The division produced a large number of scientific illustrations, particularly for the Department of Ichthyology. It designed and produced a new general guide to the Museum and a promotional brochure and newsletters for the Lerner Marine Laboratory, and continued its program of new poster and directional sign installations throughout the Museum.

Gordon R. Reekie, *Chairman*

LIBRARY

Installation of a computer system for the cataloging of serials, acquisition of important new books and serials, redesigning of the Library's physical layout and final planning for the new Rare Book Room were among this year's highlights. Staff shortages were deeply felt in all sections of the Library, but procedures were instituted which helped avoid work backlogs.

The new serials section, responsible for recataloging the 15,000-title serials collection and for processing all newly-acquired serials, spent the year planning and perfecting its new procedures and operations. This involved the completion and testing of a new computer system which will help in the production of a new serials catalog. A contract has been signed with G. K. Hall & Co., Boston, to publish the catalog; a small royalty should be received from this project. In addition, a procedural manual for recataloging and keypunching the catalog data was completed.

The acquisitions section, under Mr. J. Frederick North, assisted in the serials cataloging project, and established a new procedure for circulating new and uncataloged materials. Under this procedure, within a nine-month period 363 uncataloged books and 1000 uncataloged serials were available in the Current Literature Room within one week of receipt.

The illustrated personal diary and correspondence of Ernest Thompson Seton were donated to the Library by Mr. and Mrs. Joseph Cullman, 3rd. Takeda Chemical Industries contributed Tatsuo Kariyone's illustrated "Atlas of Medicinal Plants," and the bird reports of Captain James C. Scott, who was keeper of the Montauk Point Light on Long Island, New York, from 1891 to 1911, were given to the Library by the late Dr. Robert Cushman Murphy. Other gifts included titles from *Natural History* Magazine, the Natural History Press and Time Inc. A total of 695 monographs, 112 new serial titles, 15,930 serial issues and 3200 maps were added to the collection.

Of special interest is that the Library established an exchange of scientific publications with the Institute of Scientific and Technical Information, Peking, The Peoples Republic of China. Seven of the Institute's serials are now arriving; many of them are in European languages.

Lack of space, changes in Library procedures and new projects prompted Miss Nina J. Root to redesign the Library's physical layout. Current journals, which had shared space with the rare book collection, were moved into a newly-decorated and relighted Current Literature Room. The serials and cataloging sections were also relocated to improve work flow.

Plans for converting a suite of offices near the Library into a Rare Book Room have been completed, and a November 13 opening has been set. Generous gifts from the Bunbury Company, Inc., Summit, New Jersey, and Mrs. Alfred Lee Loomis, Jr., have provided the funds necessary for furnishing and equipping the room. A grant from the National Endowment for the Arts was received for designing a security system and air conditioning and humidity controls. The recently-donated "Seton Papers" will be included in the Rare Book Room's first exhibition.

A five-year grant of $117,500 from the Clark Foundation will enable the Library to restore its rarest books and to preserve a portion of the collection from further deterioration. In anticipation of the relocation of the rare book collection, Mrs. Elizabeth Whitman, a volunteer, has been preparing a catalog of the collection.

A grant from the National Science Foundation to restore and catalog the Museum's rare film collection was transferred to the Library for completion of the project. A rare film cataloging policy has been established by Miss Sheila Burns, and it is estimated that the completed rare film library will contain about 90 archival Museum films.

The readers' services section, which is concerned with circulation, reference and interlibrary loans, is under the direction of Miss Mildred Bobrovich. It continued to serve the scientific staff and the public at a rate comparable to previous years, although the section was understaffed. The Library circulated 62,451 items, served 9100 readers, searched 11,670 call slips, answered 7458 reference questions, supplied 26,150 Xerox pages and filled 3400 interlibrary loan requests. The contract with the New York State Library to fill interlibrary loan requests realized an income of $12,000.

A generous financial gift was made to the Library by Dr. Cyril F. dos Passos. The Library also shared in a bequest made by the late Dr. Libbie Henrietta Hyman.

Miss Mary V. Wissler, Senior Reference Librarian, retired after more than 35 years with the Museum. Mr. Kevin McShane was appointed Serials Librarian.

Nina J. Root, *Librarian*

PUBLICATIONS

Curator

Curator Magazine has completed publication of three numbers of Volume XIV and two numbers of Volume XV. With the help of a grant from the Museum Aid Program, and with reduced publication costs, *Curator* expects to become more viable economically. At the same time, an active effort to obtain more subscriptions and manuscripts has brought a wide varietry of articles in *Curator* to an increased audience of people concerned with all aspects of the museum profession.

Thomas D. Nicholson, *Editor-in-Chief*

Scientific Publications

The Office of Scientific Publications published a total of 44 articles by the scientific staff of The American Museum of Natural History communicating new discoveries, new ideas and vitally important modifications of old ones. Twenty-six numbers were printed in *American Museum Novitates,* seventeen articles in the *Bulletin of the American Museum* and one part in *Anthropological Papers.*

Included in this total were papers from Anthropology, 4; Entomology, 14; Herpetology, 5; Ichthyology, 4; Invertebrate Paleontology, 2; Mammalogy, 5; Ornithology, 5; Vertebrate Paleontology, 5. All articles were accompanied by line drawings and photographs providing a visual adjunct to the texts.

Based on the investigations of American Museum scientists and associates of the Museum, the three journals added to the literature descriptions of 76 new species and subspecies, eight new genera, one new superfamily and one new family.

Also brought to press were part 1 of a catalog of type specimens in the Ornithology Department, a mammoth illustrated key for use in identifying the mammals of Oaxaca and technically beautiful reproductions of outsize maps based on research of pre-glacial and glacial rocks and faunas of north-central Nebraska. Notable also were reproductions of photographs made with the scanning electron microscope by entomologists and invertebrate paleontologists and the report of underwater television use for study of coral reef fish communities in Bimini.

Florence Brauner, *Editor*

DEVELOPMENT AND COMMUNICATIONS

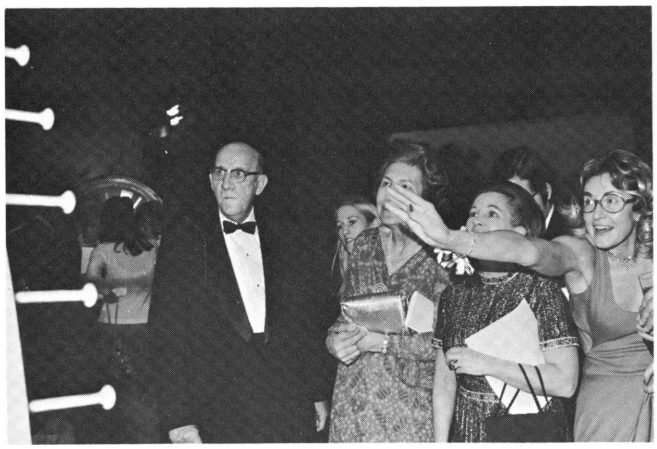
The interdependence of strong programs of development, communications and publishing has long been apparent, and this year these activities in the Museum were placed under the management of the Vice-President. Their coordination can be expected to generate increased revenue, a broader base of membership, a greater knowledge among constituents about what the Museum does, and increased opportunities to fulfill our mandate to bring information about natural history to the general public.

Development and Contributors

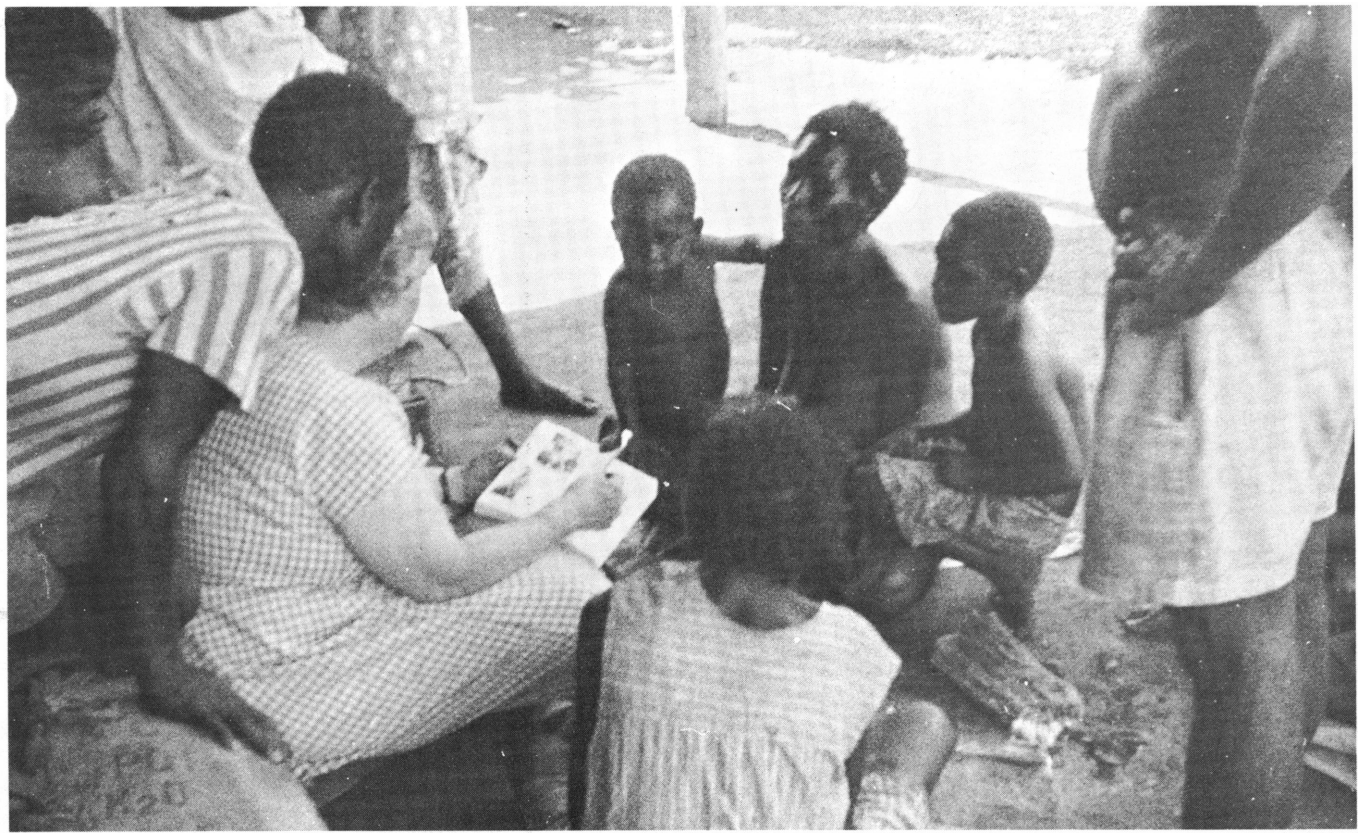
Most noteworthy was the execution of the Museum's first annual corporate drive, a campaign that raised $207,000 in new funds. Trustee Howard L. Clark, Chairman and Chief Executive Officer of the American Express Company, led the drive with the highly effective assistance of a committee of 36 business leaders. The drive's success was due in large part to their dynamic efforts, and to a vigorous attempt to bring the Museum's scientific programs to the attention of large companies. This introduc-

tion of firms with farsighted corporate giving programs to the Museum should be of benefit in multiple ways through the years. At first we were concerned that the corporations might be interested only in giving to those institutions whose programs make some immediate contribution to the field of the company's interest. It soon became apparent, however, that the chief executive officers and corporate giving directors had no difficulty in appreciating the Museum as a cultural and educational resource of the first magnitude or in identifying the importance of its basic research in the biological sciences. They agreed enthusiastically that the Museum as a national institution is making unique contributions to man's understanding of the

Games of chance with natural history themes were a popular feature at the Rites of Spring party on March 8. Here a guest urges a winning number out of the ornithology roulette wheel.



Dr. Margaret Mead shows descendants of the Alitoa Arapesh pictures of their grandparents, whom she studied 40 years ago in the West Sepik District, Papua New Guinea. The present generation lives at Hoskins Bay on New Britain, where Dr. Mead visited this year to observe lifestyle changes stemming from the move. She will discuss her work in a series of February lectures at the Museum.



What appears to be a frolic in the mud actually serves more serious purposes, according to a February article in *Natural History*. The women and girls of a village on Brazil's Paraiba River seek protection from the tropical sun and malarial mosquitos. They also catch small fish swimming in the watery ooze at the fall of the tide.

biological systems and human cultures on earth, and they gave generously to the annual corporate drive.

The annual giving program, which now includes the corporate drive, has been a continuing and valuable source of funds; during the year the combined programs brought in $751,000 for operating expenses. The Trustees raised $291,000 of this. The combined efforts of the Men's and Women's Committees (excluding Trustee members) generated $198,000, including $76,000 netted from the Rites of Spring. The annual corporate drive and miscellaneous sources accounted for the remainder. The success of the Rites of Spring and of the auction in the winter of 1971 point up the qualities of verve and imagination that the Men's and Women's Committees members bring to the Museum. They and other volunteers produce ideas, new friends and an enthusiasm that affects every project they undertake. The main purpose of the Men's and Women's Committees, however, is to produce revenue—now very badly needed—for the Museum. To this end the committees will be expanded and more effective programs of personal contact will be introduced.

Natural History Magazine

Natural History continues to be one of the most beautiful, lively and readable magazines in its field. Articles during the year have covered areas ranging from the South Pacific to the Arctic and from the ocean floor to above the treeline. And the subject matter also varied greatly, from the black widow to the black rhinoceros, and from pollution in ancient Rome to the uncertain future when scientists may prolong human life indefinitely.

Several articles about China appeared in *Natural History* during the year, beginning with a review of recent archeological finds (and some of the first color photographs of the artifacts published in the United States), and including several detailed descriptions of life on a farm commune and in Peking by columnist Arthur Galston. Articles on wildlife in cemeteries (which have been widely reprinted) and sidewalk fossils were part of an emphasis on urban natural history which will be continued in the fall with a special supplement on the importance of trees in cities.

Many changes occurred in the editorial and publishing staff during the year. The strengthening of the organization contributed to the successful year just completed and a favorable outlook for coming months.

Both advertising and membership increased. The former rose by approximately 22 percent in pages over the prior year and average membership increased by approximately five percent, reaching 308,000 with the May issue. This growth, as well as an intensive effort to control and reduce expenses, had the effect of producing a significant return from the Museum's associate membership program. The associate membership program, after providing *Natural History* magazine as a major benefit, made a substantial contribution to the Museum for the support of its many other programs.

Public Affairs

Public Affairs, in which the functions of Guest Services and Public Relations were combined at the beginning of the fiscal year, worked at strengthening the Museum's communications and services to the public, both externally and internally. The Museum staff appeared on network and local television programs, in magazines and in newspapers. Wire service distribution of stories and photographs led to hundreds of placements in newspapers

Advertisements for the Museum appeared in a number of national magazines; this one calls attention to research in herpetology, which is being conducted by Dr. Charles W. Myers, Associate Curator.

throughout the country, and excellent stories continued to appear frequently in *The New York Times* and the *Daily News.* Museum activities in the fall and winter—such as the opening of the People Center, the acquisition of a large arachnid collection, the opening of several popular exhibitions and the duplication of a *Stegosaurus* skeleton—generated good media coverage during the annual corporate drive.

The staff of Guest Services was occupied with the detailed planning and coordination of numerous special events, many of them involving food service. The cafeteria served approximately 423,000 meals and snacks. The difficult logistics of feeding a daily average of some 1900 visiting pupils in the new school lunchrooms were managed smoothly. Information was provided to thousands of tourists and other potential visitors by means of the automatic telephone service, the bi-monthly *Calendar of Events* and the general information flyer.

Although the Museum has had good success with individual efforts at institutional advertising in the past, this year it launched a campaign—connected with the annual corporate drive—to use several segments of the mass media simultaneously. With the cooperation of the American Express Company and the creative assistance of Ogilvy & Mather, a series of Museum advertisements were placed in a large number of influential national magazines and another series of taped messages were placed on local radio stations. Plans are now under way to continue those campaigns and to produce television spot commercials as well as bus and train poster advertising.

Public Affairs assisted the Deputy Director for Research in calling the attention of potential visiting investigators to the Lerner Marine Laboratory. In addition to putting out an information brochure and two issues of the *Lerner Marine Laboratory Newsletter,* the office contacted a large number of marine biologists and thereby increased the *Newsletter's* mailing list to include the names of more than 5000 scientists.

Membership

The coordination of the communications and fund raising programs should have a beneficial effect on many Museum activities and perhaps most especially on membership. It is hoped to expand the corps of dedicated special (higher class) members and the large body of Associate Members who subscribe to *Natural History* in ways that will strengthen their relationship with the Museum. During the year a successful program was launched to enlist weekend visitors to the Museum as members. An active program of events for members and their children was continued.

The successes of the annual corporate drive, other development activities and *Natural History* have not, unfortunately, closed the gap between Museum expenses and income. However, the Museum was able last year to reduce to $625,000 the prior year's budgetary deficiency of $907,000. Closing the gap between Museum expenses and income is a constant challenge; a substantial deficit is again budgeted for fiscal 1974-1975. This Annual Report is a chronicle of what was accomplished during the year; the existing deficit and prospects for increased expenses might generate a long list of what was *not* accomplished. Parts of the collections cannot be studied, groups of people who could benefit from learning about natural history go untaught, and the long-term program for building spectacular new exhibition halls is necessarily delayed. Next year's annual corporate drive and general development campaign will be specifically aimed at the remedy of these problems.

David D. Ryus, *Vice-President*

ADMINISTRATION

Plant Operation, Maintenance and Construction

The Museum complex consists of 20 buildings with more than one million square feet of floor space. In spite of this fact, the need for additional space for exhibition, offices or laboratories, storage and service areas continues to be the most vexing problem. In the past year several steps were taken to remedy some of the Museum's storage difficulties. The basement of Building 1A, which was formerly a partly enclosed garage, has been enclosed, heated, lighted and fitted as a storage space for the fossil fish collection. This important improvement was made possible by a grant from the Richard King Mellon Foundation. That same grant allowed for the construction of a temperature and humidity controlled storage area for textiles, furs and skins in the anthropology collections.

When the Museum closed its heating and generating plants several years ago and began purchasing steam and electricity from Consolidated Edison the old generator room was assigned as storage space for large specimens in the mammalogy collections. The problem was that the entrance to the generator room was not large enough

A frog that can make you croak.

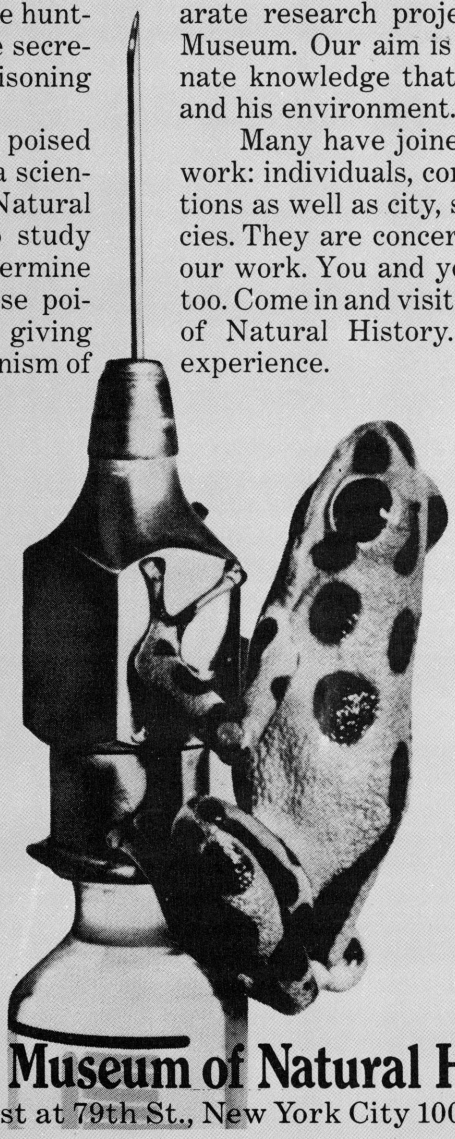
(It may someday save your life.)

The gaudy little polka-dotted creature below is a "poison-dart" frog from the tropical jungles of Panama. For such an eye-catching morsel, he has developed an amazing protective device to help ensure his survival. When frightened or touched by a predator, he secretes a powerful nerve poison from the skin. Primitive native hunters still use related species that have secretions more deadly than curare for poisoning their blowgun darts.

So why is the "poison-dart" frog poised on our hypodermic needle? Because a scientist from The American Museum of Natural History is collecting these frogs to study their biology and evolution and to determine the variety of poisons present. These poisons are chemically unique and are giving medical scientists clues to the mechanism of nerve transmission. This information is relevant not only in human neurology but also in other important areas of medical research.

Poison-dart frogs are only one concern of the many scientists who work behind the scenes at The American Museum of Natural History. Last year there were over 300 separate research projects under way at the Museum. Our aim is to collect and disseminate knowledge that will help protect man and his environment.

Many have joined us in supporting this work: individuals, corporations, and foundations as well as city, state, and federal agencies. They are concerned with the results of our work. You and your company should be too. Come in and visit The American Museum of Natural History. It's an unforgettable experience.



The American Museum of Natural History

Central Park West at 79th St., New York City 10024

to accommodate the items to be stored; this year that problem was solved by replacing one of the large windows in the generator room with a roll up steel door. A five-ton chain hoist was then installed to lift large heavy items into the new storage area. The area now conveniently houses the Mammalogy Department's collection of cetacean bones, including several huge whale skulls.

This year also saw the completion of the new executive offices on the third floor. They provide space for the Director, Deputy Director for Administration, Controller and their supporting staffs.

The program to improve the acoustic qualities of the exhibition halls so that they may be used more effectively for teaching was extended to the Hall of Late Mammals, the Hall of Asian Mammals and some of the corridors in the Roosevelt Memorial Building where acoustical ceiling tiles were installed. This continuing program of acoustical treatment has been made possible from funds received several years ago from the Museum's late Trustee, Harold Boeschenstein.

The need to improve the fire security has long troubled the Administration. During the year installation was begun on smoke and rate-of-temperature-rise detectors in offices, laboratories and collection storage areas, as the first phase in a program which will eventually cover all parts of the Museum. Construction of a fully enclosed emergency fire stairs and an elevator connecting Buildings 4, 6 and 8 on the Columbus Avenue end of the complex are underway. Installation of new standpipes and hose racks in Buildings 1 and 1A has also started. These fire protection projects have been funded through the capital budget of the City of New York.

Controller

During the past year and a half the Controller has reviewed the financial statements, internal reporting system and procedures, auditing programs and bookkeeping procedures of the Museum. As a result of this review, some of the financial statements and internal report procedures have been refined to yield more information on a more timely basis; the internal auditing program has been expanded to include the payroll, cashiering and voucher payable operation; the bookkeeping procedures have been refined to improve the processing of payroll and voucher payments; the payroll, consisting of more than 600 full time and 150 part time employees, was fully automated through Service Bureau Operation on January 1 and now provides the Museum with a timely and detailed analysis of both payroll and social benefits; and the voucher payable operation has been refined so that vouchers are now audited by the Controller's office and payment has been expedited.

Further changes are contemplated in connection with financial statements and internal reports. These changes, however, will be introduced gradually, over the next two to four years, as we introduce new automated record keeping machines and techniques.

Personnel Office

The Museum employs approximately 750 persons including permanent, term and temporary employees on either a full or part-time basis. During the past year there was an increase of more than 50 percent over the average hiring rate of the previous years. Two hundred and sixty-one new employees came to work and 223 new employees including 29 retirees terminated. The employment function also has been enlarged as a result of affirmative recruiting and placement action taken by the Museum as an equal opportunities employer.

In this time of increasing and frequently changing government regulations affecting both employer and employee, the Personnel Office has had, as one of its major activities, the interpretation, communication of and adherence to statutory requirements relating to discrimination, wages and hours, wage control, labor relations, employment of veterans, occupational safety and other city, state and federal legislation. A continuing evaluation of Museum policies, procedures and practices in these areas was introduced and a number of changes have been implemented to help assure Museum compliance with legal requirements and government guidelines.

The establishment of the Frederick M. Warburg Scholarship Fund has enabled the Museum to initiate a tuition support program, to encourage employees who wish to expand their skills and qualifications for Museum employment. Although the number of applicants for this program which was initiated in September was small, the breadth of the courses taken and passed by those individuals who participated covered a wide range from high school equivalency test preparation to courses included in a Master's degree program.

Several departments that heretofore had not requested Urban Corps Interns participated in the program this year. This may account for the six percent increase in the number of students assigned to

To complement the existing attendant guard force, a closed circuit television surveillance system, equipped with zoom lenses, was installed in eight areas of the Museum. The new system has improved security in public areas and helped control visitor traffic flow.

the Museum last summer and during the academic year as compared with the last year.

Building Services

A central security control room has been constructed near the Building Services office. One of the principal features of the room is a closed circuit television surveillance system that will be used to monitor eight key areas in the Museum complex. This system is expected to provide an additional measure of security and improved crowd control and visitor traffic flow throughout the Museum. Because of the pan tilt and zoom features that a number of the cameras have, a considerable amount of the Museum complex can be viewed within the limitations of the small number of cameras which have been installed.

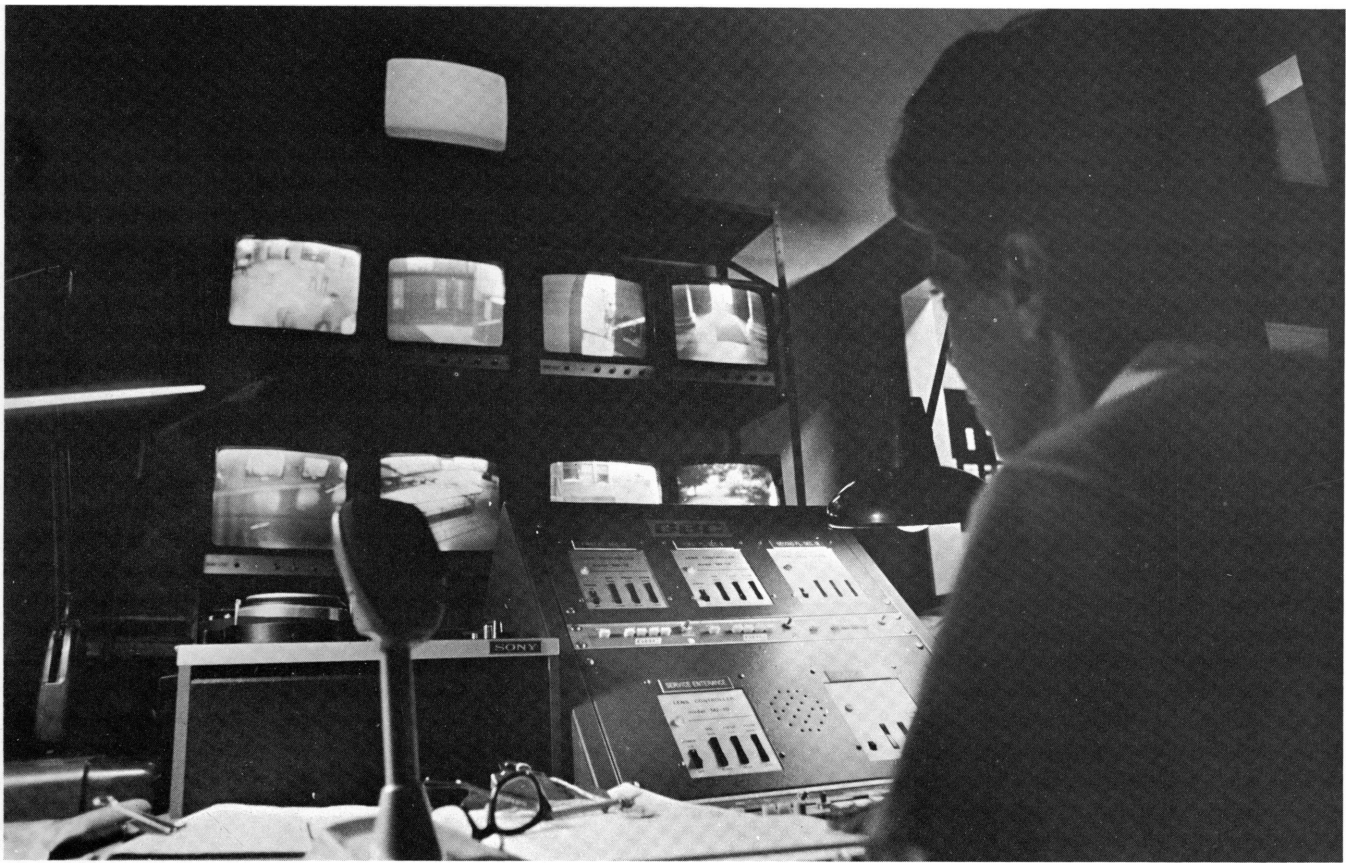
The security control room will also house the Museum's intrusion alarm systems, the new fire detection alarm system, the base station for the Museum's two-way radio communications system and the Museum's public address system. It will be operated on an around-the-clock basis every day of the year.

Museum Shop

The new Junior Shop has been operating in the basement of the Roosevelt building near the subway entrance and new school orientation and eating area. The new location and the self-service method of merchandising have proven successful particularly in the handling of sales to young visitors in school classes. The shift of the sales from the Seventy-seventh Street Foyer to the Roosevelt basement has also reduced the congestion and noise level that had previously existed in the Seventy-seventh Street selling area. The Museum Shop continues to provide imaginative and attractive gifts in the natural science and anthropological areas.

Photography

The Museum's print and color transparency collection includes more than a half million items. This



During Roy Chapman Andrews's Central Asiatic Expedition of 1928 photographer J.B. Shackelford took this picture of Mongolian women listening "to a concert on our electric victrola." Such archival photographs are being restored and copied on safety film.

year, publishers of trade textbooks, encyclopedias and other publications paid the Museum for the right to reproduce some 1500 items. Universities, high schools, elementary schools, museums and individuals purchased 3700 black and white prints and more than 15,000 color slides copied from the files. Through the generosity of a number of friends of the Museum some 3400 new color transparencies were added to the collection.

Many of the film negatives are quite old and some were found to have been made on nitrate stock which disintegrates with age and can become hazardous. The National Endowment for the Arts awarded a $16,000 grant to replace approximately 35,000 black and white nitrate negatives with contact prints and copy negatives on safety film. The photographs which will be preserved under this restoration project include those taken on expeditions to Mongolia, Africa and the Arctic and Antarctic by Roy Chapman Andrews, Osa and Martin Johnson, Carl Akeley, Ronald Amundsen, Lincoln Ellsworth, Admiral Byrd, Commander Peary and others.

As a result of their investigation into the possible ways of converting the nitrate negatives, two members of the Photography staff, Mr. Arthur Singer and Mr. James Coxe, participated with Kodak in the testing of a new direct duplicating film. This film is designed for making duplicates from conventional black-and-white-tone negatives or positives with one exposure and normal processing.

Charles A. Weaver, Jr.,
Deputy Director for Administration

ATTENDANCE

During the year, 1,945,435 persons visited the Museum and 484,451 (including 458,004 paid admissions) visited the Planetarium, making a total attendance of 2,429,886.

TREASURER'S REPORT

Summaries of the Museum's financial operations for the current year and of its financial condition at the close of business on June 30, 1973 are contained in the statements on the following pages. These statements were examined and reported upon by the firm of Coopers and Lybrand.

Fiscal operations in 1972-73 are summarized in the Statement of Income and Expenses of Current Funds on page 48. The statement identifies separately those funds which were available and used for general operating purposes (General Fund) and those which were restricted to and used for special purposes (Special Funds). The total of these funds, also shown, represents all expenditures incurred last year to carry out the operations and objectives of the Museum. Expenses for the year were $12,378,851; income came to $11,753,668.

The excess of expenses over income of $625,183 reflects a deficit in the General Fund of $251,233 (against expenditures of $8,570,185) plus a deficit in Special Funds of $373,950 (against expenditures of $3,808,666). These are further affected by transfers between funds, authorized by the Board of Trustees, as shown in the Statement of Changes in Fund Balances on page 46. The final deficit in the General Fund is $234,918, compared to $907,463 in the prior year. With respect to Special Funds, the deficit for the current year's operation and the balance available after transfers between funds represent activities that are carried on within the fiscal year with funds that are, in some cases, reserved from prior years or that may continue to be funded in future years.

The excess of expenses over income in Special Funds has been met by a transfer from restricted Endowment Funds. The deficit in the General Fund account will be financed by transfers from unrestricted endowment during the following year. The reduction in deficit resulted principally from expense controls and from the substantial success of continuing and new efforts to raise funds for operating purposes.

Current Funds expenses for the year were held to an increase of $317,475 from the prior year. This is an increase of about 2.6 percent, and it should be measured against the considerably greater rate of increase in costs for goods and services that was the experience in the general economy for the same period. The disposition of operating funds (see following charts) shows that 46 percent was directed toward support of education, exhibition and scientific research. Plant operation represented 15 percent and administration 11 percent of expenses. These percentages were virtually the same in 1971-72.

Current Funds income during 1972-73 increased by $1,334,224. This increase included support allocated for special purposes and support available for general purposes. Noteworthy with respect to the latter were a substantial increase in individual and corporate contributions, a special grant from the New York State Council on the Arts to assist in meeting the General Funds deficit, income from the fund-raising event "The Rites of Spring," and an increase in Museum membership income. The support appropriated by the City of New York to the General Fund included an adjustment for retroactive wage increases paid to employees during the fiscal year.

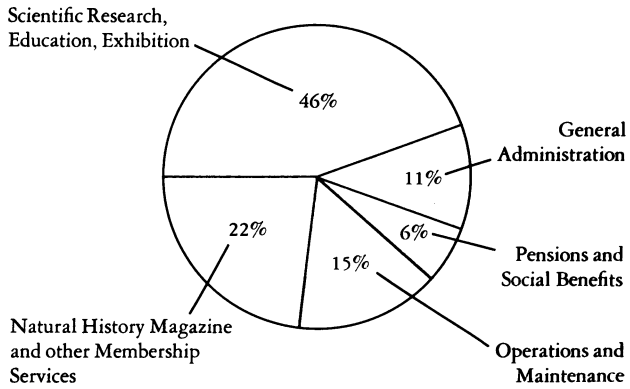
Turning from operations to the Museum's Endowment in 1973, there was a net increase in Endowment Funds book value of $1,021,955 (see Statement of Changes in Fund Balances, page 46). However, the market value of Endowment Fund investments which stood at $51,697,669 on June 30, 1973, declined by $6,839,331 from the market value at June 30, 1972, reflecting security market trends during the year.

Faced with the general problems associated with an inflationary environment and sharply fluctuating values of its investments, the Museum continues to plan its operations and fiscal requirements for the near future with conservatism. This is reflected in conscious efforts to assess programs and their cost-effectiveness, continuing restrictions and evaluation of employment levels and careful control of expenditures. While these measures have not materially affected basic Museum functions, they have resulted in the consolidation of some activities, the elimination of certain service operations, and a reduction in employment through normal attrition.

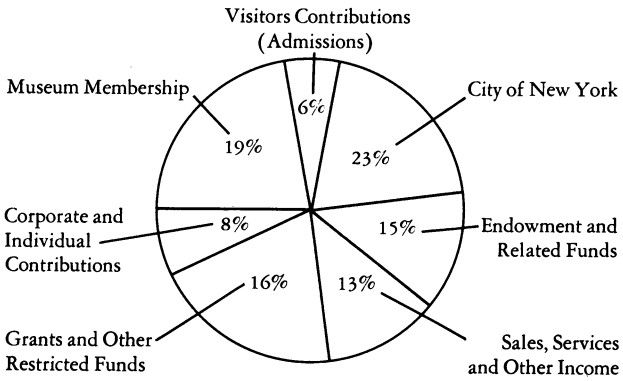
More optimistically, the growth and success of continuing and new revenue producing efforts have assisted materially in meeting rising costs and reduced endowment yields. These efforts include discretionary admission fees contributed by visitors, individual and corporate contribution campaigns, grants from private and governmental agencies, and membership promotion. The continued development of these and other sources of funds will be an important element in our ability to cope with the financial needs of future years.

Frederick A. Klingenstein,
Treasurer

Total Expenses: $12,378,851
(Year ending June 30, 1973)



Total Income: $11,753,668
(Year ending June 30, 1973)



Deficit: $625,183

AUDITORS' REPORT

The Board of Trustees,
The American Museum of Natural History,
New York, N. Y.

We have examined the balance sheet of THE AMERICAN MUSEUM of NATURAL HISTORY as of June 30, 1973, the related statements of income and expense of current funds and changes in funds for the year then ended. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances. We previously examined and reported upon the financial statements for the year ended June 30, 1972.

In our opinion, the aforementioned financial statements present fairly the financial position of The American Museum of Natural History at June 30, 1973 and 1972 and the results of its operations for the years then ended, in conformity with generally accepted accounting principles applied on a consistent basis.

Coopers & Lybrand

1251 Avenue of the Americas
New York, New York
August 24, 1973.

FINANCIAL STATEMENTS AS OF JUNE 30, 1973 AND 1972

THE AMERICAN MUSEUM OF NATURAL HISTORY

ASSETS:	Current Funds	
	General Fund	Special Funds
Cash:		
Demand deposits	$ 27,675	$ 503,332
Time deposits	1,413,827	995,746
Receivable from sale of securities		
Accounts receivable, less allowance for doubtful accounts of $45,239 in 1973 and $22,182 in 1972	427,537	36,985
Due from City of New York	127,385	
Due from other funds	12,072	378,938
Investments in marketable securities (Notes 1 and 2)		9,398
Planetarium Authority bonds (Note 3)		425,000
Museum shop inventory, at cost	176,667	
Prepaid expenses	127,002	
	$2,312,165	$2,349,399

LIABILITIES AND FUNDS:		
Accounts payable and accrued liabilities	$ 456,216	$ 294,242
Payable for securities purchased		
Due to other funds	7,321	
Unearned membership income (Note 1)	2,083,546	
Funds:		
General Fund (deficit)	(234,918)	
Special Funds (Note 4)		2,055,157
Endowment Funds (Note 5)		
Pension Fund (Note 6)		
Frick Employees Retirement Fund		
	$2,312,165	$2,349,399

BALANCE SHEETS, JUNE 30, 1973 AND 1972

1973			
Endowment Funds	Pension and Frick Employees Retirement Funds	Total	1972 Total
$ 693,586	$ 58,933	$ 1,283,526	$ 1,064,044
390,000		2,799,573	2,143,637
99,975	36,720	136,695	356,673
		464,522	422,780
		127,385	517,220
	7,321	398,331	916,208
51,597,689	8,398,560	60,005,647	62,299,977
		425,000	425,000
		176,667	152,650
		127,002	130,488
$52,781,250	$8,501,534	$65,944,348	$68,428,677
		$ 750,458	$ 799,724
$ 113,122	$ 37,738	150,860	432,774
391,010		398,331	916,208
		2,083,546	1,840,154
		(234,918)	(907,463)
		2,055,157	1,823,170
52,277,118		52,277,118	51,255,163
	7,953,576	7,953,576	11,774,877
	510,220	510,220	494,070
$52,781,250	$8,501,534	$65,944,348	$68,428,677

The accompanying notes are an integral part of these financial statements.

STATEMENTS OF CHANGES
FOR THE YEARS ENDED

	Current	
	General Fund	
	1973	1972
Balance (deficit), beginning of year	($907,463)	($527,553)
Additions:		
Gifts, bequests and grants		
Interest and dividend income		
Net profit (loss) on sales of investments		
Other income		
Total additions		
Deductions:		
Excess of expenses over income, as annexed	251,233	883,572
Payments to pensioners and beneficiaries		
General administrative expenses		
Past service contributions to CIRS (Note 6)		
Total deductions	251,233	883,572
Transfers between funds:		
Financing of:		
1972 General Fund deficit	907,463	527,553
Special Funds activities		
Other	16,315	(23,891)
Total transfers	923,778	503,662
Balance (deficit), end of year	($234,918)	($907,463)

IN FUND BALANCES
JUNE 30, 1973 AND 1972

Funds					
Special Funds		Endowment Funds		Pension and Frick Employees Retirement Funds	
1973	1972	1973	1972	1973	1972
$1,823,170	$1,513,275	$51,255,163	$50,038,769	$12,268,947	$12,523,272
		1,143,123	1,284,084		
				332,252	477,693
		1,448,917	1,598,168	715,154	(140,997)
				30,371	6,674
		2,592,040	2,882,252	1,077,777	343,370
373,950	758,360				
				551,515	573,614
		108,049	93,941	51,780	24,081
				4,211,954	
373,950	758,360	108,049	93,941	4,815,249	597,695
		(907,463)	(527,553)		
542,501	1,068,255	(542,501)	(983,733)		
63,436		(12,072)	(60,631)	(67,679)	
605,937	1,068,255	(1,462,036)	(1,571,917)	(67,679)	
$2,055,157	$1,823,170	$52,277,118	$51,255,163	$ 8,463,796	$12,268,947

The accompanying notes are an integral part of these financial statements.

STATEMENTS OF INCOME AND EXPENSES OF CURRENT FUNDS FOR THE YEARS ENDED JUNE 30, 1973 AND 1972

	1973			
	General Fund	Special Funds	Total	1972 Total
Income:				
Appropriation from the City of New York	$2,695,593		$ 2,695,593	$ 2,476,543
Gifts, bequests and grants	880,197	$1,915,818	2,796,015	2,278,844
Interest and dividend income	1,419,752	343,154	1,762,906	1,727,846
Visitors contributions		725,485	725,485	530,359
Museum membership	2,289,904		2,289,904	2,036,001
Other income	1,033,506	450,259	1,483,765	1,369,851
Total income	8,318,952	3,434,716	11,753,668	10,419,444
Expenses:				
Educational activities	2,278,615		2,278,615	2,092,423
Exhibition halls and exhibits		604,314	604,314	658,944
Natural History Magazine	2,778,355		2,778,355	2,643,205
Other special purposes program and projects		2,790,957	2,790,957	2,786,754
General administrative expenses	1,034,316	284,230	1,318,546	1,267,917
Plant operating and maintenance expenses	1,898,822		1,898,822	1,887,135
Pension and other social benefit expenses (Note 6)	580,077	129,165	709,242	724,998
Total expenses	8,570,185	3,808,666	12,378,851	12,061,376
Excess of expenses over income	($ 251,233)	($ 373,950)	($ 625,183)	($ 1,641,932)

The accompanying notes are an integral part of these financial statements.

NOTES TO FINANCIAL STATEMENTS

1. The land and buildings utilized by the Museum (most of which are owned by the City of New York), fixed assets (which are charged off at time of purchase), exhibits, collections and the library are not reflected in the balance sheet.
   Purchased investments are recorded at cost and investments acquired by gift or bequest are recorded at market quotations at the dates of acquisition.
   A portion of membership dues is allocated to Natural History Magazine and recognized as income ratably over the membership term.

2. Cost and market quotation of investments at June 30, are as follows:

	1973		1972	
	Cost	Market	Cost	Market
Special Funds	$ 9,398	$ 10,000	$ 9,584	$ 10,000
Endowment Funds	51,597,689	51,697,669	50,152,793	58,537,000
Pension and Frick Employees Retirement Funds	8,398,560	8,268,943	12,137,600	13,567,000
Total	$60,005,647	$59,976,612	$62,299,977	$72,114,000

   The Museum's investments consist of the following:

	1973		1972	
	Cost	Market	Cost	Market
Bonds	$18,481,143	$17,066,689	$21,580,241	$21,173,410
Preferred stock	1,064,582	1,059,375	1,522,760	1,410,975
Common stock	40,459,922	41,850,548	39,196,976	49,529,615
	$60,005,647	$59,976,612	$62,299,977	$72,114,000

3. The investment in bonds ($570,000 principal amount) of The American Museum of Natural History Planetarium Authority is carried at cost. The financial statements of the Planetarium, which is operated under the supervision of the Museum, are annexed. Interest income of $25,650 received from the Planetarium in each of the years ended in 1973 and 1972 is included in other income of the general fund.

4. The balances at June 30, 1973 and 1972 of special funds (funds which are received or appropriated for specific purposes) are net of overdrafts of certain of these funds of approximately $488,000 and $217,000, respectively. These overdrafts represent expenditures in anticipation of transfers from endowment funds or receipt of gifts and grants.

5. Endowment funds (including funds functioning as endowment funds) are summarized as follows:

	June 30	
	1973	1972
Endowment funds, income available for:		
Restricted purposes	$22,871,247	$22,909,433
Unrestricted purposes	8,839,443	9,014,603
Funds, functioning as endowment, principal and income available for:		
Restricted purposes	3,456,375	3,464,801
Unrestricted purposes	17,110,053	15,866,326
	$52,277,118	$51,255,163

6. Effective July 1, 1971 active employees of the Museum were transferred from the Museum's pension plan to the Cultural Institutions Retirement Systems Pension Plan (CIRS). The Museum agreed to contribute $5,294,730 to CIRS, representing the past service cost applicable to such employees, of which $4,034,666 was paid in November 1972 and the balance, including interest, to be contributed over a period of 22 years in equal annual installments of $88,056. Employees who retired prior to June 30, 1971 or their beneficiaries, will continue to receive benefits from the Museum's pension funds.
   In April 1973, the Management Board of the Museum designated that the pension fund be divided into an "A" fund, equal in amount to the present value of the actuarial liability for pensions due to retired employees, and a "B" fund, consisting of the balance of the pension fund. At June 30, 1973, the "A" fund amounted to $4,671,297 and the "B" fund to $3,282,279. Each year an amount equal to five per cent of the average balance of the "B" fund is to be used to fund the amortization of the past service liability to be paid to CIRS and certain other related expenses and any remainder of such five per cent is to be transferred to the general fund as a reimbursement of the normal cost of the CIRS plan.
   Normal cost of the CIRS plan was approximately $312,000 and $400,000 for fiscal 1973 and 1972, respectively. In addition, $176,112, representing annual amortization of past service costs for fiscal 1973 and 1972, was remitted to CIRS in 1973.

7. Certain reclassifications have been made in the 1972 financial statement to conform such statements to presentations adopted in 1973.

THE AMERICAN MUSEUM
PLANETARIUM
BALANCE SHEETS,

ASSETS:	1973	1972
Cash:		
Demand deposits	$ 272,819	$ 116,292
Time deposits	27,905	102,761
Accounts receivable	10,417	4,657
Inventory, publications and souvenirs, at cost	26,918	33,178
	338,059	256,888
Equipment, fixtures, etc. (Note 1):		
Zeiss planetarium instrument, at cost	221,928	221,928
Less, Allowance for depreciation	41,615	30,515
	180,313	191,413
Furniture, fixtures and equipment	1	1
	180,314	191,414
Buildings, at cost (Notes 1 and 4)	784,788	596,136
	$1,303,161	$1,044,438

OF NATURAL HISTORY
AUTHORITY
JUNE 30, 1973 AND 1972

LIABILITIES:	1973	1972
Accounts payable	$ 122,562	$ 78,139
4½% Refunding Serial Revenue bonds, past due (Note 3)	570,000	570,000
Accrued interest, past due	315,450	315,450
	1,008,012	963,589
CONTRIBUTED CAPITAL, FUNDS AND DEFICIT (Note 6):		
Contributed capital:		
Charles Hayden	156,869	156,869
Charles Hayden Foundation (Note 4)	429,455	379,455
Perkin Fund (Note 4)	300,000	100,000
	886,324	636,324
Trust Agreement Fund	2,500	2,500
Guggenheim Foundation Fund (Note 2)	30,313	32,001
Deficit, as annexed	(623,988)	(589,976)
	295,149	80,849
	$1,303,161	$1,044,438

The accompanying notes are an integral part of these financial statements.

STATEMENTS OF INCOME, EXPENSES AND DEFICIT
FOR THE YEARS ENDED JUNE 30, 1973 AND 1972

	1973	1972
Income:		
Admission fees, less allowances and commissions	$426,886	$453,835
Auxiliary activity, sales booth	83,867	77,965
Special lectures and courses	34,297	30,083
Miscellaneous	47,237	7,498
Total income	592,287	569,381
Expenses:		
Preparation, presentation and promotional	255,931	261,208
Operation and maintenance	180,008	171,240
Auxiliary activity, sales booth	69,687	68,650
Administrative and general	27,884	31,209
Pension fund, social security and other employee benefits (Note 5)	56,039	67,608
Total expenses	589,549	599,915
Income (loss) before interest and depreciation	2,738	(30,534)
Interest on past due 4½% Refunding Serial Revenue bonds	(25,650)	(25,650)
Provision for depreciation (straight-line method) (Note 1)	(11,100)	(11,096)
Net income (loss) for year	(34,012)	(67,280)
Deficit, beginning of year	589,976	522,696
Deficit, end of year	$623,988	$589,976

The accompanying notes are an integral part of these financial statements.

NOTES TO FINANCIAL STATEMENTS

1. The Planetarium's corporate charter terminates when all its liabilities, including bonds, have been paid in full or otherwise discharged. At that time, its personal property passes to The American Museum of Natural History and real property to the City of New York to be maintained and operated in the same manner as other city property occupied by the Museum. The land utilized by the Planetarium was donated by the City of New York.

   The policy of the Planetarium is to capitalize only major additions and replacements of equipment, machinery and other plant items and to depreciate such items over their useful lives. Fully depreciated assets are carried at nominal value. Because of the nature of the ownership of the property, provision for depreciation of the building is considered unnecessary.

2. In fiscal 1972, the Daniel and Florence Guggenheim Foundation contributed $188,000 to establish and maintain a space theatre at the Planetarium to replace the Copernican Theatre. Through June 30, 1973, $157,687 has been expended on this project.

3. The Planetarium Authority bonds were purchased by The American Museum of Natural History in 1948. The Charles Hayden Foundation contributed $200,000 to the Museum toward the purchase of such bonds.

4. During fiscal 1973, the Planetarium began construction of a new wing. The cost of this project is estimated at $460,000, of which $215,000 was expended in fiscal 1973. This project is to be principally financed by contributions of $50,000 from the Charles Hayden Foundation, received in 1973, and $400,000 from the Perkin Fund, of which $100,000 was received in 1972, $200,000 in 1973 and $100,000 is expected to be received in 1974.

5. The Planetarium and its employees participate in the Cultural Institutions Retirement Systems Pension Plan. Pension expense for fiscal 1973 and 1972 was $26,997 and $38,877, respectively.

6. Changes in contributed capital and funds were as follows:

	Guggenheim Foundation Fund	Charles Hayden Foundation	Perkin Fund
Balance, July 1, 1971		$379,455	
Contributions	$188,000		$100,000
Expenditures	(155,999)		
Balance, June 30, 1972	32,001	379,455	100,000
Contributions		50,000	200,000
Expenditures	(1,688)		
Balance, June 30, 1973	$ 30,313	$429,455	$300,000

There was no activity in other contributed capital or fund accounts in 1973 or 1972.

AUDITORS' REPORT

The Members of The American Museum of
Natural History Planetarium Authority,
New York, N. Y.

We have examined the balance sheet of THE AMERICAN MUSEUM of NATURAL HISTORY PLANETARIUM AUTHORITY as of June 30, 1973 and the related statement of income, expenses and deficit 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. We previously examined and reported upon the financial statements for the year ended June 30, 1972.

In our opinion, the aforementioned financial statements present fairly the financial position of The American Museum of Natural History Planetarium Authority at June 30, 1973 and 1972 and the results of its operations for the years then ended, in conformity with generally accepted accounting principles applied on a consistent basis.

Coopers & Lybrand

1251 Avenue of the Americas
New York, New York
August 24, 1973.

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