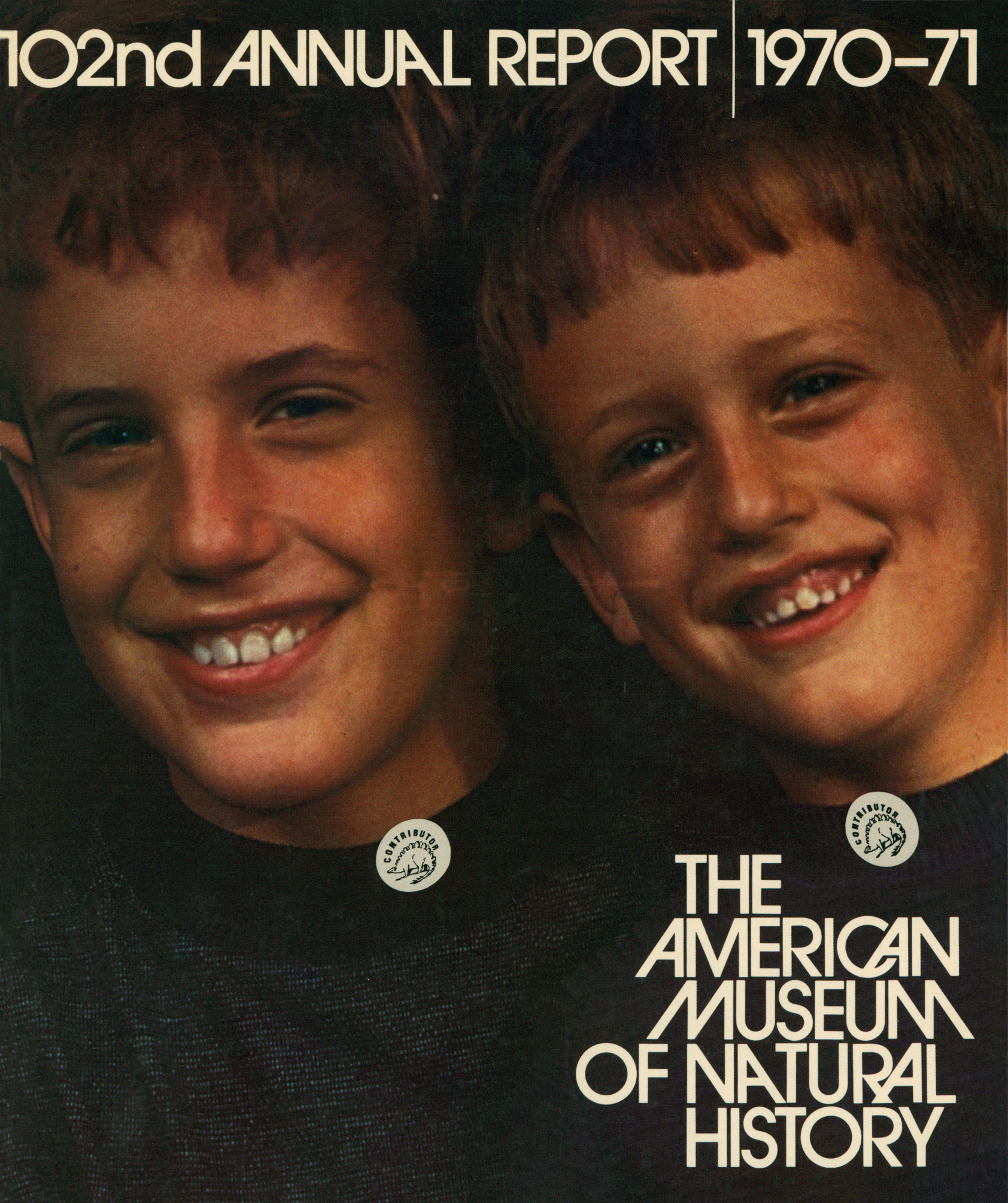
102nd ANNUAL REPORT | 1970–71



THE AMERICAN MUSEUM OF NATURAL HISTORY

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102nd ANNUAL REPORT/JULY 1970, THROUGH JUNE 1971/THE CITY OF NEW YORK

ONE-HUNDRED-AND-SECOND 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

Traditions are useful as long as they are flexible and thus the facts of life being what they are, the Museum this past April departed from its century-old tradition of free admission. It is now required that visitors make a contribution on admission, discretionary in amount, in an effort to increase public support for all programs and to make it possible for us to carry on for the benefit of all the people of New York City and the country.

With several million visitors a year, the Museum spends more than $2 per visitor, but income—from public and private sources—provides only about $1.50 per visitor. We are suggesting that our visitors contribute an amount on admission that will help bridge this gap between costs and income. Of course we do not expect that the new policy will close the budget gap, but in the face of continually rising costs we must try to keep it within bounds. We need this broad support from the public to help in doing so.

In the past few years there has been a tremendous increase of public interest in the environment, in human cultures, in outer space and in biological relationships—all subjects on which the Museum has long been an authoritative interpreter. There have been many more visiting scientists, many more education programs, and many more pressures to maintain existing exhibitions and to build new ones. Unfortunately, we suffer from the same financial pressures that afflict most large public institutions, and so we continue to seek more income and more public support.

In last year's annual report I reminded our friends that the Museum had embarked on an effort to raise $25,000,000 and, at that time, I appealed for your support. You have been generous and I am happy to say that the amount raised has gone in the last year from $7,000,000 to $11,200,000.

A university acts in many ways as a repository for books, but the books must have interpreters who collate knowledge of the past for the use of the present. A natural history museum acts as a repository for a collection of specimens from the natural world, gathered (in our case, over a period of 102 years) and presided over by a staff of curators and their assistants, who interpret the collections for the benefit of students, visitors and the larger public. One task of science is to advance the understanding of the world we live in. One of the most marvelous and puzzling aspects of this world is the extraordinary diversity of living beings from bacteria and other one-celled organisms to whales, elephants, and, ultimately, man. The branch of science that describes this diversity, and attempts to unravel the secrets of its origin and meaning, is systematics. Since the presence of adequate collections is an indispensable prerequisite of all systematic studies, it is only in natural history collections that systematics can be cultivated.

The scientists who conduct research in systematics are by necessity obliged to perform a dual function. They are systematic biologists in their research, but they also have the obligation to maintain the collections of the institution with which they are associated. In principle this is not very different from the obligation of the experimental scientist to maintain his instruments in excellent working order. Likewise, just as the astronomer has technical assistants who are charged with the maintenance of his telescopes and with the development of his photographic plates, so does the systematic biologist have technical assistants for the purely maintenance aspects of curating, such as cataloging, labeling, and prevention of deterioration through insect pests and mold.

The task of the curator is better understood if a few additional words are said about the functions of natural history museums. As stated above, by necessity there is no other place in the world where systematic research can be carried out except in a museum (broadly defined). If the museums were to default on their obligations, it would be the end of systematic biology. The availability of collections is a necessity for work in this field. Only a small part of such material can be and should be exhibited. A visitor touring all our public areas would see only a tiny percentage of the collection of our sixteen million specimens and artifacts.

Because the Museum has such large and varied collections, and because many of the species represented in our collections are now extinct (and in many cases we know why they vanished), we occupy a very special position in assessing the threat that man has posed to all living things, including himself. The role we should play in the environmental crisis should be as scientific adviser and counsel, and that is just what we are doing. The area of concern is very broad and the time is alarmingly short. It has been estimated that all the surface of the earth compatible with human occupation and utilization will have been occupied and utilized by the year 1985. However, not enough is known about the new environments that man's technology has created; there are well-documented examples of polluted ecosystems that have been improved or even restored by conscious human intervention. The phrase "man and his environment" suggests not only the effect of man on his environment but also the shaping of man by the environments—

Shadow plays have been a widespread theatrical form in much of Asia for hundreds of years. In South India there is a unique street shadow theater in which the epic stories of the Ramayana and the Mahabarata are performed before a screen by a wandering troop who are paid in agricultural products. The puppets are made of transparent animal skin and are brilliantly painted, with movable arms, legs and other body parts. They range from 24 to 92 inches in height. Shown here is a nobleman, dressed in jewels and traditional costume. This puppet is one of a large number in the anthropological collections of the Museum. Some of the puppets will be displayed in the new Hall of Peoples of Asia, which is now being designed.

natural and artificial—which he creates or in which he elects to live. We at The American Museum of Natural History can, with the help of our friends and supporters, show people how they can best adapt themselves and their life standards to produce a sound environment.

The new Childs Frick Wing, constructed with the support of the late Mr. Childs Frick and his family to contain the incomparable collection of fossil mammals he gave to the Museum, will be dedicated in October. This building houses the fine staff and collections which keep the Museum in the first rank of paleontology.

The new Hall of Peoples of the Pacific was dedicated, on May 18, by Dr. Margaret Mead, its creator. This hall is the culmination of almost half a century of study in the field and in the laboratory by Dr. Mead, and it has re-created for all of us the lives of the people of that area, who were unaffected by the modern world longer than any other ethnic group. (Many of them were in fact transferred from the Stone Age into Western civilization in a single day when they were transported by a jet airplane from Papua to Australia.) It is a beautiful hall and it will enrich the lives of our vistors for years to come.

The number of our visitors has impelled us to become concerned with the problem of noise in our exhibit halls and public areas. Guided by expert counsel provided by one of our Honorary Trustees, Mr. Harold Boeschenstein, we have recently acoustically treated the Hall of Biology of Invertebrates. During the coming year we hope to do the same for the Dinosaur Halls and the 77th Street Foyer. The main cafeteria has been modernized and is now a very effective facility.

We record with sorrow the deaths of four former Trustees, friends who by their constructive participation helped carry the Museum to its present position of eminence.

Richard King Mellon died on June 3, 1970. He served various terms on the Board from 1941 to 1962, at which time he was elected a Benefactor in recognition of his great interest in, and many contributions to, the Museum.

Robert D. Sterling, who died on September 3, 1970, was elected to the Board in 1953, and was later made an Honorary Trustee. Mr. and Mrs. Sterling contributed generously to many of the habitat groups in the Halls of North American Forests, North American Mammals, North American Birds and Ocean Life.

Robert G. Page died on December 25, 1970. He was first elected to the Board in 1953, and he served as a

Vice-President from 1957 through 1967.

Dr. Columbus O'Donnell Iselin, whose great grandfather was a founder of the Museum, died on January 5, 1971. Dr. Iselin, one of America's foremost oceanographers, was elected to the Board in 1951, and served for nine years.

During the past year three new trustees were elected: Mrs. Miriam Colon Edgar, Mr. Sylvan C. Coleman, and Mr. Fergus Reid, III. Mr. Thomas J. Watson, Jr., and Dr. Henry Clay Frick, II, were both re-elected to the Board, and Mr. Robert E. Blum was made on Honorary Trustee.

The Museum was decorated with the Order of the Aztec Eagle by the Government of Mexico. This is the only decoration that nation awards to non-Mexicans, and it was given in recognition of the Museum's Hall of Mexico and Central America, which was opened last year.

I am happy to report that the floodlighting of the Central Park West facade was officially turned on last February, in the presence of Administrator August Heckscher and one of our trustees, Mrs. John V. Lindsay.

Although the Museum occupies a national and world-wide position, it is also a part of the community in which it lives, and so last September we staged a festival in Theodore Roosevelt Park called "West Side Day." The ten thousand people who came "dug for dinosaurs," heard whales talking, asked an "astronaut" robot difficult questions, and danced. It was a wonderful day! We will do it again next October.

On April 14 the Museum sponsored a one-day program to foster the preservation of wolves, complete with a live Canadian timber wolf named "Jethro." The April issue of *Natural History* was mainly devoted to the subject, and a long playing record, "The Language and Music of the Wolves," was published. More than a quarter of a million copies were sold during the first two and one-half months.

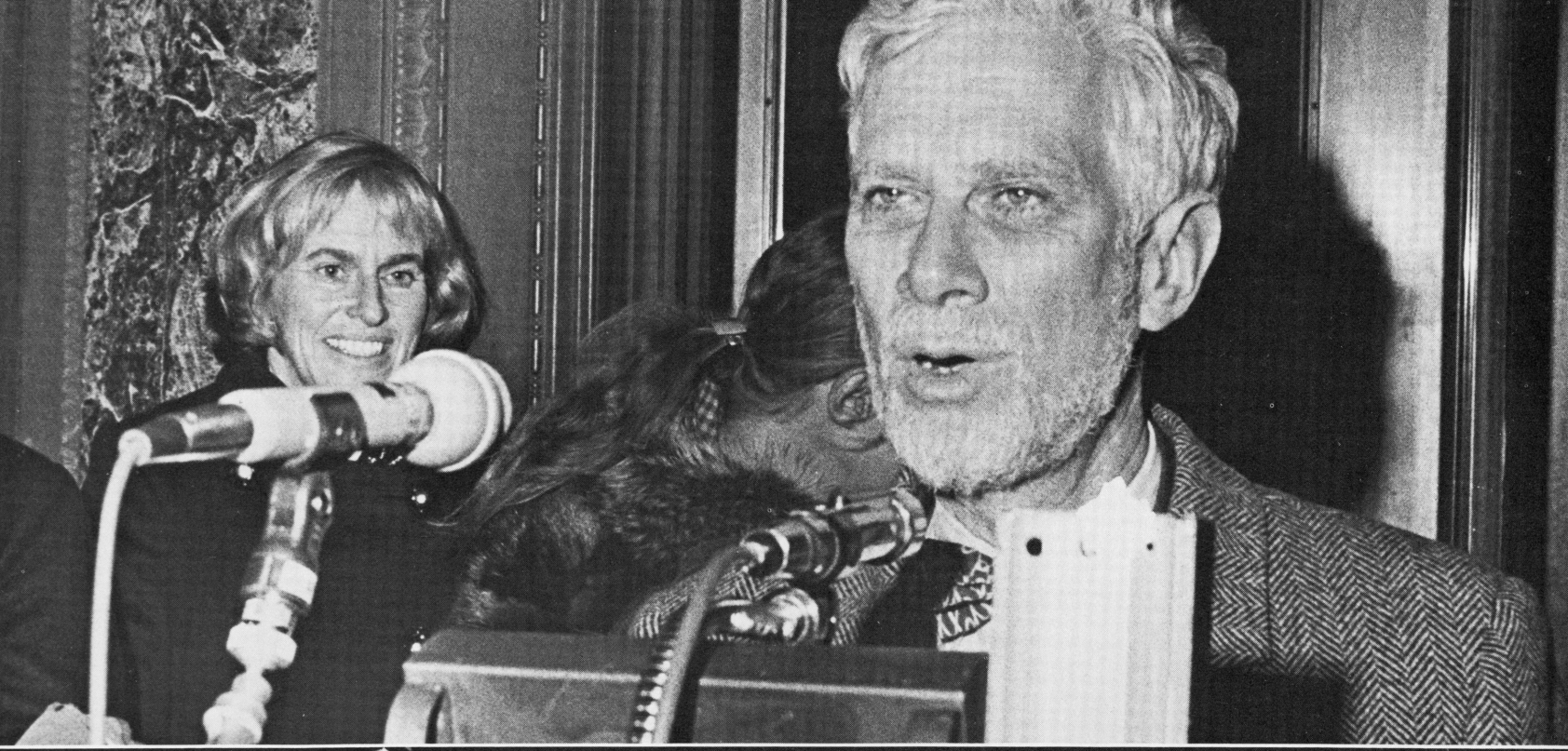
A few days later there was lively participation by the Museum in Earth Day activities. Members of the scientific staff were on hand throughout the Museum to answer a variety of questions and there was wide press coverage.

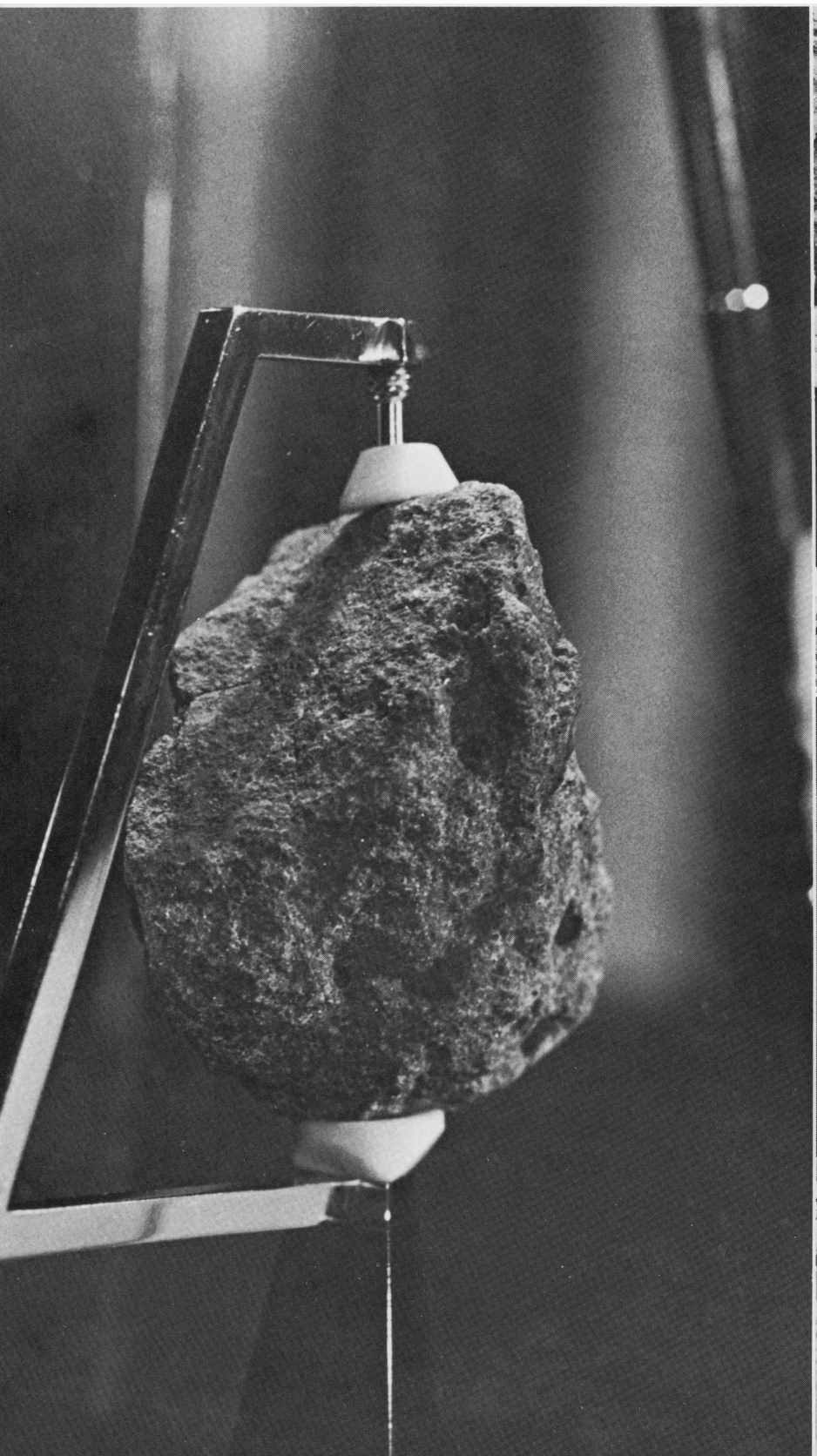
The Centennial exhibit, "Can Man Survive?", has now been dismantled, but the film "The Time of Man" is still being seen by audiences all over the country, thanks to generous private assistance. Last year the film was seen by more than a quarter of a million people, and we will continue the program for at least another year. We will also continue to have our Environmental Information Desk open at least two days a month, and we hope to offer daily service in this program in the near future.

The Men's and Women's Committees have been very active, under the leadership of Mrs. John Macomber, and Mr. David C. Clark and Mr. Larson M. Powell. A great deal of hard work by all members of these committees has accomplished heartwarming results. This past year they have raised over $491,000, a new record by a margin of $83,000. In addition to the increasingly fruitful work of our volunteers, an important new source of support has come from the subscribers to *Natural History,* elicited by letter under the pursuasive signature of Dr. Margaret Mead.

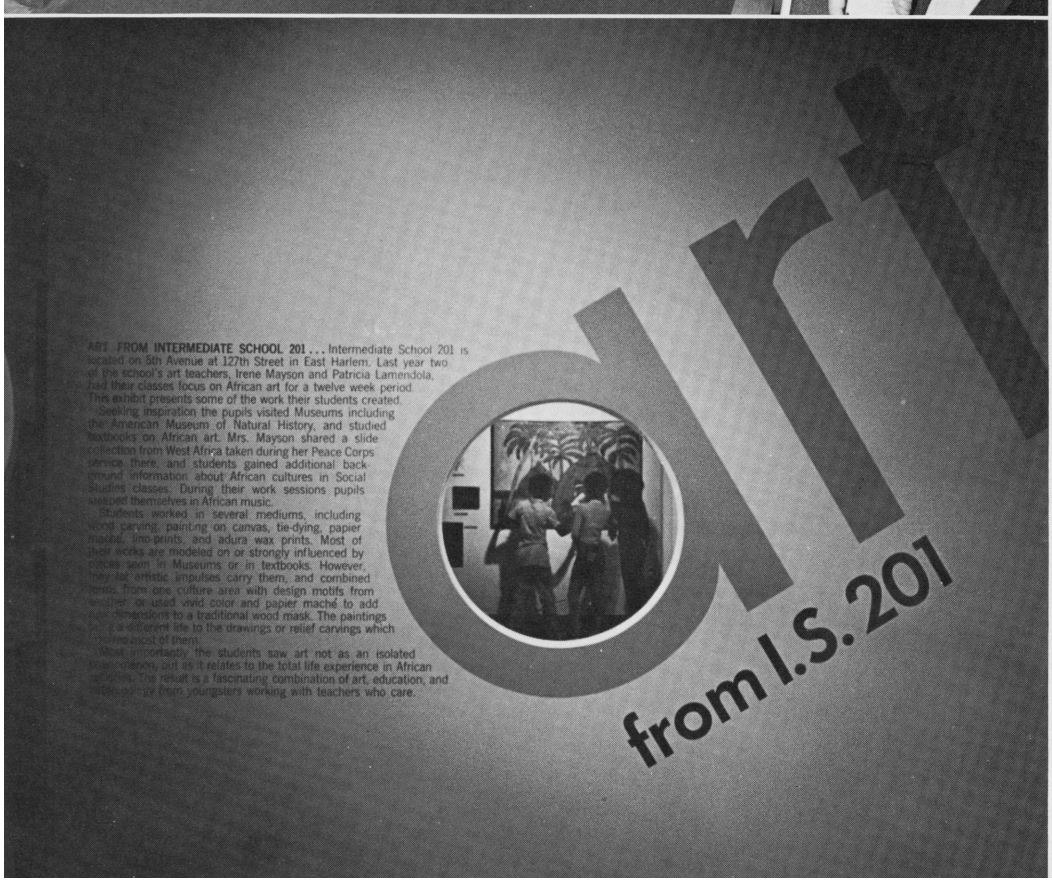
Gardner D. Stout, *President*

Mrs. John V. Lindsay and Mr. August Heckscher were on hand in February for a festive ceremony in which 15,620 watts of lights were turned on to illuminate the Central Park West facade of the Museum. The lights, which are on all night every night, greatly enhance the Museum's appearance for the benefit of its West Side neighbors.





Museum activities during the year were characterized by spontaneity and diversity. Hundreds of thousands of people saw a priceless rock from the moon—the second to be displayed at the Museum—last fall. In the early summer a highly successful exhibition of Chinese kites was opened and gifts of toy kites were presented by Mr. Gardner D. Stout to students who visit the Museum frequently. Older visitors got a behind-the-scenes tour and an opportunity to talk to Mr. George Whitaker about the specimens maintained in Vertebrate Paleontology. Wolf Day in April called attention to the plight of wolves and introduced Museum employees to an amiable wolf named Jethro. The art themes in the Hall of Man in Africa provided inspiration to students in Intermediate School 201 in East Harlem to create their own art objects, which the Museum put on exhibit in March.



Academic and cultural institutions which depend on endowments, public grants, and private contributions have suffered under a severe financial burden during the past two years, and The American Museum of Natural History is no exception. The financial difficulties we are experiencing reflect the economic crisis that has enveloped the country and nearly every corner of our society. It is a period marked by rapidly rising costs for goods and services, for wages and social benefits, but of stable or diminishing income. The result is a gradual erosion of financial strength whereby a relatively fixed income can buy less and less.

Museums such as ours are particularly vulnerable in the wage-price squeeze that affects the economy. Our wages and other costs follow the community spiral upward, but we have limited means to increase our income. Unlike the university, we cannot raise tuition; unlike industry, we cannot raise the prices on our products; unlike government, we cannot increase taxes.

We pay the same prices for goods and services as do others in the community. Our wage scales and social benefits costs are closely tied to those in municipal government, in the academic world, and in the other markets where we compete for personnel.

Another shadow puppet is shown, this one a soldier dressed in contemporary clothes carrying a gun. The figure may represent a member of Ravana's Army in the war with Rama.

In a society increasingly influenced by the collective bargaining process, we have no choice but to meet the competition in the labor market if we are to maintain quality of service. The unit cost per hour of labor, and for the supplies and services we need to function, has risen eight to ten per cent annually for the past two years. In the same period, income from private sources has risen less than two per cent. Thus our buying strength, for labor, goods, and services, has eroded during the past two-year period by an estimated twelve to sixteen per cent per year.

The Museum is fortunate, perhaps more so than other similar institutions, in having so broad a base for its financial support. Public support includes the annual appropriation and capital funds from the City, for cleaning, guarding, maintaining, and improving our building, and grant funds from Federal and State agencies for special educational and research activities. Private sources of support, for the scientific, education, and exhibition programs, include income from endowment, from Museum services, from membership, from the annual contributors' program, and grant funds from private foundations. These varied sources, taken together, provide a balanced financial foundation on which the strength, richness, and variety of our activities and programs are built.

Unfortunately, we are now experiencing a simultaneous erosion in both public and private sources of support. At a time when it is increasingly difficult to raise or even maintain private funding levels, the financial plight of our City of New York is seriously threatening the base of support for building services and maintenance. Most serious of all is the threat to the balance of our support foundation posed by the freeze on employment enforced on us by the City. Its effect is to stifle the quality of service we can offer the public as the loss of even a small number of employees in key positions is felt in the area of public service where our City support funds are concentrated.

We have been sensitive to these problems as they have arisen and grown more serious over the two years recently past. We realized that it would be more effective to anticipate them and prepare for them by introducing efficiencies and economies where we could find them rather than to be forced into sudden and serious cuts in employment and elimination of programs. We have attempted to reduce employment where we could through attrition, to absorb and combine services and functions in the work of other units, and to reduce expenditures for materials and services where these could be postponed or eliminated without a major impact on our work. Simultaneously, we have sought out new sources of income where we could find them.

During the past year, in continuing efforts to produce greater efficiency and economy in our work, we have consolidated the functions and personnel of several smaller operations into a larger Division of General Services; re-organized and introduced more efficient work practices in the Division of Plant Operations; changed the basic principle of allocating personnel in the Division of Building Services in order to apply more manpower to cleaning needs; introduced mechanical aids to cleaning requirements at a considerable saving in manpower; employed part-time and contractual services in cleaning and guarding to overcome difficulties in scheduling; developed a strong and loyal group of volunteer assistants to supplement the functions of the Department of Education; and introduced substantial economies in our purchasing requirements without sacrificing quality.

At the same time we have found generous support for some of our needs from new sources. Private philanthropic foundations have given us substantial assistance for our educational and scientific programs. And, as President Stout reported, our recent change in admission policy has brought us financial assistance from our visiting public. Our flexible admission policy, wherein all visitors must make some contribution, discretionary in amount, on entering the Museum, has found understanding acceptance. While not imposing a serious burden on our Museum audience, it has given us needed help in meeting our obligations within tolerable deficit limits.

Clearly, these are times to husband our resources, to review carefully and reorder our priorities, to improve where possible the efficiency of our programs, activities, and services. Yet they are not times to despair or to forego the improvements that we feel are essential. Despite the financial difficulties of the past year, we have found it possible to build two new scientific facilities, the laboratories in the Department in Ornithology and the Animal Behavior laboratories, both in support of graduate research and training programs, and to complete the Childs Frick Wing, where storage and research on our fossil mammal collection will now be transferred. We have materially strengthened the supervision in our service departments; we have renovated and substantially improved our food service facilities for employees and the public; we have introduced dramatically new

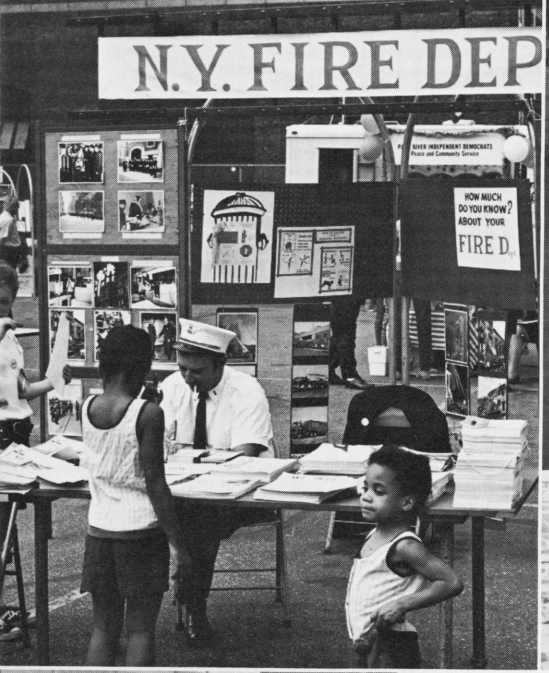
educational programs; we have raised the circulation by one-fifth and the editorial standards of *Natural History* magazine; and we have begun at last to construct a much-needed center for the reception, orientation, and service needs of school classes. In exhibition, we have completed the Hall of the Peoples of the Pacific, completed another major section in the Hall of the Biology of Invertebrates, continued the installation of the new Hall of the Biology of Amphibians and Reptiles, and carried forward our planning for three additional major halls, Minerals and Gems, Peoples of Asia, and the Biology of Mammals.

These are accomplishments to be proud of in any year. To achieve them in the face of acute financial problems is a measure of the vitality and relevance of our work, of the true strength and energy of our Board, our employees, and our generous and loyal supporters.

Thomas D. Nicholson

Thomas D. Nicholson, *Director*

Fun and games, balloons and fossils, food and films, music and dancing, a noisy whale and a talkative astronaut —the Theodore Roosevelt Park on the north side of the Museum was filled with neighborhood visitors and many activities on West Side Day. The Museum staff and volunteers all helped, and everyone had a good time.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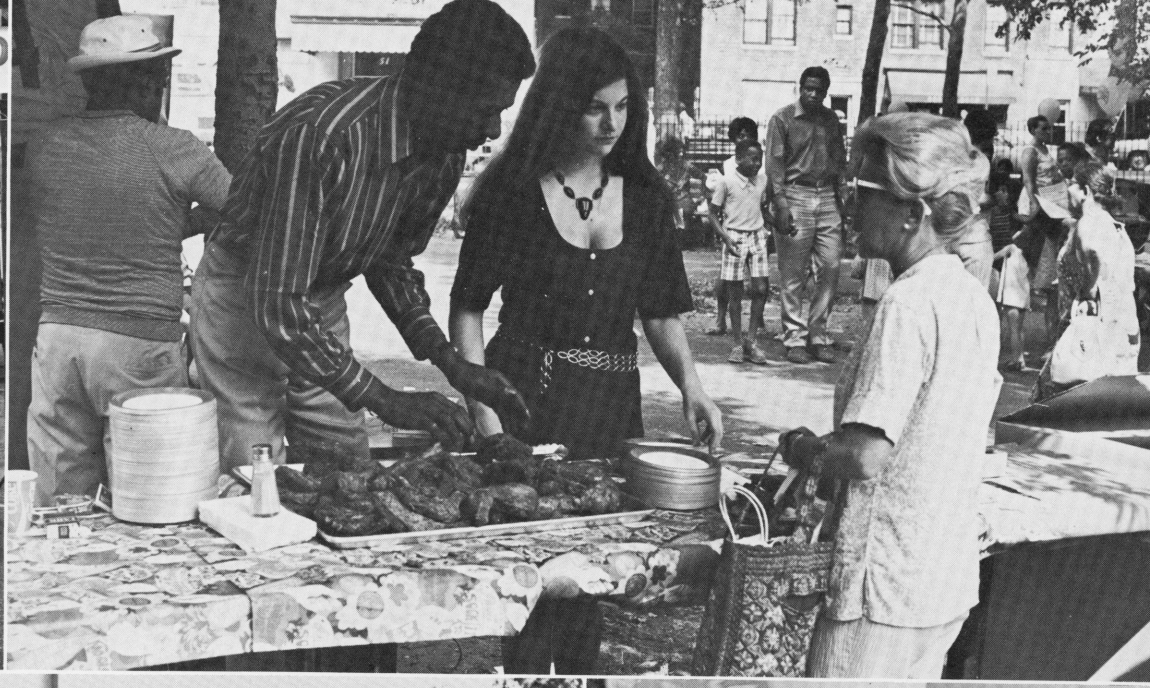
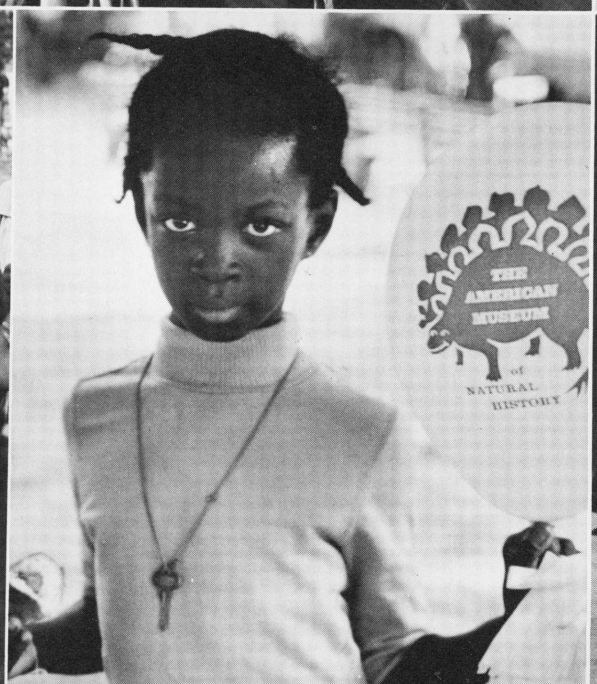
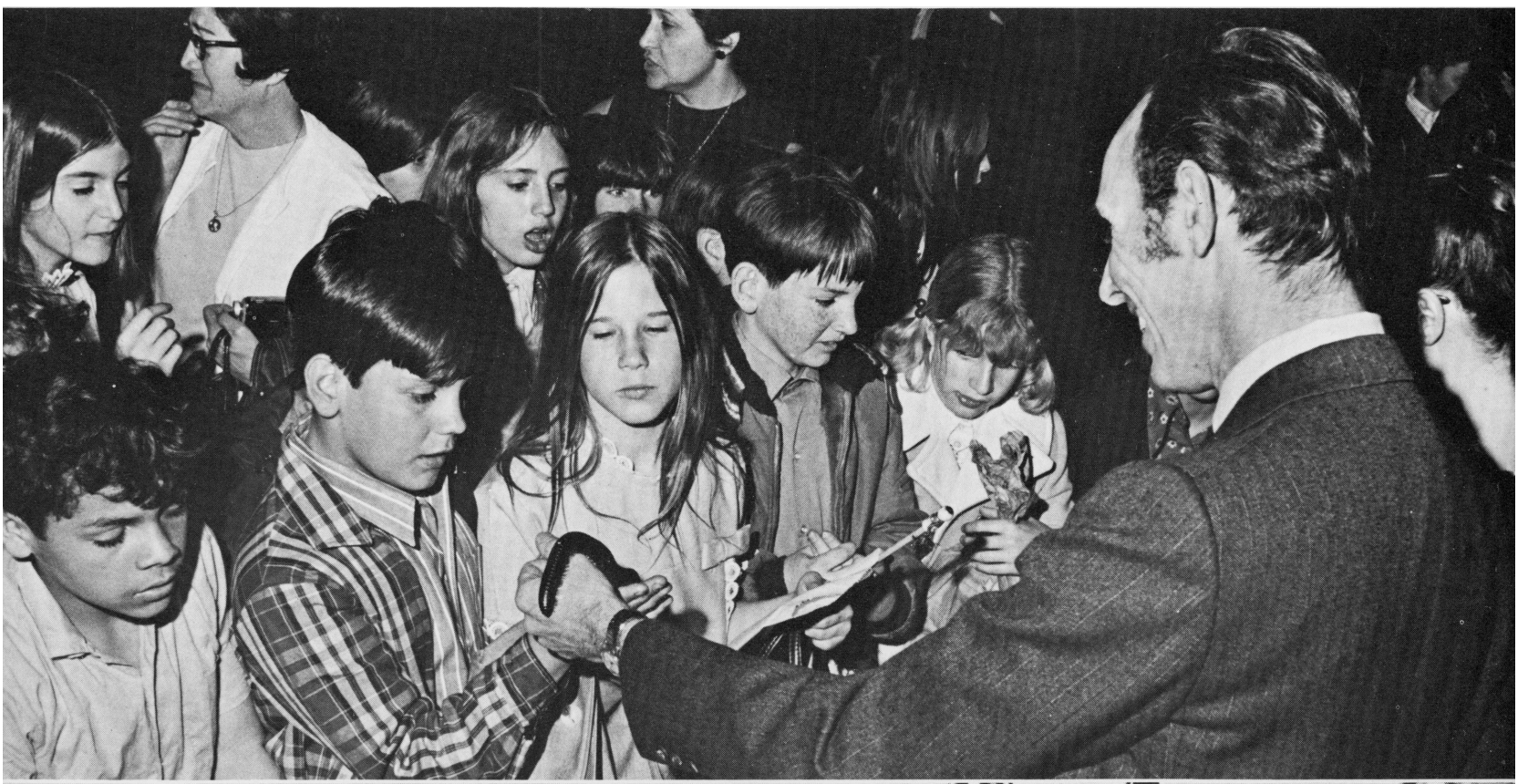


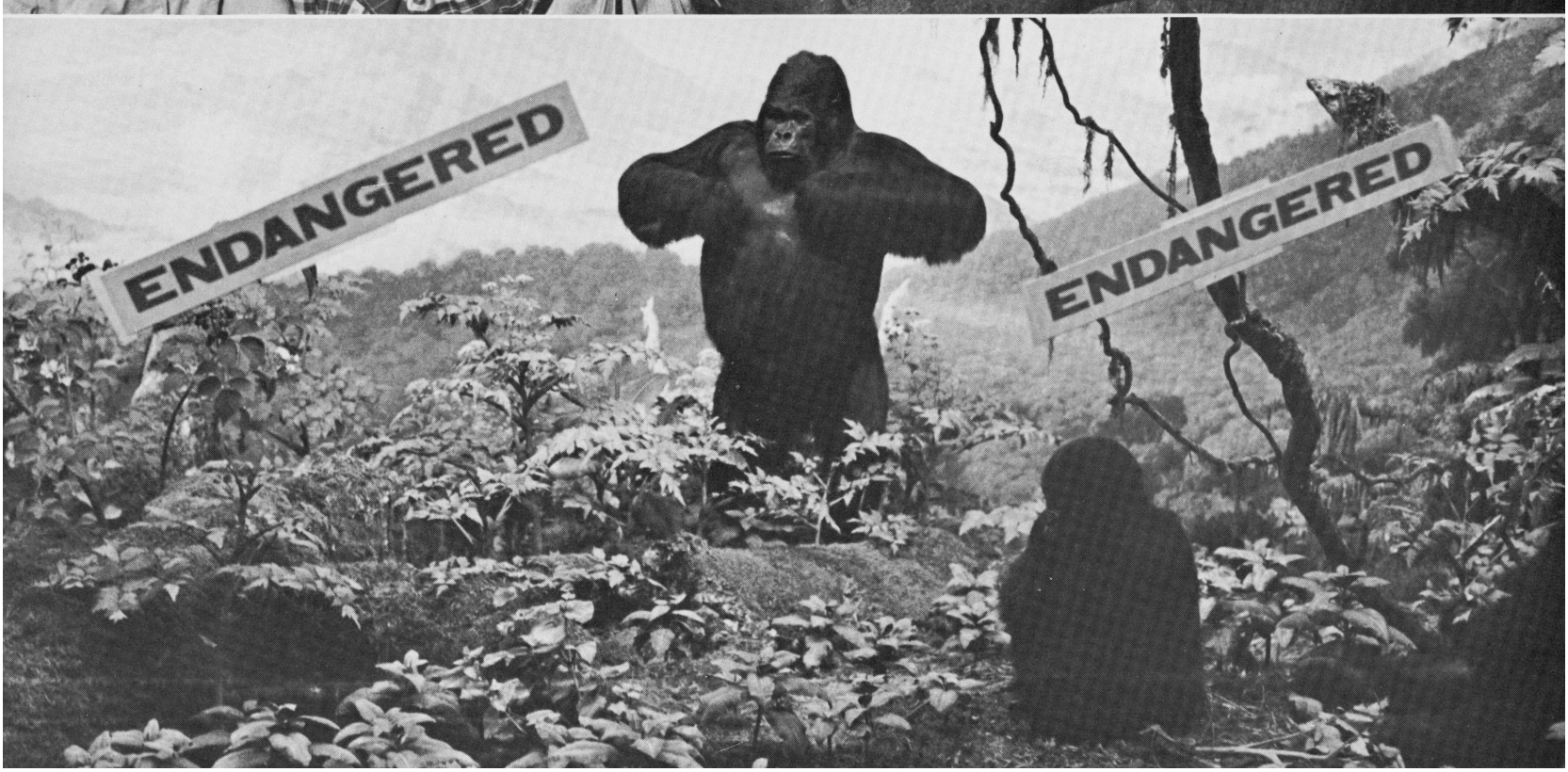

THE AMERICAN MUSEUM
of
NATURAL
HISTORY


Dr. J. A. L. Cocke
MEMBER


The American Museum of Natural History
MASON
VAN GENT
LAWN ONTARIO

Are all animals important? What will happen as more species become extinct? The questions were raised repeatedly on Earth Day in April when the Museum devoted its resources to providing information about today's environmental dangers. Some of the staff were out in the Museum halls for direct contact with the public and others answered questions by telephone and on the radio. Some of the Museum's most popular habitat groups, containing threatened species, bore big signs reading "Endangered."





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

Department of Animal Behavior: Dr. Ethel Tobach was elected to the Board of Governors of the New York Academy of Sciences and she was elected a Fellow of the Animal Behavior Society. Dr. Howard R. Topoff was elected to serve a second term as Vice-President of the New York Entomological Society.

Department of Anthropology: Dr. Stanley A. Freed was elected a Fellow of the New York Academy of Sciences. Dr. Margaret Mead received the Joseph Priestly Award from Dickinson College, the Gimbel National Award from Gimbels, the Arches of Science Award from the Pacific Science Foundation, and the Graduate Faculties Alumni Award for Excellence from Columbia University.

Department of Entomology: Dr. Jerome G. Rozen, Jr., was elected a Trustee of the New York Entomological Society. Dr. John A.L. Cooke was elected Editor of *Entomological Americana,* a publication of the New York Entomological Society. Dr. Lee H. Herman, Jr., was re-elected President of the New York Entomological Society and was elected Vice-President of the Coleopterists Society.

Department of Herpetology: Dr. Roger Conant, a Research Associate in the Department who is Director of the Philadelphia Zoo, was awarded the honorary degree of Doctor of Science by the University of Colorado.

Department of Invertebrate Paleontology: Dr. Norman D. Newell was elected President of the Society of Systematic Zoology; he was also elected a member of the American Philosophical Society and a Life Member of the Society of Economic Paleontologists and Mineralogists. Dr. Roger L. Batten was elected a Member of the Geological Society of America.

Department of Living Invertebrates: Dr. William K. Emerson was elected to a three-year term on the Council of the Society of Systematic Zoology. Dr. Dorothy E. Bliss was elected Chairman of the Division of Invertebrate Zoology in the American Society of Zoologists. Dr. Ernst Kirsteuer was elected an Active Member of the New York Academy of Sciences. Dr. Horace W. Stunkard was awarded The American Museum of Natural History Gold Medal for Distinguished Achievement in Science.

Department of Mammalogy: Dr. Richard G. Van Gelder was appointed to the Technical and Editorial Advisory Board of the Population Reference Bureau. Dr. Sydney Anderson was re-elected Recording Secretary of the American Society of Mammalogists and Dr. Karl F. Koopman was elected Director of the Society. Dr. Guy G. Musser was appointed Editor of the General Notes Section of the *Journal of Mammalogy.* Mr. Hobart M. Van Deusen was elected an Honorary Associate of the Western Australian Museum and he was also elected President of the Explorers Club of New York.

Department of Ornithology: Dr. Dean Amadon was elected an Honorary Foreign Member of the French Ornithological Society.

Archbold Biological Station: Dr. James N. Layne was elected President of the American Society of Mammalogists; he was also elected to the Executive Board of Trustees of the Florida Chapter of the Wildlife Society and to the Board of Trustees of the Florida Defenders of the Environment; and he received an appointment as Research Associate of the Florida State Collection of Arthropods in the Florida Department of Agriculture and Consumer Services. Dr. Glen E. Woolfenden was promoted from Associate Professor of Zoology to Professor of Biology at the University of South Florida.

Southwestern Research Station: Mr. Vincent D. Roth was appointed Research Associate in Biological Sciences at the University of Arizona in Tucson.

Staff changes are recorded below, including those effective July 1, 1971:

In the administrative offices, the following staff changes took place:

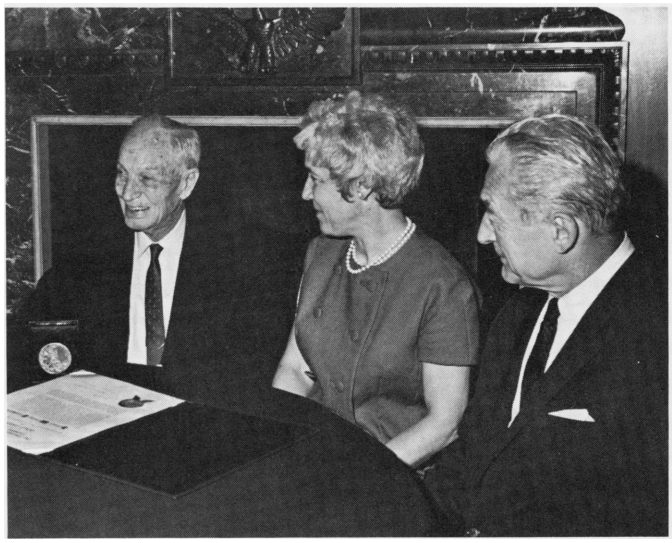
Mr. Charles A. Weaver, Jr., was promoted from Assistant Director to Deputy Director. Mr. Donald Albert was appointed Manager, General Services; Mrs. MaryJane Keddy was appointed Assistant Executive Secretary; Mrs. Teresa Martin was appointed Manager, Contributors Office and Mr. Joseph R. Saulina was appointed Manager, Development Office.

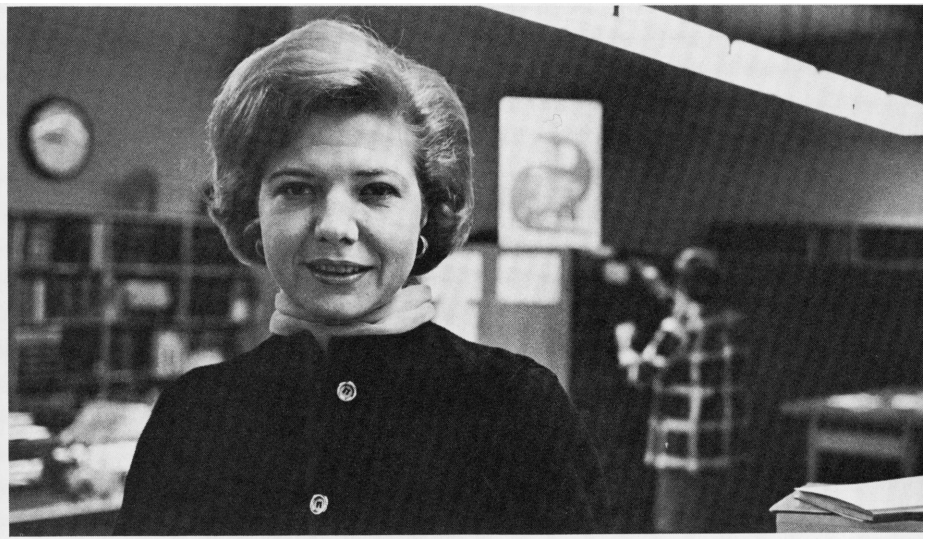
In the scientific and educational departments, the following promotions and appointments were made:

Department of Animal Behavior: Dr. Jerome Wodinsky was appointed Lerner Associate Curator and Dr. Howard R. Topoff and Dr. H. P. Ziegler were appointed Research Associates.

Department of Anthropology: Dr. Stanley A. Freed was promoted from Curator and Acting Chairman to Curator and Chairman. Miss Michiko Takaki was appointed Assistant Curator, Dr. Ian Tattersall was appointed Assistant Curator of Physical Anthropology and Dr. Rhoda Metraux was appointed Research Associate.

Dr. Horace W. Stunkard, who has been a Research Associate in the Department of Living Invertebrates for 50 years, was honored by the Board of Trustees in June when he received The American Museum of Natural History Gold Medal for Distinguished Achievement in Science. Dr. Stunkard (left) is shown after the award ceremony with his daughter, Mrs. John R. Latham, and Mr. Latham. In the photograph at right is Miss Nina J. Root, who was appointed Librarian in October.





Department of Entomology: Mr. Mohammad Umar Shadab was appointed Scientific Assistant and Dr. Penny M. Connell was appointed Research Fellow.

Department of Ichthyology: Dr. Gareth J. Nelson was promoted from Assistant Curator to Associate Curator and Dr. Hans-Peter Schultze was appointed Research Associate.

Department of Invertebrate Paleontology: Dr. John J. Lee was appointed Research Associate. In Micropaleontology Press, Dr. Tsunemasa Saito was appointed Editor and Mr. Norman Hillman and Mr. Martin Janal were appointed Assistant Editors.

Department of Mammalogy: Miss Norma Goldberg was appointed Archbold Scientific Assistant.

Department of Ornithology: Miss Helen Hays was appointed Chairman, Great Gull Island Committee and Dr. F. Gary Stiles was appointed Research Fellow.

Department of Vertebrate Paleontology: Mr. Ted Galusha was promoted from Frick Assistant Curator to Frick Associate Curator and Dr. Edwin H. Colbert and Dr. George Gaylord Simpson were appointed Curators Emeritus.

Archbold Biological Station: Dr. A. L. Rand was appointed Research Associate.

Lerner Marine Laboratory: Dr. Jerome Wodinsky was appointed Resident Scientist and Lerner Associate Curator and Dr. Edward S. Hodgson was appointed Research Associate.

Department of Education: Dr. Sarah E. Flanders was appointed Natural Science Coordinator and Mrs. Gloria Davis was appointed Registrar. Mr. Michael Harlow, Miss Anne Jennings and Miss Wanda Zablodowsky were appointed Instructors.

In the Library: Miss Nina J. Root was appointed Librarian. Miss Mildred Bobrovich was appointed Reference Librarian and Mrs. Blanca Fukanaga was appointed Cataloguer.

On *Curator* Magazine: Mrs. Avis Kniffin was appointed Assistant Editor.

On *Natural History* Magazine: Mr. Martin Rosinsky was appointed Development Manager, Mr. Roy Allen and Mr. Frederick Hartmann were appointed Associate Editors and Miss Joan Meintjies was appointed Assistant to the Editor.

In the Film Collection: Mr. Henry M. Lester was appointed Conservator, Film Collection.

In the Office of Public Relations: Mr. Ira Knaster was appointed Coordinator of Radio and Television Activities.

In the Department of Plant Operation and Maintenance: Mr. Charles L. Miles was appointed Manager, Building Services. Mr. Robert B. Hill, Mr. Philip C. Miller and Mr. Albert C. Potenza were appointed Assistant Managers, Building Services.

It is with deep regret that the death of Dr. William King Gregory on December 29, 1970, is recorded. He was Curator Emeritus of Fishes and Comparative Anatomy in the Department of Ichthyology. Dr. Gregory was a researcher whose interests encompassed many fields, whose acquaintance with the notable scientists of his day was broad, and whose writings were prolific. He was associated with the Museum for 44 years and his influence was memorable.

Two grey spiny-backed mice are shown in a laboratory enclosure intended to simulate as closely as possible the natural habitat of these desert rodents. Dr. Ethel Tobach is studying combative behavior among these mice and their close relatives, the red spiny-backed mouse. Both species are found in Africa and Asia and there, in the wild, their home ranges overlap. The grey mice can tolerate a much higher population density than the others and they tend to fight among themselves less. Research also disclosed that the younger animals in both species tend to fight more than older animals and that females fight more than males.

DEPARTMENT OF ANIMAL BEHAVIOR

Learning is a basic element in the behavioral development of individual animals in all but the simplest forms of life. While there are many examples of animals learning from their peers, their social group or their parents, in many other instances individuals learn through their own experiences as for example through trial and error. In several of the research projects presently conducted by the department, mechanisms of learning are being investigated, and in all the current research, the role of learning in the behavior being investigated is an important consideration.

In a broad study of sexual behavior in domestic cats that Dr. Lester R. Aronson and Mrs. Madeline L. Cooper have been conducting for several years, they have been mating males in the same room for long periods under rather regular conditions. In this way the cats become very familiar with their surroundings in the particular setting. When males were deprived of the sense of smell, they would begin mating much more quickly upon being brought to the room. This, however, does not suggest that the olfactory deprived males are more highly aroused sexually; rather these males are not distracted by the strange odors of other cats and people that have been in the room recently.

Dr. Ethel Tobach has been studying the neurological and developmental basis of social and emotional behavior in four different animals: a marine invetebrate, the sea hare; two species of spiny-backed desert mice, and the white laboratory mouse. She is finding that combative behavior, activity patterns, and sensory functions differ among these species in terms of survival value in species-typical environments.

The cues utilized by birds during migration and homing appear to be of a multiple nature. Celestial navigation is dependent on the capacity of the bird's senses to make use of available reference sources such as the sun and constellations. Additional cues may be provided by atmospheric currents. Recent work has shown that a number of other lesser known cues may also be used. Dr. Helmut E. Adler believes that birds learn to utilize these cues through their daily experiences. These are among the many ideas that were examined in detail at an important Conference on Orientation that was organized by Dr. Adler and held at the Museum. Twenty-five leading scientists served as conferees and 200 scientists and selected students were auditors. The conference was sponsored by the New York Academy of Sciences, co-sponsored by the Museum, and was supported in part by the National Aeronautics and Space Administration.

Dr. Evelyn Shaw is studying the marine shiner perch of California. This strange fish has an unusual sexual cycle. The young fishes become sexually mature within a few weeks after they are born in the summer and they mate soon thereafter. The female stores sperm for several months, the eggs are fertilized in the late fall, and the next batch of young are born six months later.

For an underwater animal, such as a fish, sound is probably the most important channel of communication, since it is independent of turbidity and water currents, and it can also provide directional information. Dr. William N. Tavolga has shown that many fishes produce sounds in connection with mating and schooling. It is possible that their sounds also furnish information to them about obstacles in the environment by means of a crude kind of echo-location.

Dr. Aronson and several of his colleagues and students, Drs. Leo S. Demski and Jerry W. Gerald and Messrs. Lawrence R. Picker, Jack Izower, and Ronald Thomas are studying the brains (particularly the cerebrum and cerebellum) and behavior of fishes. In mammals, the cerebellum is mostly concerned with locomotion and equilibrium, but it has been found that in fishes the cerebellum is less concerned with motor processes and is more involved in learning.

When army ants forage and change the location of their nest, they run in long, unbroken columns. Each ant orients in the colony by following a chemical trail laid down by the secretions of other ants. They also orient by maintaining contact with logs, rocks, and other ants. Dr. Howard R. Topoff has found that the chemical sense is more important than the sense of touch. When a chemical trail is present, ants can orient without tactual cues. However, when tactual cues are provided without a chemical trail, the ants are not able to orient.

Along with the research program, the department maintains an extensive research training program that reaches from the talented young high school student to the advanced postdoctoral fellow needing specialized research training. This year the department has developed in conjunction with The City University of New York a special interdisciplinary graduate program in animal behavior-biopsychology. In order to accommodate the additional staff and students in this program, the Museum is renovating and furnishing an entire floor in the Education Building as additional laboratory space designed specifically for behavioral research. An award of $128,690 from The Grant Foundation and an appropriation of $60,000 from the Graduate Division of the City University have been received for this purpose.

Lester R. Aronson, *Chairman*

The peoples of the Pacific have long been under the appreciative scrutiny of Dr. Margaret Mead. In May some of the most exceptional pieces from the Museum's fine collection of Pacific artifacts were displayed in a major new exhibition—the Hall of Peoples of the Pacific—created under the direction of Dr. Mead.

UNDERGRADUATE RESEARCH PARTICIPATION PROGRAM

The Undergraduate Research Participation Program, now in its twelfth year, continues to make a valuable contribution to the education of young scientists-in-training as well as to the advancement of research in the Museum.

During the year 205 students applied for admission to the Program. Twenty-four were accepted, 23 for the summer and one for the academic year. Many students worked in Museum laboratories; others participated in research at the Museum's Kalbfleisch Field Research Station and Archbold Biological Station and one student did her work at the Bodega Marine Laboratory in California. The students came from many colleges, among them, for example, Blackburn College, the University of Chicago, Fresno State College, Pembroke College, Tufts University, Yale University, and the City University of New York. In connection with the Program, thirteen scientific papers were published, are in press, or are in preparation this year. The students made major contributions to these studies and to the publications. The program has received generous support from the National Science Foundation for twelve consecutive years.

Lester R. Aronson

DEPARTMENT OF ANTHROPOLOGY

In a complex and rapidly changing world knowledge of the dynamics of culture is essential information and every experience, past or current, of cultural change is a valuable source of that information. Anthropology seeks information about culture by examining both the content and the processes—the past through archeology and the present through ethnology—not only to find out about, but also to explain these complexities.

The new Hall of Peoples of the Pacific, which opened on May 19, is a case in point. Here, artifacts from five Pacific culture areas are displayed, not only for their intrinsic beauty, but also to illustrate processes such as the exchange of ideas and techniques. Directed by Dr. Margaret Mead, the hall shows these five culture areas and the processes which they underwent and are still undergoing. Through the imaginative use of artifacts, sound, photos, and models, the hall illustrates both how these cultures were, and how they are changing today. Mr. Preston C. McClanahan was the designer, and Miss Elizabeth Nickerson and Mr. Philip C. Gifford, Jr., assisted Dr. Mead with the installation of the hall. In addition an alcove devoted to Australian aborigines was installed under the supervision of Dr. Richard A. Gould.

Plans and preparations for the new Hall of Man in South America are under the joint direction of Dr. Junius B. Bird and Dr. Robert L. Carneiro. In this connection, Dr. Bird visited sites in Peru in July and in Colombia and Panama in April. Both trips sought information about the early movements of man in South America. Dr. Carneiro has been actively planning the new hall and has been engaged in work on a regional study of man in Amazonia. His other research includes studies of classical and modern evolutionism in cultural anthropology and a study of the relationship of organizational and technological factors in the rise of civilizations.

Dr. Stanley A. Freed, in collaboration with his wife, Dr. Ruth S. Freed, completed a comparison of role behavior in matrilineal and bilateral societies involving the Navaho of North America and residents of a traditional village in northern India. He has also been at work on a long-range study of such topics as the comparative fertility of urbanized and non-urbanized residents of a traditional village in northern India.

Dr. Gordon F. Ekholm, in pursuit of evidence of pre-Columbian contacts between Asia and South America, explored the origins of American wheeled animal toys, the lotus motif in Classic Maya art, and the history of New World mirrors. He visited museums, private collections, and archeological sites in Mexico in connection with this work.

Dr. Gould is interested in the cultures of people who live at the hunting and gathering level. In September he returned from a year-long field trip to the Aborigines of the Western Australian Desert. He excavated archeological sites near the Warburton Range. Artifacts collected there are now under analysis at the Museum.

Dr. Walter A. Fairservis, Jr., examined data pertaining to contacts between the Nile River valley and the people of what is now the desert plateau region of Egypt, prior to 10,000 B.C. He is investigating the nature and possible significance of this interaction for the development of Egyptian civilization. He is also preparing a temporary exhibition of costumes of Asia for a November opening and is planning the future Hall of Man in Asia. During the year, Dr. Fairservis contributed temporary exhibits of Asian bells, jeweled plaques from Nepal, and Chinese kites.

Dr. Mead returned to the field in June for a re-visit to the Admiralty Islands. In the fall, she will join Dr. Rhoda Metraux along the Sepik River in New Guinea on the Jane Belo Fund Expedition to the Iatmul people.

Dr. Harry L. Shapiro is engaged in a long-term study of the physical effects of overcrowding in Calcutta. He continues work on a revision of the human heart exhibit for the Hall of the Biology of Man.

Miss Michiko Takaki has combined ethnology and ecological studies for research into local resource management among the Uma, a Kalinga-speaking people of northern Luzon, in the Philippines. This long-range study is among the most intensive examinations in anthropological terms of the relationship of man to his environment.

In July, fifty scholars attended by invitation the New World Writing Systems Conference, which was hosted by the department at the Museum. Among the topics under discussion was the possible relationship of the Aztec Stone of the Sun to Asian writing.

Throughout the year, Mr. Philip C. Gifford, Jr., and Miss Priscilla Ward continued classifying, cataloging, and maintaining the physical and cultural anthropological collections. Eighty-one accessions were acquired last year, including important specimens from Peru, Australia and China.

Stanley A. Freed, *Chairman*

DEPARTMENT OF ASTRONOMY & AMERICAN MUSEUM—HAYDEN PLANETARIUM

This department is one of the logical sources of astronomical information for the press, the public and the educational community in these, the opening years of the Space Age. Accepting the opportunity to provide up-to-date information and facilities, the staff of the Department of Astronomy took further steps to modernize the presentation of information.

In June the Copernican Room—the visitor's introduction to the sky shows in the Sky Theater—was closed for renovation. The area will be converted into a stand-up theater with the capability for 360° projection by means of 40 projectors onto 22 screens. Vignettes of the history of space exploration and the continuously unfolding story of events of the Space Age will be presented. The renovation was made possible by a grant of $188,000 from the Daniel and Florence Guggenheim Foundation. The theater will be called the Guggenheim Space Theater when it reopens in mid-October.

A second improvement was the inauguration of a taped presentation of the sky show in the Sky Theater. Because of unavoidable variations which resulted from presentations made by nine excellent but different lecturers in the Sky Theater, the taping was done to insure consistency in the music and the commentary. "On the Shoulders of Giants" was the first taped

program. It ran from May 3 to June 28 and audience response was very favorable. Future taped programs are being developed.

Sky show presentations of special note were given during the year. In December a Christmas sky show in Spanish was staged to provide the opportunity for learning about astronomy to members of the general visiting public whose primary language is Spanish, but it met with little response. Several school shows in Spanish met with enthusiastic receptions. In June a special sky show was presented in Chinese.

Dr. Mark R. Chartrand, III, who had been Assistant to the Director of the Natural Science Museum of Cleveland, was named head of the Planetarium's educational program in August. An expanded program of educational courses required opening of the Planetarium on Monday nights. One new course, "Astrophotography for Amateurs," was so popular that 60 students enrolled and two sections were necessary. Other new courses were "The Birth and Death of Stars," and "The Structure and Composition of the Galaxy." A total of 9040 persons attended courses.

Attendance at the Planetarium during the year decreased 10.9% below the previous year. Total attendance was 558,590 persons, with the largest attendance during May and the smallest in September.

In the research area, the completion of a simple and inexpensive form of radiotelescope for construction by high school teachers and amateurs was a highlight. Under development for several years, the final version was devised by Mr. Robert Boyle of Princeton University and Mr. Robert Fessen of Villanova University, two Undergraduate Research Project participants working at the Kalbfleisch Field Research Station during the past summer.

Franklyn M. Branley, *Chairman*

DEPARTMENT OF ENTOMOLOGY

The discovery this year of the first two flightless bees ever known raised some intriguing questions about the evolution of social insects. Of the 20,000 species of bees that exist, all individuals had been believed capable of flight. One of the species having a flightless member, belonging to the sweat bee family Halictidae, was uncovered in Australia; the other species, *Perdita portalis* Timberlake, belonging to the ground-nesting family Andrenidae, was found by Dr. Jerome G. Rozen, Jr., near the Museum's Southwestern Research Station. While excavating the communal nest of this rare subterranean bee, he discovered males that differed remarkably from those of the same species collected in flowers. The nest-inhabiting males were incapable of flight, having reduced wings and lacking flight muscles. Their heads and their mandibles were enormously enlarged. As is characteristic of many subterranean insects, their eyes were greatly reduced, the brownish integument lacked conspicuous markings, and many body setae were spine-like. These same characteristics were also associated with the flightless sweat bee of Australia.

As interesting as is the remarkable degree of convergent evolution between the two species belonging to unrelated bee families, even more engrossing is the likelihood that they indicate an entirely new and unsuspected form of social development among insects. These bees represent the first examples of a social system in which males are differentiated into two castes while females form a single caste. (In all other social bees and wasps, the females comprise two castes, i.e., queens which are responsible for laying eggs and sterile workers which carry on foraging and colony defenses.) Dr. Rozen plans further studies to learn how caste determination comes about, as well as to identify the functions of the subterranean-type male. The large head and long mandibles suggest that these males are "soldiers" which defend the nests against parasites and predators.

Dr. Frederick H. Rindge continued his systematic studies of the geometrid moths of the New World with particular emphasis on the very large subfamily Ennominae. He progressed in a revision of the tribe Nacophorini from Chile and from the adjacent Andean region of Argentina and in a revision of the eastern North American geometrid genus *Lytrosis.* He also completed a review of North American species of the primarily Old World geometrid genus *Cleora.* He has undertaken a systematic investigation of the large geometrid genus *Mericisca* from the southwestern United States and Mexico.

Dr. Pedro W. Wygodzinsky dedicated most of his efforts to work on Neotropical Simuliidae (blackflies), in collaboration with Dr. Sixto Coscarón. This study is concerned with the distribution, taxonomy and phylogeny of blackflies in cool and cold temperate areas of South America and of Central America. Dr. Wygodzinsky and the Mexican entomologist, Professor Díaz Nájera, described a new genus and species of blackflies from the Transversal Volcanic Range in Mexico. In addition, Dr. Wygodzinsky completed a manuscript summarizing the classification and distribution of Thysanura of North America and the Caribbean. These insects include silverfish, firebrats and related species, some of which are economically

important in that they attack material in commercial storehouses and in kitchens, as well as books and other products containing starch and paper. This, the first systematic review of this group of insects for the United States for more than 30 years, should have wide use in applied entomology.

Dr. John A. L. Cooke has initiated an exciting program dealing with the urticating hairs on theraphosid spiders (tarantulas). It has been known for many years that most large tropical and desert tarantulas could produce prolonged and painful irritation if handled, yet the hairs that cause the urticaria had never been investigated. Working in collaboration with Mr. Fred Miller, Chief of the Parasitology Laboratory at Meadowbrook Hospital on Long Island, Dr. Cooke studied the hairs of more than 60 theraphosids with the aid of a scanning electron microscope. Having identified four main types, he concludes that differences in structure among these setae will provide valuable new information for theraphosid systematics—a field currently in a state of considerable confusion.

Dr. Lee H. Herman, Jr., pursued his investigations on the taxonomy, classification, biology, zoogeography and phylogeny of the rove-beetle genus *Bledius.* As a result of this work, he has now separated two genera from *Bledius* and has tentatively segregated yet another genus, from the Old World. His three-part monograph on the species of *Bledius* in North America and the West Indies is progressing. Among Dr. Herman's other studies of the rove beetles is a revision of *Trigites,* a genus formerly thought to contain only a single species. He has found that a Siberian species and a third species from the Southwestern United States also belong to *Trigites.*

Although the extensive collections of the department were substantially upgraded during the year, space permits the acknowledgment only of the arrival from East Africa of the butterfly collection of Dr. V. G. L. van Someren. This generous gift, consisting of 22,931 specimens, is believed to be the largest single collection of African butterflies to come to the United States.

Jerome G. Rozen, Jr., *Chairman*

DEPARTMENT OF HERPETOLOGY

The relationship, classification and ecology of amphibians and reptiles continued to be the focus of research. To this end, Dr. Richard G. Zweifel advanced his long-term studies of population ecology by examining the longevity, growth and movements of thousands of individually marked reptiles and amphibians at the Museum's Kalbfleisch Field Research Station on Long Island. Such long-term studies provide basic information which cannot be obtained in any other way. Dr. Zweifel also continued his investigations of frogs of New Guinea by studying collections of preserved specimens at the Museum.

Dr. Charles J. Cole took his specialty, the study of the chromosomes of reptiles and amphibians, out of the laboratory for two months last summer, transporting a portable field cytology laboratory to Mexico. There he collected living specimens in order to analyze their chromosomes. He concentrated on collecting lizards of the genus *Sceloporus* and frogs of the genus *Rana,* and prepared microscopic slides and specimens in the field for later detailed analysis at the Museum.

Dr. Charles W. Myers continued his search for arrow-poison frogs in Panama and in Colombia. The evolutionary implications of variations in the skin secretions and skin color patterns of these frogs is Dr. Myers' chief interest. In February, he worked from a small boat in the rain forests along the Rio San Juan in Colombia, an area probably among the wettest land environments on earth, with annual rainfall of between 16 and 33 *feet.* Dr. Myers initiated a study of the unusually large and diverse amphibian and reptile populations of this region, and preserved specimens representing more than 80 species. One result of these studies was the discovery of a class of poisonous alkaloids with structural features unprecedented in nature.

Because of the computer terminal installed last year, the Genera of Reptiles project and the Herpetological Information Search Systems extended its information search services to herpetological and other scientific organizations and to individuals. Dr. Herndon G. Dowling, project director, assumed the editorship of *Herpetological Review* during the year.

The projected new hall of the Biology of Reptiles and Amphibians took another step forward with the completion of renovation and the structural construction of the exhibit cases. A temporary exhibition titled "Adaptations of Amphibians and Reptiles" was shown in the Museum's Corner Gallery during the fall. It consisted of nearly a hundred color photos and a motion picture.

The department received from the Southwestern Research Station a living specimen of *Phryonsoma ditmarsi,* a lizard long thought to be extinct or, at least, unavailable to collectors. It was last collected

Perdita portalis Timberlake, a highly unusual species of bee that contains a caste of flightless males. This subterranean bee, ⅜ inch long, stays in the nest, apparently as a defender; its wings are much smaller but its head and mandibles are much larger than those of its counterpart which leaves the nest to collect nectar. The bees were discovered by Dr. Jerome G. Rozen, Jr., at the Southwestern Research Station in Arizona.

The tropical arrow-poison frog of the family Dendrobatidae (left) was collected by Dr. Charles W. Myers in Panama. By its color, this gaudy little red and black frog tells predators of its distastefulness; it is distantly related to another species that is still used for poisoning blowgun darts. The defensive skin secretions of arrow-poison frogs are chemically unique and are of interest to zoologists, biochemists, and medical researchers—as well as to primitive Indians. Dr. Myers is collaborating with scientists from the National Institutes of Health in discovering new kinds of these poisons. The photo at right shows a scientific expedition in Guatemala collecting fishes. The expedition, one of three conducted by the Department of Ichthyology during the year, was made under the supervision of Dr. Donn E. Rosen.

in 1897 and first described in 1906. The collections underwent their greatest increase in more than 30 years—9200 specimens—partially because of one collector, who provided more than half of the specimens obtained at nominal cost. Eighty-one of the new accessions represented species completely new to the collections.

More than 2100 preserved specimens were loaned to researchers around the country and in foreign countries. And, as in the past, the general public made many phone and mail inquiries and the department gave them information and advice.

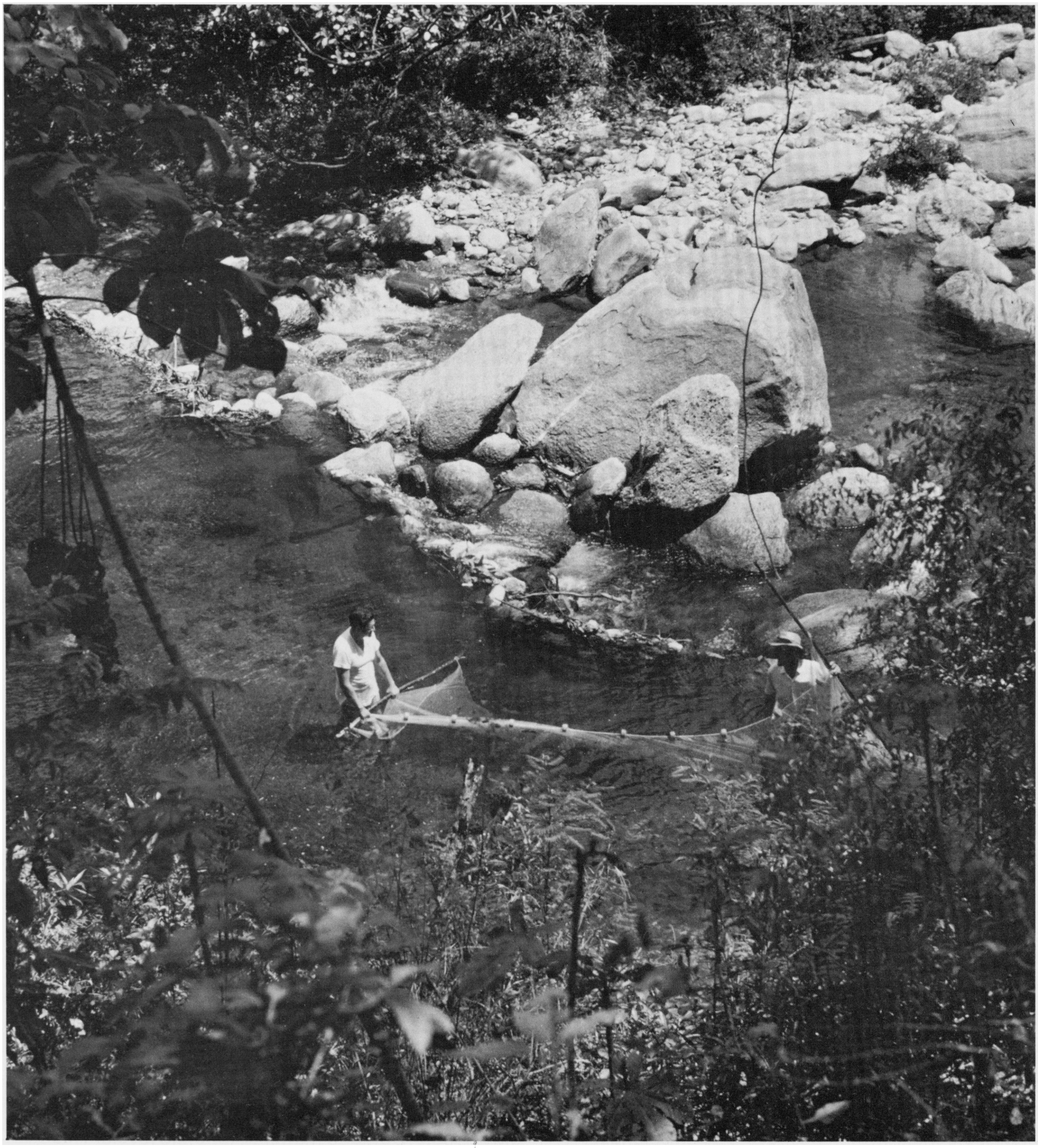
Richard G. Zweifel, *Chairman*

DEPARTMENT OF ICHTHYOLOGY

Research activities in the department greatly increased in number and diversity over last year and have resulted in the publication of seventeen scientific papers by Drs. Donn E. Rosen, James W. Atz, C. Lavett Smith, and Gareth J. Nelson, with another nineteen in press or in preparation; the completion of three expeditions (to Guatemala, the Virgin Islands and the Bahamas); and the addition of more than 16,000 new specimens to our research collections. Nevertheless, all these activities are in many ways overshadowed by the completion and publication by Dr. Atz of the first volume of the new *Dean Bibliography of Fishes.*

Although the Bibliography is but one of the department's many activities and concerns itself with ichthyological literature rather than with the fishes themselves, it is a program of vast dimensions. The Bibliography is a computerized analysis of the greater part of the significant ichthyological literature published during 1968. This index contains 512 pages of analyzed information and the 1969 and 1970 volumes now in preparation are each expected to be twice this size.

At the date of this writing many letters have been received in the department from among the more than 2500 ichthyologists and institutions around the world who received the first volume of the Bibliography. Even these early responses are overwhelmingly favorable. Praise has come from Dr. Carl L. Hubbs, one of the leading American ichthyologists, and Dr. Robert W. Harrington, Jr., president of the American Society of Ichthyologists. The letters have included such comments as, "The most outstanding ichthyological event in many years," and "The most important service ever provided for the world's



ichthyologists." The achievement of this goal by Dr. Atz within a period of three years is, of course, an unparalleled accomplishment that involved scholarly understanding, interpretation, and analysis of scientific literature as well as extensive research into computer methods for storing and retrieving information.

Dr. Rosen has begun a new research project to study the anatomy and relationships of the world's largest assemblage of marine and freshwater fishes. He is also conducting two long-range projects in collaboration with staff members of the British Museum. One study, on fishes of the Middle Triassic and Lower Cretaceous periods, has presented indications that modern types of teleosteans were already present in the Lower Jurassic. The other study, on the structure and relationships of deepwater alepocephaloid fishes, has disclosed that these fishes share a remarkable specialization of the gill apparatus with the oceanic fishes of the suborder Argentinoidei.

Dr. Smith, whose research interests focus on fish communities, believes the community structure is both the result of the setting for evolutionary processes. He is involved in several related studies of community ecology. One deals with observations of a patch reef community that Dr. Smith made during a two-week dive in the Tektite II underwater habitat in the fall. Another concerns ongoing observations made of coral reef fish communities near the Lerner Marine Laboratory in Bimini; an underwater television camera makes it possible to observe the undisturbed fishes in their environment.

Dr. Nelson is currently finishing a taxonomic revision of the species of Indo-Pacific gizzard shads, one part of a long-term study of clupeomorph systematics. He has been investigating the problem of clupeomorph relationships from varied standpoints which include the structure of the gut, the distribution of cephalic sensory canals, the anatomy of the skeleton and the superficial anatomy and meristics of discrete populations. Dr. Nelson is also continuing his work on comparative studies of the head in fishes generally, with particular emphasis on developmental anatomy.

Donn E. Rosen, *Chairman*

DEPARTMENT OF INVERTEBRATE PALEONTOLOGY

Invertebrate paleontology is markedly interdisciplinary within the life and earth sciences. Consequently, original investigations within the department during 1970-1971 were spread over several scientific subjects, always emphasizing broad scientific principles in functional anatomy, organic evolution, ecology, and classification of living and fossil marine invertebrates. These subjects contribute to an understanding of the evolution of marine life and also to the history of the physical earth, since invertebrate fossils provide the most convenient and generally the most accurate means for measuring and dating the geologic ages of rocks and geologic events.

Among the highlights of the year were the work by Dr. Niles Eldredge on functional anatomy and evolution of trilobites and other invertebrates, the discovery by Dr. Roger L. Batten of previously unknown details of the ultramicroscopic structure of the molluscan shell, and the research by Dr. Norman D. Newell on the evolution of the Bivalvia and on faunal extinctions through time.

The latter program of research resulted in plans for an international conference which will be held in Calgary, Canada, in August. The conference, which Dr. Newell helped organize, is to deal with the unique events at the boundary between the Permian and Triassic periods. About half the known families of animals of the time abruptly became extinct in a "catastrophe" at the end of the Permian. Causes of this extinction have been under study for some time by Dr. Newell and others, and the conference will provide an opportunity to inquire into current research on the topic.

With Mr. Sidney S. Horenstein, Dr. Newell continued the reclassification of Permian bivalves from the Salt Range of West Pakistan. While these fossils are used as a standard of comparison for similar marine faunas elsewhere, they had never before been studied with modern methods.

Dr. Newell spent eight days during July studying rocks and fossils of the Southern Hemisphere's ancient "supercontinent," Gondwanaland. This is part of his study of South America and Africa in Late Paleozoic times, just before the two continents drifted apart.

Dr. Batten has been able, because of access to an electron microscope, to investigate the cellular structure of Paleozoic gastropods more intensively than was possible with conventional optical microscopy. He has found that shell ultrastructure is very variable between individuals of the same or related species, but that there is less variation of the ultrastructure among higher taxonomic levels. This

suggests that shell structure may be modified by the environment, a prospect that opens important new research areas. Dr. Batten also found two previously unknown shell wall-structure types, both of which show growth lines on the outer surfaces. This project was shared with Professor Heinz Erben of Bonn University.

Dr. Batten joined with Dr. Allan Bé in a study of planktonic pteropods (opisthobranch gastropods) of the Atlantic Ocean. He will be principally concerned with documenting the shell ultrastructure in order to identify fragments found in deep-sea sediments above the carbonate compensation level. During the year Dr. Batten also saw the publication of the fine geological textbook, "Evolution of the Earth," which he wrote with Dr. Robert H. Dott, Jr., and was published by McGraw-Hill, Inc.

Dr. Eldredge has been studying the adaptation and functional morphology of fossil trilobites and living arthropods from various parts of the world. He is also actively reconsidering methodology in paleontological phylogenetics, the nature and meaning of phylogenetic trends, and the nature of speciation from the viewpoint of the fossil record. Dr. Eldredge spent three weeks in Quebec collecting Lower Devonian trilobites and additional time in New York State collecting Middle Devonian invertebrates.

The Micropaleontology Press has been partially restaffed and reorganized. It is now under the general editorship of Dr. Tsunemasa Saito, of the Lamont-Doherty Geological Observatory at Columbia University. Work resumed on annual catalog supplements of Foramanifera and of Ostracoda, and a new catalog of Polycystine Radiolaria is under production. Mr. Arthur N. Dusenbury, Jr., is the new Assistant Editor in charge of the Quarterly Journal *Micropaleontology,* with two new Assistant Editors, Mr. Norman Hillman and Mr. Martin Janal, having been appointed to work on the catalogs. Programming has begun of an information retrieval system for the literature of micropaleontology.

Drs. Newell, Batten, and Eldredge continue to hold professorships in Columbia University's geology department, and courses in aspects of invertebrate paleontology continue to attract well-qualified graduate students to the Museum. Certain courses are also now open to students at Rutgers University.

Norman D. Newell, *Chairman*

DEPARTMENT OF LIVING INVERTEBRATES

Diverse programs of research, curation, education and exhibition engaged the department's energies during the past year. In the field and laboratory, staff members studied the evolution of mollusks, classification of worms, and physiology of crustaceans, having 28 papers published and nearly completing several others. They supervised the addition of approximately 64,000 specimens, mostly mollusks, to the reference collections. They sponsored the research of seven undergraduates and three graduate students from local universities.

Dr. William K. Emerson progressed in his long term investigation of the late Cenozoic molluscan faunas of the mid-latitudes of the Western Hemisphere. This analysis was enhanced this spring by the addition of large collections of intertidal mollusks obtained by Mr. William E. Old, Jr., from Peru, Ecuador, and the Galápagos Islands. Much additional data on the ecology and zoogeography of these tropical mollusks are now available as a result of this field study.

For several years, Dr. Dorothy E. Bliss and her associates have been preparing extracts of central nervous tissues of the land crab, *Gecarcinus lateralis,* and treating these extracts with physical and chemical agents to determine the properties of molt-controlling hormones within the extracts. In the past year the need for a more sensitive quantitative means of expressing hormonal activity became apparent and considerable time was devoted to developing a method. Dr. Bliss and her co-workers also continued their efforts to determine how low temperature blocks molting in land crabs.

Dr. Ernst Kirsteuer advanced his studies on the systematics, anatomy and ecology of nemertean worms and on interstitial invertebrates of the Caribbean Sea. He conducted field investigations on the marine sand fauna and on nemertean worms found on coral reefs of Panama and Jamaica, W.I. Nearly 1000 specimens were collected and studied alive, and for the first time the occurrence of nemerteans in deep areas of tropical reefs was recorded. During the period of this report, three papers were published, three others were sent to press, and the first draft of a monograph on the west Atlantic and Caribbean species of the nemertean genus *Ototyphlonemertes* was virtually completed.

Dr. Horace W. Stunkard who on June 15 was awarded The American Museum of Natural History Gold Medal for Distinguished Achievement in Science, continued the investigation of the parasitic marine flatworms of the region of Woods Hole, Massachusetts. Over the past forty years, Dr. Stunkard and his students have elucidated the developmental stages,

Dr. Ernst Kirsteuer and colleagues from the Discovery Bay Marine Laboratory are shown collecting nemerteans from a coral reef in 160 feet depth on the north coast of Jamaica.

life cycles, and taxonomic position of 32 species of fifteen families of trematode worms. His work during the past year centered on laboratory studies of two species of trematodes which occur during their life-cycle in mollusks, fishes and birds.

Dr. Linda H. Mantel and her co-workers continued to study how blood and gut fluid of the land crab *Gecarcinus lateralis* vary in composition during the molt cycle of the crab and how the body fluids redistribute themselves at the time of ecdysis. Dr. Mantel and her associates use fractions isolated from neuroendocrine tissues of the crab to study changes in permeability of tissues involved in fluid movements.

Numerous important accessions—marine shells, mollusks and gastropods—came from such distant points as the New Hebrides, Papua, West Thailand, the Galápagos Islands, and the Mozambique Channel. The latter's deep waters yielded two species of shells, *Conus euroconatus* Sowerby III and *Phalium microstoma* von Martens, which were new to the collection.

With the part time assistance of Mrs. Mae Lackner and Mrs. Marjorie Bogart, Mr. Old supervised the cataloging of some 60,000 specimens of mollusks, thus enabling much of this new material to be placed in the systematic collections.

Mr. Harold Feinberg continues compilation of a catalog, now totaling about 120 pages, of the department's holdings of typological crustaceans. The decapod type specimens were relabeled for easier reading as a result of this project.

Dr. Emerson collaborated on the February exhibit, "Sea Shells, Gems of the Oceans." Dr. Kirsteuer contributed additional label copy and drawings for "Structure and Classification," currently on exhibit in the Hall of Biology of Invertebrates. Also for the Hall, Dr. Bliss, working with Dr. Jerome G. Rozen, Jr., and Miss Alice Gray of the Department of Entomology, completed scripts and provided scientific supervision for many segments of an exhibition to be called "Invertebrates and the Environment." The same collaborators worked on another exhibition, "Giant Invertebrates," scheduled to open in mid-1971. For a segment of the "Invertebrates and the Environment" exhibition, Dr. Mantel completed the scientific script on the physiology of adaptation, exemplified by an animal functioning in its environment.

William K. Emerson, *Chairman*

DEPARTMENT OF MAMMALOGY

The completion of numerous research projects, the initiation of several exhibition programs, and continued service to the profession and the public were representative of the department's activities during the year.

Dr. Sydney Anderson's study of the mammals of the Mexican State of Chihuahua, begun in 1956, was completed and will be published in the *Bulletin of The American Museum of Natural History.* The study encompassed classification as well as faunal and ecological relationships of more than 120 species, ranging from the opossum to the big-horned sheep. Dr. Guy G. Musser's studies of the systematics of Asian rats and mice were the subjects of eight published papers. Two papers by Dr. Musser on systematic studies of various neotropical rodents were also published.

The research interests of Dr. Richard G. Van Gelder have widened in recent years to include problems of population dynamics and spatial orientation, two closely connected areas that are of special interest today when overpopulation threatens human life. During the year he prepared two chapters of a book on spatial orientation and related behavior in mammals, and in July and August, with an undergraduate research assistant, he conducted population studies among small mammals at the Kalbfleisch Field Research Station. In the fall of 1970, as a member of the Friedman South West Africa Expedition, he collected some 60 mammal specimens, including skeletons of several species. The expedition gathered data about the spatial relations of various types of herd animals. Horn temperatures of antelopes were taken to check a hypothesis that horns serve as heat radiators during stress.

Dr. Karl F. Koopman published results of his research on the bat genus *Chalinolobus* in Australia and Africa. His analysis, suggesting that the Florida bat *Eumops* is a distinct subspecies of the more widely distributed tropical American bat, was also completed and a manuscript submitted for publication. Dr. Koopman continued his analytical studies of the taxonomy and distribution of Sudanese bats.

Mr. Hobart M. Van Deusen developed his investigations on distribution, taxonomy, and habitats of Australasian mammals. He submitted for publication four papers on bats, long-nosed spiny anteaters, water rats, long-tailed pygmy possums, and other marsupials.

Under Dr. Sydney Anderson's direction the department continued the preparation and cross-indexing of lists of the recent mammalian literature. Dr. Guy G. Musser served as editor of the General Notes section of the *Journal of Mammalogy* and Dr. Anderson edited the first seven numbers of "Mammalian Species."

Dr. Van Gelder gave courses in population dynamics and spatial relations and behavior at the Downstate

Medical Center of the State University of New York. He, Dr. Anderson and Dr. Koopman served on doctoral committees for students at the City University of New York and the University of Kansas.

A variety of services to outside groups and individuals were provided by members of the department. These services ranged from acting on requests to identify specimens to answering innumerable telephoned and written inquiries concerning mammals in general, as well as endangered species and other environmental problems.

In addition to giving numerous lectures on environmental subjects, Dr. Van Gelder and Dr. Anderson participated in several radio and television programs dealing with the environment and endangered species, including a five-hour Earth Day program broadcast from the Museum.

Three exhibits are now in preparation. One, on the mammals of New York State, is being supervised by Mr. Van Deusen. The other two are under the direction of Dr. Van Gelder and deal with the biology of mammals and the species that are threatened with extinction.

The Archbold Expedition, although not actually in the field during 1970-1971, nevertheless received a number of important bat specimens from cooperating groups doing field work in Malaya, Madagascar, New Guinea, and the Sulu Archipelago.

Richard G. Van Gelder, *Chairman*

DEPARTMENT OF MINERALOGY

Human society is confronted with serious questions with regard to the quality and durability of its existence. This results from an intricate web of socio-ecological pressures recognized by The American Museum of Natural History when it posed the Centennial question: Can Man Survive? These pressures introduce in turn a severe challenge to the function and activities of this department. In reporting on the year's activities it is best first to indicate that, in review, the value of many of the traditional activities emerges undiminished.

Basic research into the nature and evolution of the earth's crust with concomitant investigation of stony meteorites and the chemistry of lunar material has been continued by Dr. D. Vincent Manson. The study of a suite of igneous and volcanic rocks collected on an expedition to Newfoundland in July, 1970, is proceeding and will help elucidate the complex history of the proto-Atlantic Ocean.

A combined Mammalogy-Mineralogy field trip, The Friedman South West Africa Expedition in September and October, 1970, had as its principal mineralogical goal the investigation of the origin of a crater—Mount Brukaros—in the Gibeon meteorite-strewn field in Southwest Africa. Two new samples of the meteorite were documented and a collection made of rocks from Mount Brukaros to be subsequently studied at the Museum. Numerous minerals representing new localities were recovered for the collection. Of great value was the interdisciplinary observation of the interrelationship among fauna and flora in the harsh physical environment of this arid region.

The department continues to exert itself in communicating to the lay public the significance and excitement of these and related contemporary scientific contributions. Innumerable lectures, seminars and special courses were given during the year to the public, schools, university classes and amateur societies. Radio and television programs also provided many opportunities to present the department's contributions to the public.

Several temporary exhibits were prepared for the Museum, including, with the assistance of the National Aeronautics and Space Administration and The American Museum-Hayden Planetarium, the showing of an Apollo 12 sample. Detailed plans and preparations continue for the new Hall of Minerals and Gems. The invaluable assistance of Mr. Christopher J. Schuberth of the Department of Education is acknowledged in this major undertaking. The exhibit has the theme "Materials of the Earth" with the intent of providing an aesthetic and educational experience in the understanding of man's natural resources.

Mr. David M. Seaman contributes to the curation of the collections. Accession of 500 new minerals including three new species, 28 meteorites and thirteen tektites is noted. Significant among the accessions were a crystalline dioptase specimen, the gift of Mr. Cleveland E. Dodge and a twelve ounce nugget, the gift of Mr. David Webb.

Cooperation continues with numerous institutions, primarily in the form of specimen loans for scientific studies. Some 2500 requests from the public for assistance with information and identification were handled this past year and impose a growing responsibility upon this department.

D. Vincent Manson, *Chairman*

DEPARTMENT OF ORNITHOLOGY

As the education of young ornithologists has always been a prime function of the department, the open-

ing of modern teaching areas and laboratories for graduate study came as a welcome event. In residence now are three graduate students who are working under the Graduate Program in Evolutionary Biology, sponsored jointly by the Museum and the City University of New York. A number of other ornithologists are in various programs of research and training in the department; among these are three postdoctoral fellows under the Frank M. Chapman Memorial Fund.

Dr. Lester L. Short was appointed Adjunct Professor at the City University of New York and he, together with Dr. Wesley E. Lanyon who is also an Adjunct Professor, are responsible for the graduate research program in the Department of Ornithology. Dr. Lanyon and his group used the climate control rooms in the new laboratories to test a conclusion reached by the late William Beebe that the pigmentation in the plumage of birds can be influenced directly by the relative humidity of the environment. Other units in the laboratory are in use for studies of the factors influencing the reproductive success of the Australian Zebra Finch.

Dr. Lanyon continued his studies of South American flycatchers with field work in Argentina and Brazil and experimental work with related and other birds at the Kalbfleisch Field Research Station, of which he is Resident Director.

A worldwide study of the family of woodpeckers is the chief research project of Dr. Short. A major paper on his investigations appeared in *Bulletin of The American Museum of Natural History.* He is also preparing an analysis of the birds of the Gran Chaco of Paraguay. Dr. Ernst Mayr of Harvard University, who is a Museum Trustee and Research Associate in Ornithology, was the co-author with Dr. Short of a book, "Species Taxa of North American Birds, A Contribution to Comparative Systematics," which was published during the year.

Dr. Charles Vaurie continued his research on the large family of South American birds known as Ovenbirds or Furnariidae, and published a small book on their classification. The appearance of Dr. Vaurie's book on the birds of Tibet was delayed in press, but its publication is expected shortly. A major work on the type specimens of birds in the Museum by Mr. James C. Greenway, Jr., a Museum Trustee and Research Associate in Ornithology, went to press near the end of the year, as did the volume "Curassows and Related Birds," by Dr. Jean Delacour and Dr. Dean Amadon. Plans are also under way for a new edition of "Hummingbirds" by Mr. Crawford H. Greenwalt, to be sponsored by the Museum. The first publication was in 1960, and the book was highly successful.

Mr. G. Stuart Keith organized an ornithological investigation of the Mt. Nimba area in Liberia in the spring of 1971. Other members of the party were Miss Helen Lapham of the Department of Ornithology, Dr. James Carr of Princeton University, and Mr. Alec Forbes-Watson of the Kenya National Museum. Messrs. Keith and Forbes-Watson then proceded to Madagascar and plan a book on the birds of that island.

A profitable exchange of specimens between the Delaware Museum of Natural History and The American Museum of Natural History has been initiated, as the result of a collaboration between Dr. Amadon and Mr. John du Pont, President of the Delaware Museum and a Field Associate in Ornithology at The American Museum. An article on Philippine birds has also been published as a result of this collaboration.

Mr. Charles E. O'Brien's primary responsibility was the supervision of the study collection, which comprises about one million specimens of birds and eggs. A complete generic index to the collection was prepared under his supervision. For the first time since the late 1930's, assistance in curating the egg collection was available; Mr. Henry Pelzl began this task in 1970.

Mrs. Mary LeCroy helped all the curators in various ways. In addition she spent many weekends and much of her vacation participating in research on seabirds at the Museum's field station on Great Gull Island.

Dean Amadon, *Chairman*

DEPARTMENT OF VERTEBRATE PALEONTOLOGY

Plans for occupying the ten-story Childs Frick Wing, as well as decisions related to details in the construction, have involved most members of the department during the past year. Preparatory to the move, a program of cleaning, repairing and documenting parts of the Frick collection and the departmental fossil collection was begun. It is expected that the move into the Frick Wing will start in the fall of 1971; the curation project will continue for many years.

The important task of documenting the Frick Collection of fossil mammals has been carried forward mainly by Mr. Morris Skinner and Mr. Ted Galusha, who have also had papers published on late Tertiary deposits in Nebraska and New Mexico.

Dr. Malcolm McKenna, in collaboration with Drs. Richard H. Tedford of this department and Drs. Karl F. Koopman and Guy Musser of the Department of Mam-

malogy, is working on a new classification of the Mammalia; it is the first extensive revision involving both fossil and Recent forms since that of Dr. George Gaylord Simpson in 1945.

Other research on fossil mammals and the stratigraphic units from which they are derived includes Dr. McKenna's studies on the Paleocene and Eocene of Wyoming. Dr. Tedford's investigations of the history of the Carnivora and the Australian marsupials, Mr. Galusha's work on Pleistocene felids, Mr. Skinner's investigations on a variety of Pleistocene forms, and Mr. Beryl E. Taylor's revision of the Protocertaidae (ungulates).

Such research was necessarily conducted in the field as well as in the laboratory. Field studies were carried out by nearly every member of the curatorial staff, in most cases in the familiar yet always productive Triassic, Jurassic, Cretaceous, and Tertiary beds of the western United States. Dr. Tedford took his field studies to South Australia in the summer for a three-month expedition, conducted jointly with the Smithsonian Institution and the South Australian Museum. He and his associates spent most of their time at the Quaternary deposits of Lake Callabonna, a classic but little-investigated site that proved to be a rich repository of exceptionally complete mammal material. The *Diprotodon*-bearing laminated clays were rich not only in large marsupials and birds but also in trackways, plant remains, mollusks, ostracods, and rare insects. Dr. Tedford returned to Australia in May to pursue studies of the late Mesozoic and early Cenozoic rocks of the Artesian Basin.

Aside from completing a paper on the cranial anatomy of the holostean fishes, Dr. Bobb Schaeffer devoted most of his research time to Triassic and Jurassic higher bony fishes from Western North America. The Jurassic is a significant interval in regard to the origin of modern fishes, particularly the sharks and teleosts. Since American Jurassic material is scanty, an effort is being made to obtain good specimens for description and for comparison with more numerous and well-documented European taxa. In co-authorship with Dr. Max K. Hecht of this department and Dr. Niles Eldredge of Invertebrate Paleontology, Dr. Schaeffer completed a paper on the broader aspects of evolutionary and systematic paleontology and the role of Paleontology in phylogeny.

Dr. Eugene S. Gaffney, who is now in charge of all the activities related to fossil amphibians and reptiles, is completing several major papers on the history of the turtles, including the Mesozoic baenoids. He is also describing a new Triassic reptile fauna from North Carolina.

Visiting scientists inevitably bring varied approaches to intellectual problems. This year the department benefited from the visits of a number of colleagues, including Dr. Rubens da Silva Santos from Brazil and Dr. Taseer Hussain from Pakistan.

Bobb Schaeffer, *Chairman*

SPECIAL ACTIVITIES

ARCHBOLD BIOLOGICAL STATION LAKE PLACID, FLORIDA

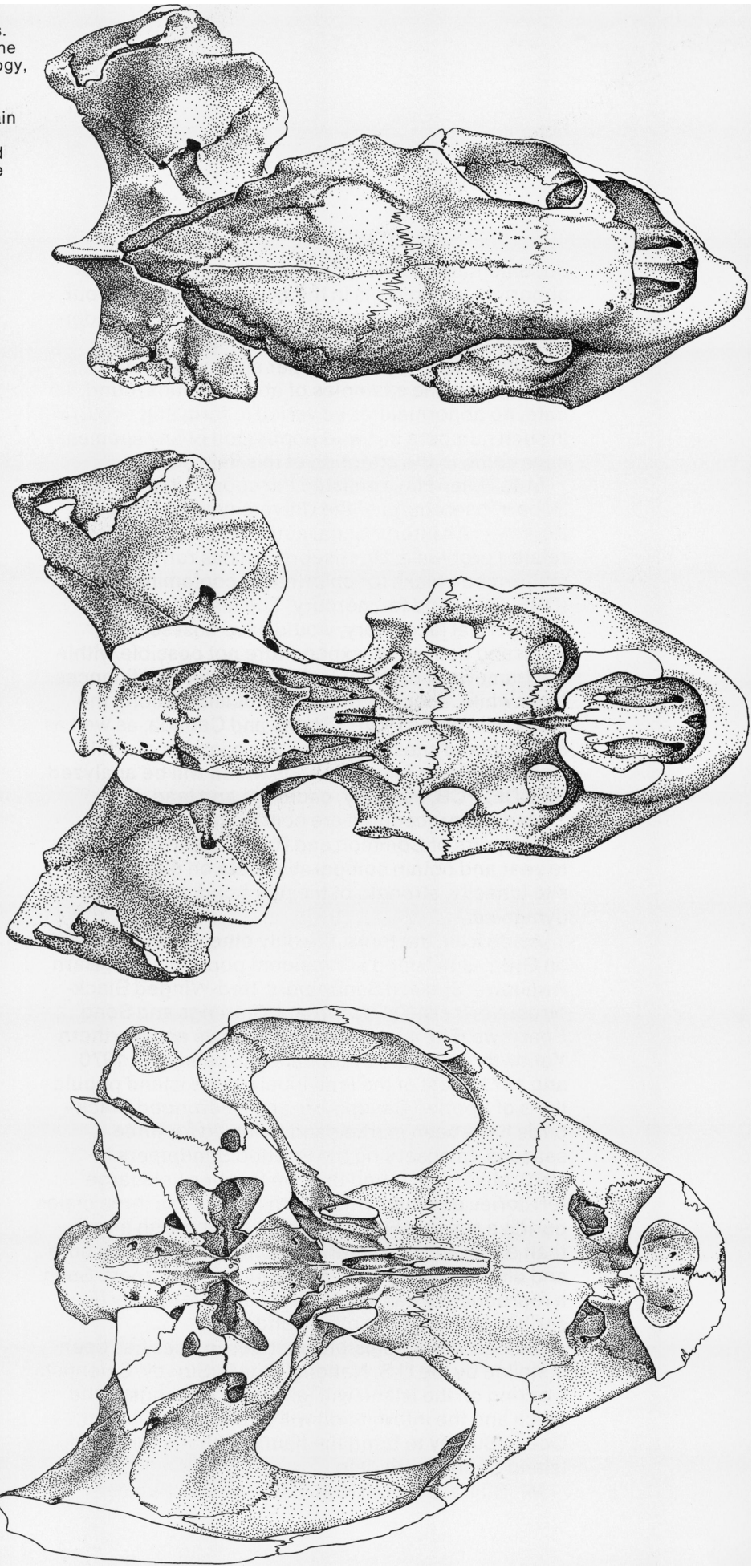
Studies of the major ecosystems of the station and its environs were continued during the past year. A large part of this program consisted of detailed investigations of the population, ecology, and life histories of the mammals and other vertebrates of the station. In addition to field studies, various aspects of behavior and physiology relevant to a fuller understanding of the ecological relationships of certain species were also examined in the laboratory. Further data on the micro-climates of the station were obtained, including seasonal variation in air temperature and soil moisture for each vegetation type. The annual crop of oak, hickory and palmetto, which appears to have an important bearing on population cycles of certain species, was censused for the second year.

In addition to station personnel, a number of other persons aided in these projects. These included Mr. Edward Vine, Middlebury College, and Mr. Gerald Lieberman, University of California at Los Angeles, both participants in the Undergraduate Research Participation Program, Mr. John Douglass, Harvard University, who served as an undergraduate volunteer assistant, and Miss Marsha Siegler and Miss Susan White, graduate students at the University of South Florida.

Dr. Daniel S. Fertig, California State College at Los Angeles, collaborated with Dr. James N. Layne on a study of the physiological ecology of the cotton rat and the rice rat, which are important members of various natural ecosystems of Florida.

Thirty-five investigators representing seventeen

The determination of the paths of descent and the history of living things often involves the study of complicated anatomical structures. The example illustrated concerns studies on the history of turtles. The upper drawing, prepared in the Department of Vertebrate Paleontology, is a top view of one of the most ancient sea turtles, found in rocks about 200 million years old. The middle drawing shows the same specimen with the upper parts of the skull cut away to reveal the brain case and the various holes and channels for blood vessels, nerves, and muscles. The lower drawing is a skull from a sea turtle collected live recently, also with the roof cut away. Careful comparisons of the structures inside the two skulls led to the conclusion that this particular fossil turtle skull is the oldest currently known relative of modern sea turtles.



institutions utilized the station facilities during the year. Their research projects covered a broad range of subjects, as illustrated by the following samples. Dr. Gary D. Bernard, Yale University, continued his studies of the insect compound eye, focusing on the role of corneal coloration in diurnal Dipters (flies). Dr. John T. Emlen, University of Wisconsin, used the station as a base of operations in his investigation of the ecological distribution and abundance of land birds inhabiting pine forests of the southeastern United States and the northern Bahamas. Dr. Hans Dreisig, University of Copenhagen, in his second stay at the station, continued his research on the external and internal factors involved in the timing of activity cycles in insects with studies on locomotor activity in cockroaches, light emission in fireflies, and stridulation in orthopterans. Dr. Dean Amadon of the Museum staff continued his long-term studies of the birds of the station and environs.

In addition to visiting investigators, 671 other persons visited the station during the year. This number includes 21 groups, mostly high school and college classes.

The station was active in environmental affairs. Staff members lectured on a variety of environmental topics and consulted frequently with individuals, groups, and governmental agencies on ecological problems. The station participated in a campaign to protect the remaining black bear population in the state and in the preliminary planning of an inventory of rare and endangered Florida wildlife.

Thirteen papers or reports were published during the year by station personnel, and twelve others are in press or being prepared for publication. Ten publications based upon research of visiting investigators appeared during the year and ten others which had appeared in 1968 or 1969, but were not included in previous reports, were added to the station bibliography.

Richard Archbold, *Resident Director*

GREAT GULL ISLAND
LONG ISLAND SOUND, NEW YORK

A comparative study of large concentrations of Common and Roseate Terns on Great Gull Island, begun in 1969, continued in the spring nesting seasons of 1970 and 1971. A team, formed at the start of this project, studied production in the colony with special reference to the effects of pollution. One of the most significant results of the study was

documentation of an increase in the occurrence of abnormal young terns in the colony. A tern with four legs, another with asymmetrically placed and underdeveloped eyes, and another with maloccluded mandibles (a misshapen upper and lower beak) were among the examples of abnormalities found. To date, no abnormalities so varied in form and occurring in such numbers in a wild population of any species have come to the attention of this field station.

Miss Helen Hays enlisted the cooperation of Dr. Robert Risebrough of the University of California at Berkeley. An international authority on pesticides and related problems, Dr. Risebrough has run tests on the malformed chicks for chlorinated contaminants (DDE, PCB) and for mercury. The tests, if sent to a commercial laboratory, would have cost several thousand dollars, an expenditure not possible within the framework of Great Gull Island's limited finances. Meanwhile, cooperators at five localities along the east coast of the United States and Canada, as well as at two inland sites, are collecting samples of adult Common Terns and their eggs which will be analyzed for DDE, PCB, mercury, cadmium and lead.

Marking procedures are continuing in order to follow pairs of Common and Roseate Terns from year to year and obtain comparative data on clutch size, site tenacity, strength of the pair bond, and population dynamics.

Aside from the terns, the only other birds that nest on Great Gull Island are resident populations of Barn Swallows, Spotted Sandpipers, Red-Winged Blackbirds, Northern Yellowthroats, Starlings and Song Sparrows. The island's Barn Swallows and Northern Yellowthroats were systematically banded in 1970 and 1971. Most of the individuals in the island populations of Spotted Sandpipers and Redwinged Blackbirds have been marked and followed for three seasons. In observing the Spotted Sandpipers in 1970, Miss Hays found that the females held large territories and might mate with as many as three males during a season. Females which nested with more than one mate were seen with only one male at a time and clutches of eggs were about ten days apart. Such a reproductive pattern has not been previously described in this or any other sandpiper.

A clock which registers changes in tides has been installed by the U.S. National Ocean Survey. Scientists working on the island will take daily readings of the clock and the information will enable the National Ocean Survey to bring the nautical charts for Long Island Sound up to date.

Mr. Richard E. Harrison, the widely known cartographer-conservationist, has completed six signs warning people away from Great Gull Island. The signs have been placed at landing areas around the island's periphery and have significantly decreased attempted landings by unauthorized persons.

Talks on the activities at Great Gull Island were given by the staff and volunteers to the following groups: the Hackley School, Thames Science Center and the Essex Conservation Organization, The Williams School, the Chapin School, Goucher College, and The Burroughs Club of Johnstown.

Helen Hays, *Chairman, Great Gull Island Committee*

KALBFLEISCH FIELD RESEARCH STATION HUNTINGTON, LONG ISLAND, NEW YORK

For the twelth consecutive summer, the Kalbfleisch Field Research Station participated in the Museum's Undergraduate Research Participation Program, sponsored in part by the National Science Foundation. Twenty-one college undergraduates were in residence during the year. They were from California State College at Long Beach, City College of New York, Cornell University, Fairleigh Dickinson University, Michigan State University, New College, Ohio Wesleyan University, Pomona College, Princeton University, Rutgers University, University of Florida, University of Michigan, University of Nebraska, University of New Hampshire, University of Rhode Island, University of Rochester, and Villanova University.

Three graduate students in the Graduate Program in Evolutionary Biology, sponsored jointly by the City University of New York and the Museum, used the station as a base for their doctoral investigations. Mr. and Mrs. Robert Madden continued their studies of flying squirrels and box turtles. Mr. David N. Ewert is studying individual and intrapopulation variation in the songs of the Rufous-sided Towhee, *Pipilo erythropthalmus.*

Biology classes from Queens College and from C.W. Post College conducted field trips at the station this year.

Eleven senior investigators used the station's resources for their research programs during the year. Ten of these were from the Museum's staff: Dr. Kenneth L. Franklin, Dr. Richard G. Zweifel, Dr. Donn E. Rosen, Dr. Gareth J. Nelson, Dr. Klaus D. Kallman, Dr. Richard G. Van Gelder, Dr. Wesley E. Lanyon, Dr. Lester L. Short, Dr. Max K. Hecht, and Dr. Jack McCormick. Dr. Jon Greenlaw, Assistant Professor of Biology at C.W. Post College, was the only non-staff

senior investigator present. These scientists were conducting research in long-term projects.

The station acquired a five acre parcel of land, located along its southern boundary, through the generosity of Mrs. Rosalind Havemeyer. This increases the overall size of the station to approximately 98 acres. One of several attractive features of this new addition is a vernal pond utilized by breeding amphibians and migrating birds.

Two publications, based wholly or in part upon studies at the station, appeared during the year. Dr. Lanyon and Mrs. Vernia H. Lanyon were the authors of an article, "A Technique for Rearing Passerine Birds From the Egg," that appeared in the *Avicultural Bulletin. Bird-Banding* carried an article by Mr. Allan R. Phillips and Dr. Lanyon on "Additional Notes on the Flycatchers of Eastern North America." Other manuscripts based on research at the station are in press or in preparation.

Wesley E. Lanyon, *Resident Director*

LERNER MARINE LABORATORY BIMINI, BAHAMAS

Tropical storms, heart disease, shark attack-behavior, and one form of blindness in man, were among the research subjects at this laboratory during the past year. An unprecedented number of investigators visited the laboratory during this, the "post-construction era," including scholars from dozens of universities and research institutes.

Research highlights included a continuing study of shark feeding and aggregation behavior stimulated by amino acids and amine cues. Investigation included the use of electro-physiological apparatus especially designed and constructed for these studies and put to work for the first time anywhere. The Underwater Television Array will be used to record and observe the effect of graded stimuli on shark behavior. The study is being conducted by Mr. Robert F. Mathewson, Resident Director of the laboratory, and Dr. Edward S. Hodgson of Tufts University, a newly-named Research Associate of the laboratory.

A project which might shed light on certain kinds of heart disease, especially among those who work under high air pressure, is also in progress under the direction of Mr. Mathewson, Dr. M. Michael Sigel, Dr. David Becker and Dr. George Janz. Preliminary data indicate that quick and great pressure changes may produce a significant increase in the incidence of heart muscle infarction in test animals. Various testing procedures at the laboratory have helped provide a good base-line of information on pressure effects thus far and work is continuing.

Tropical storms were studied by an international team from the United States, West Germany, Canada, and the Bahamas. Studies of weather conditions, sea-air interface characteristics, and air and sea currents as they contribute to the intensification of tropical open-water disturbances such as storms and hurricanes, have contributed considerable information about the "feeding" and strengthening of such phenomena.

Still another study under the direction of Mr. Gerbert Rebell of the University of Miami School of Medicine dealt with a mold-caused disease, keretitis, which is responsible for some blindness in man. Mr. Rebell isolated the mold, *Fusarium solani,* from turtles. The mold found on the turtles closely resembles that found on man, particularly in pigmentation.

The Tropical Marine Biology Field Course, directed by Dr. Hodgson, attracted 24 biology students accompanied by four instructors to the intensive, full-time program in January. As an indication of the interest, value and enthusiasm of the students, a follow-up questionnaire elicited almost unanimous desire by the students to return for another course. In April a shorter but equally intensive course was conducted by Dr. William Hay of the University of Miami and the University of Illinois. Thirty-seven students attended, and this too received a very enthusiastic response. The courses will be held in 1972.

During the year, the laboratory participated in a three-day public health survey of Bimini. The laboratory contributed housing and subsistence to a visiting medical team, which provided medical tests for local residents, most particularly the young people.

Robert F. Mathewson, *Resident Director*

SOUTHWESTERN RESEARCH STATION

The Museum's foresight in retaining a relatively untouched base for scientific investigations in Arizona is becoming more apparent as the years go by. With the present tremendous development of the southwestern United States this preserve will be even more important in the future.

During the past year a total of 656 visitors stayed at the station. They included scientists and scientific assistants as well as 359 students in 16 classes.

In research, Mr. Vincent D. Roth described a here-

An extra quality of verve appeared in the Museum halls this year when 40 young people began work as Museum interns. Most of them had special interests in anthropology and some were members of the ethnic groups whose early artifacts are displayed in the halls. They struck up conversations with visitors, answered questions, pointed out exhibits, and contributed greatly toward giving visitors an appreciation for the cultures depicted in the Museum halls. Here Miss Cheryl Chaney (right) talks to a family touring the Hall of Eskimos.

tofore undescribed species and genus of spider from Sonora, Mexico, of the family Desidae. He also studied the defense mechanisms of tarantulas.

Visitors at the station discovered a living specimen of *Phrynosoma ditmarsi,* Ditmars' Horned Lizard, which had not been seen since 1897. With little information to work from, this "lost" species was "found" again on a field trip and studied at the station. The living specimen was sent to the Museum's Department of Herpetology.

Among other topics under investigation by visiting scientists were the physiological characteristics of desert toads, the behavior of Lynx spiders, the structure of ant communities, the social behavior of army ants, and the hybridization of Pinyon pines. Other lines of inquiry dealt with the paleontology and stratigraphy of the Chiricahua Mountains and the welded volcanic tuffs of the same locality.

Lectures were given to 230 persons at the station and two "E Week" ecology talks were delivered in Douglas and Animas, Arizona. The collections were increased by 500 additional insects, including 240 species, mainly weevils, darkling ground beetles, ground beetles, and fulgorids.

During the year Mr. Roth was appointed Research Associate in Biological Sciences at the University of Arizona.

A special Leitz binocular microscope with drawing attachments was added to the station's equipment and improvements were made to the station itself including the addition of a screened porch for aquaria.

Vincent D. Roth, *Resident Director*

DEPARTMENT OF EDUCATION

The services for the New York City schools are still the major concern of the department's activities. Programs supervised by Miss Marguerite R. Ross and Mr. C. Bruce Hunter provided instruction for more than 60,000 pupils. The majority of these were elementary school students, but the department this year intensified its work with junior high, high school, and community groups. Special courses were given at the Museum for schools attempting to break away from the traditional closed classroom. Lectures were given at residential rehabilitation centers for drug addicts and an experimental program was begun to train para-professional workers from day care centers and other community organizations.

The department was fortunate in receiving several sizeable grants this year. The largest, in excess of half a million dollars, from the Mary Flagler Cary Charitable Trust created new staff positions in Caribbean studies, Afro-American studies, and natural science for a three year period. It also included funds for new programs and for creating an experimental teaching area within the Museum. The department reclaimed an area on the first floor and mounted its first substantial exhibit in years, "Art from Intermediate School 201." This space which will continue to serve as an exhibition area was made possible by the grant.

An $84,000 grant from the New York State Council on the Arts supported a Teaching-Intern Program in four exhibition halls. Young people, mostly high school seniors or college students, were trained to provide information in these halls and served the visiting public daily.

A greatly expanded scholarship program enabled us to bring larger numbers of neighborhood youngsters into Saturday classes which were attended by hundreds of children.

With a grant from the New York Foundation and continued support from the Louis Calder Fund, the Natural Science Center supervised by Miss Catherine M. Pessino continued its programmed instruction for several thousand school children and on afternoons and weekends received almost 50,000 additional visitors. The Louis Calder Natural Science Laboratory moved into newer and more spacious quarters opposite the Natural Science Center.

The lecture series in the Evening School for Adults continued to draw heavily and maintain the high calibre for which they have become known. The same was true for the college level in-service courses for New York City teachers of which the department offered twenty-two this year. The in-service courses are all accredited by the City College of New York.

Mr. C. Bruce Hunter, the Evening School's director, again led an archaeology tour to Meso-America, and once again the tour was fully subscribed. Miss Farida A. Wiley continued the nature walks for which she is renowned and Mr. Kenneth A. Chambers and Mr. Christopher J. Schuberth worked on exhibits with the Departments of Ornithology and Vertebrate Paleontology respectively.

Working closely with Mrs. Miriam Pineo and Mrs. Marjorie M. Ransom, volunteers aided the department in many ways beyond their service at the Information Desks. Groups of volunteers trained on particular subjects acted as Teaching-Guides in halls and as instructors with programmed classes. Volunteers also assisted in refurbishing loan items in the Circulating

When an exhibition of photographs of arachnids was opened in November, two huge spider webs appeared near the ceiling. They were the work of students of the School of Visual Arts, who are learning artistic crafts in a work-education program being conducted in cooperation with the Museum.

Exhibits section and assisted in Departmental research. We look forward to an increasingly organized and productive volunteer group next year.

There were many continuous programs including Gallery Talks, Slide Talks, the Golden Age Program and the Nurse Education Program.

The weekly public film programs which were attended by some 35,000 people underwent considerable change in content. Commercial travelogues were replaced with more scientific and aesthetically pleasing films.

The Hospital Visitation Program, supervised by Miss Catharine E. Barry, reached handicapped children in more than a hundred hospitals and special schools. The Circulating Exhibit Division, supervised by Mr. Carlton B. Beil, delivered loan exhibits to more than 300 schools.

Malcolm Arth, *Chairman*

DEPARTMENT OF EXHIBITION AND GRAPHIC ARTS

The major event of the year was the opening on May 19 of the Hall of Peoples of the Pacific. The design of the hall started in 1960 and construction was finished in late 1968. During the next two and one half years the displays were installed.

The ambiance of the hall is notably different from that of any other in the Museum. A sky-blue luminous ceiling was installed to suggest the limitless expanse of the Pacific Ocean. Light from this and recessed spotlights shines through the aluminum framed all-glass cases to give a peculiarly out-of-doors atmosphere to the exhibits. A sound system played background music appropriate to the various culture areas which alternated with the sounds of the sea.

Work continued on the Hall of the Biology of Invertebrates. In the remaining unfinished section, "Adaptation to Environment," five marine habitat groups were installed and the exhibit of giant invertebrates was completed as were other introductory and explanatory displays.

Preparators who worked on the Hall of Peoples of the Pacific are now busy in the Hall of Amphibians and Reptiles. While construction on the hall continues, habitat groups are being assembled in the Department of Exhibition for future installation.

Preliminary plans and specifications for three future halls were drawn up during the year. These are the Halls of Minerals and Gems, Peoples of Asia, and the Biology of Mammals. In this, the department worked closely with the Exhibition Committee and William F. Pedersen Associates, the Museum's consulting architects.

The Theodore Roosevelt Memorabilia are being readied for relocation on the first floor of the Roosevelt Memorial Building where they will be installed in conjunction with a new conservation exhibit. The Lincoln Ellsworth Memorabilia are also being renovated, as is the exhibit of New York-area birds and mammals.

On May 16, "Can Man Survive?," the Museum's centennial exhibit, was closed two years to the day after it was opened. In the Corner Gallery, October marked the introduction of an exhibit of color photographs by Dr. Nathan Cohen, of the University of California at Berkeley. The exhibit, "Environmental Adaptation in Reptiles and Amphibians," remained on view until January. The gallery was then redesigned for the first in a series of multi-media presentations: "Boricua-Aquí y Allá," (Puerto Ricans—Here and There). The slide-projection presentation, a 20-minute, 500-slide show that traced the history and culture of Puerto Ricans, was opened on March 2 and continued until the end of May. In the second floor African Corridor "Design from Nature," the exhibit of drawings and sculpture by Pratt Institute students was succeeded by an exhibit of color photographs of spiders and spider webs by Ann Moreton. It included a collection of live spiders and tarantulas and continued through mid-June, this was followed by a display of kites from the Museum's Chinese kite collection.

A new gallery for temporary exhibits has been constructed in the area outside Education Hall on the first floor. This will be used for display organized by the Department of Education. The first such show, "Art from Intermediate School 201," was opened in April.

The Exhibits of the Month continued throughout the year, ranging from a display of mammals on postage stamps to specimens of fish affected by pollution in the New York area. Renovation of the Hall of African Mammals was also furthered and the Okapi, Libyan Desert, Gemsbok, and Giant Sable groups were completed.

Of all the Graphic Arts Division assignments, the most notable was the design of the first issue of the *Dean Bibliography of Fishes.* This 600-page index of ichthyological literature is probably the largest single project ever carried out by the division.

Gordon R. Reekie, *Chairman*

LIBRARY

A review of the objectives, scope and policies of the Library was begun and will continue into the next year.

At the Library's request, the New York State Interlibrary Loan Network reevaluated the Library and designated it as a referral center only for those natural science subjects that fall within the Museum's scope of primary concern. By eliminating such broad subject matter as archeology, agriculture, and botany, the 2114 requests received from libraries throughout the United States and Canada were handled more satisfactorily and ran to about 300 fewer requests than were received in the previous year.

All other areas of work showed increased activity. The Library served 13,705 readers, circulated 72,820 items, searched 12,342 call slips, answered 13,547 reference questions, and supplied 14,784 xerox pages. Six hundred monographs and 14,634 journal issues were among new and important material added to the collection.

New procedures to reduce the costs of cataloging by nearly 50% were instituted and a revision of the fifteen-year-old acquisition policy was begun.

The process, started in March, of reclassifying some 7500 titles to conform with the Library of Congress classification system, will be completed in September and represents an important step toward the eventual total revision to Library of Congress classification.

Publication of the Library's catalog, which reflects one of the world's outstanding natural science collections, has been given serious consideration. The catalog probably will be published in the next fiscal year and could yield a modest income.

Under a grant from the New York State Council on the Arts, reorganization and consolidation of the stacks were begun in March. Some 30,000 pamphlets were removed from the shelves and placed in pamphlet boxes for easier handling and more effective preservation. Folio volumes were transferred to flat shelf storage. All monographic works were put into their proper class order. Other materials were alphabetized and the stacks carefully labelled. New space has been provided for materials that are to be cataloged eventually by Library of Congress classification.

Work has continued in the Library's map room, designed to house a collection of geological, geographical, and topographical charts. New storage equipment was purchased and additional maps acquired.

Valuable books were donated by Dr. Richard G. Van Gelder and Dr. Robert Cushman Murphy.

The Library was host to librarians from Argentina and the Netherlands. The staff attended several professional meetings and during visits to other libraries observed procedures and exchanged views.

A large force of student aides, working under the Work-Study Urban Corps programs, was assigned to a variety of departmental tasks that enabled the Library to meet its commitments.

Miss Nina J. Root was appointed Librarian. Other appointments during the year were: Miss Mildred Bobrovich, Reference Librarian, and Mrs. Blanca Fukanaga, Cataloger.

Nina J. Root, *Librarian*

PUBLICATIONS

A decision was reached early this year to undertake a more vigorous promotion for members and subscribers to *Natural History* Magazine. It was anticipated that competition in the specialty magazine field and economic problems might offset the circulation level it had reached unless steps were taken to assure its stability. Further the success of the magazine in recent years, both editorially and in terms of its promotion, was so evident that a reasonable opportunity to improve its circulation seemed to be at hand.

Fortunately, these premises proved to be correct. Improvements in the editorial quality and the standards of manufacture were introduced, and promotional efforts and expenditures were increased by more than 60 per cent. These efforts were successful in realizing the goals established. By June of 1971, paid circulation had increased by nearly 20 per cent above the level of last year. And the reader response to the magazine, as reported by the editor, indicates clearly the success of its new editorial vigor.

Still in negotiation is the revision of the Museum's relationship to Doubleday & Company, Inc., with the objective of continuing the successful book publishing program of the Natural History Press, but under terms that allow the Museum greater flexibility in its publishing program and remove some of the financial risk the Museum had shared. We are optimistic that a new contract, terminating the undesirable features of the former arrangement, favorable to both the Museum and Doubleday, will be concluded this summer.

Meantime, the Museum has begun to build and strengthen a broader publishing potential around the nucleus of the *Natural History* Magazine staff. Funds were made available to stimulate the publication of book-length manuscripts, and the second catalog

to be published this way is under contract and in process. Editorial and publishing responsibility for *Curator,* for publishing the James Arthur Lectures, for continuing the development and publication of the Man and Nature Lecture series, and for revision and publication of the Museum general guide has been assigned to *Natural History.* It is expected that other publishing ventures, desirable for the Museum to undertake in the extension of its educational and scientific goals, will be initiated as the need and opportunity arise and as the *Natural History* staff continues to develop its experience and competence more broadly.

Thomas D. Nicholson, *Director*

CURATOR

Curator completed its fourteenth year of publication with a circulation of approximately 1000. The journal has received the bulk of its contributions from professionals in other Museums, and in many cases published articles attracted lively responses that were printed as follow-up articles. *Curator* thus offers a forum to discuss the challenges and changes that are characteristic of modern museology.

Volume XII was completed with the publication of 320 pages. The second number of Volume XIII brought the number of pages in that set to 171. Dr. Thomas D. Nicholson was assisted in performing the editorial duties by Miss Janet Chernela, who was succeeded during the year by Mrs. Avis Kniffin, Associate Editor of *Natural History.* The staff of the Museum and particularly the Editorial Board of *Curator* continued their active and valuable participation in the journal's publication.

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

NATURAL HISTORY

Natural History had an energetic and innovative year. The magazine improved its appearance by doubling the number of editorial color pages. It published three special supplements—"The Gaeltacht of West Kerry," "The State of the Species: Beyond Civilization," and "Peoples of the Pacific"—and produced a long-playing record album, "The Language and Music of Wolves," which was distributed as a members' bonus. The magazine is in final negotiations with Columbia Records for commercial distribution rights to the record. An offshoot of the release of the album was a wealth of publicity, both national and international, ranging from front-page stories in *The New York Times* and exposure on major television networks to international coverage by news agencies.

Continuing its broad editorial emphasis on the area of environmental issues, the magazine gained wide notice through such articles as the ecology questionnaire, Arthur Westing's "Ecocide in Indochina," and Jack Hope's "Hassles in the Park." Reader response, hitherto sporadic, has virtually snowballed, stimulated by both a regular "Letters to the Editor" column and a growing circulation. Indicative of the response from the academic community was the experience of author Kenneth Watts. He received well over a hundred requests from scientists around the world for reprints of the article,"The Long Arm of Biological Law."

The magazine experienced a substantial increase in circulation during the year. In June, 1970, paid circulation stood at 238,000. The estimate for June, 1971, is 285,000 paid circulation. Advertising revenue increased substantially, from $308,596 in the previous year to $375,473 is the fiscal year 1970-1971. This dollar increase is attributable to more pages of color advertising and to higher page rates due to the increased circulation.

In addition to publication of the magazine, the *Natural History* staff was active in the publication of *Curator* and of the James Arthur Lectures on the Evolution of the Human Brain. The magazine, in conjunction with Charles Scribner's Sons, has arranged for the resumption in October of the Museum's distinguished Man and Nature Lectures.

Finally, the year saw a protracted effort to analyze and redirect the magazine's circulation fulfillment program. At year's end, a contract was signed with a new service bureau with a view toward providing readers a more efficient and reliable computer subscription service.

Alfred Meyer, *Editor*

SCIENTIFIC PUBLICATIONS

The Office of Scientific Publications published one part in *Anthropological Papers,* totaling 125 pages; eleven articles in the *Bulletin,* totaling 802 pages; and 38 numbers in *American Museum Novitates,* totaling 927 pages. This is a combined total of 1854 printed pages.

An estimated total of 523 pages for the *Bulletin* and ten numbers for *Novitates* is in press as of the date of this report.

Florence Brauner, *Editor*

OFFICE OF PUBLIC RELATIONS

Gathering, preparing and disseminating information about the Museum's activities continued as the primary concern of the Office of Public Relations. All categories of news media were made aware of these activities through press release campaigns augmented by personal contacting of feature writers, assignment editors, commentators, and program producers. These efforts resulted in massive coverage by the print and broadcast media of such events as the Museum Cadet summer job program, West Side Day, the Apollo 12 Moon Rock display, several *Natural History* feature articles, the Puerto Rican exhibit, the showing of art and sculpture by students of Intermediate School 201, Earth Day and the Hall of Peoples of the Pacific.

Major periodicals and newspapers reporting on the Museum in 1970-1971 includes *The New Yorker, Time, Newsweek, The New York Times,* the *New York Post,* the *New York Daily News,* the *Washington Post,* and the *New York Sunday News.* The Rotogravure section of the *News* published a picture spread on the Museum's "attic" collection of artifacts and an equally large photographic feature on the Chesley Bonestell paintings of outer space shown in The American Museum-Hayden Planetarium. "Wolf Day," *Natural History's* promotion for a specially-produced record album of wolf howls, issued in conjunction with its articles on the wolf as a misunderstood and endangered species, landed on the front page of *The New York Times* with a double story, one part of which was written by their music critic, Mr. Harold C. Schonberg. Newspapers throughout the world, through the services of the Associated Press and United Press International, used the story.

More than 100 local and regional television newscasts carried filmed reports on Museum exhibits and special events. Museum staff members made guest appearances on television and radio shows produced in over 500 cities across the nation. The reputation of the Museum was further enhanced through nine special broadcasts ranging from a five-hour, question-and-answer Earth Day program aired by WPLJ-FM (ABC Radio's New York outlet) to a one-hour interview with Dr. Margaret Mead in the Hall of Peoples of the Pacific on WNBC-TV's nationally syndicated "Speaking Freely."

In the spring, a set of color filmspots was produced; they were the first TV film "commercials" in Museum history. It is expected that the messages will be shown by all New York channels and by selected television stations elsewhere.

In addition to publishing the Museum's Annual Report and its newsletters, the Office of Public Relations produced a basic information brochure about the Museum, and special aids to visitors including the Micro Tour and Highlight Tour folders. It helped to plan and publicized the Exhibit of the Month series and it coordinated poster and information material for bulletin board display. It evaluated frequent requests by outside groups for permission to do still and motion picture work in the Museum, and those approved were given direct assistance by the staff.

The office answered an average of 100 letters a month from children requesting information on such topics as dinosaurs, American Indians, evolution of the horse and of man, ecology, cannibalism and how to become a curator.

The February issue of *Public Relations News* followed up its earlier accolade for the office's Centennial Year promotion by citing that campaign as one of the "ten outstanding" of the year.

Roberto Rendueles, *Manager*

GUEST SERVICES

The demands upon Museum space and services throughout 1970-1971 did not, as might be expected, lessen with the completion of the Centennial Year.

Museum projects, and activities conducted under the aegis of outside organizations were attended by more than 38,000 persons. A five-day conference on the bio-psychology of development, a four-day biomedical telemetry course and exhibit and a four-day conference on new world writing systems sponsored in cooperation with the Department of Anthropology were among the meetings held here by non-Museum groups. The Corporate Tour luncheon last fall, previews of such exhibits as "Boricua—Aquí y Allá" and the Intermediate School 201 art show, as well as the opening of the Hall of Peoples of the Pacific contributed to the total of more than 24,000 attendees at Museum-sponsored events.

Requests for the Museum's monthly Calendar of Events had grown to the point where it was necessary to print and distribute 265,000 copies a year. Last September, as an economy measure, a less expensive bi-monthly calendar was launched experimentally, reducing the number of issues to six a year. Bi-monthly publication, however, has introduced problems now under study. Chief among them is the problem of a printing deadline which is so for in advance of actual event dates that, often, complete and accurate information cannot be submitted by press time. A new approach is being sought that will ensure publication of an up-to-date calendar, thus satisfying an active and interested membership and the general public as well.

Telephoned questions for general Museum information continue to be handled via a special telephone number, 873-4225, which responds with a recorded message. Two extensions proved insufficient for the volume of information-seeking calls. It was therefore necessary last May, to add a third line. More than 5000 calls a month are answered by the recorded message units.

After extensive renovation, the restaurant was re-opened, cafeteria-style, and with a seating capacity of 400. One service line accommodates Museum employees. The second serves the public. On weekends and holidays, when attendance is at peak level, both lines are in operation for maximum service to the public and take care of more than 2000 persons a day.

Anna Montgomery, *Manager*

MEMBERSHIP

An experimental program for the promotion of membership in the higher categories was launched this year. Three new classifications of membership replaced two former ones.

During the year there will be a continued study of the promotion approach, membership categories, benefits and fees, with a view toward making as attractive and realistic an offer as possible for both the member and the Museum.

The spring and fall series of Thursday evening film presentations were very popular, with capacity audiences the rule rather than the exception. Saturday morning programs, which also were well attended, featured puppetry and dance entertainment in which children were invited to participate.

Marion B. Carr, *Membership Secretary*

PLANT OPERATION AND MAINTENANCE

The department supervised the installation of 81 high-intensity lights whose 15,620 watts of power was aimed at some 60,000 square feet of the Museum's Central Park West facade. On February 4 the system went into effect and, nightly since then, it has illuminated the architectural beauty of the Theodore Roosevelt Memorial Building. New lighting was also installed in the 77th Street Foyer, the Hall of Late Dinosaurs and the stairs and landings on the 77th Street side of the Museum. Extensive electrical modernization provided the Museum with an increase in circuit flexibility and power capacity. A program to install air conditioning in offices and laboratories is continuing.

Construction on the Childs Frick Wing, which will house the Childs Frick fossil collection for the Department of Vertebrate Paleontology, reached completion early this year. Reconstruction and remodelling of the self-service restaurant was completed in the spring. The basement-level restaurant is now the central dining facility for employees and visitors. Under joint sponsorship of the Museum and the City University, a new laboratory area on the fifth floor of Section 2 is being constructed for the Department of Animal Behavior. Completion is scheduled for mid-1971. The Louis Calder Natural Science Laboratory, located on the second floor of the Education Building, was modernized and enlarged to provide expanded facilities for the Department of Education. Under a National Science Foundation grant, entirely new quarters and laboratories to meet the needs of graduate students were completed on the 6th floor of the Department of Ornithology section. A new acoustical ceiling was installed throughout the Hall of Living Invertebrates. Further studies are being made for future installations of this type in order to more effectively reduce noise in many public areas of the Museum complex. The east and west stairways of the 77th Street Building, completely rehabilitated, have been refurbished with aluminum hand rails and terrazzo finish.

Work was completed on the structural rehabilitation of Section 9, third floor, site of the new Hall of Amphibians and Reptiles. Construction on the children's cafeteria, located in the basement of Section 9, will begin in mid-1971. Also scheduled is a new checkroom and children's buying area in the basement of the Theodore Roosevelt Memorial. Demolition of the "Can Man Survive?" exhibit was started in May, with general restoration of the Roosevelt Rotunda scheduled for completion by late July. New laboratory and classroom facilities for the micropaleontology and ichthyology departments were installed in the basement under the Ichthyology office.

The Maintenance and Construction Division lost Frederick Bisso and Gunnar Hansen through retirement. William Heslin was appointed Acting Foreman of the Sheet Metal and Machine Shop.

Frank G. Marmorato, *Plant Manager*

ATTENDANCE

During the year 2,722,127 persons visited the Museum, and 558,590 (including 530,377 paid admissions) visited the Planetarium, making a total attendance of 3,280,717.

THE AMERICAN MUSEUM OF NATURAL HISTORY

ASSETS:

	General Funds	Special Funds
Cash:		
Demand deposits (overdraft)	$ 245,727	$1,023,521
Time deposits		507,961
Receivables from sale of securities		
Accounts receivable	616,658	33,552
Investments in marketable securities (Notes 1 and 2):		
Bonds		9,575
Preferred stocks		
Common stocks		
Total investments		9,575
Planetarium Authority bonds (Note 3)		
Prepaid expenses and other assets	272,146	
	$1,134,531	$1,574,609

LIABILITIES AND FUNDS:

Accounts payable and accrued liabilities	$ 264,105	$ 486,334
Deferred income	1,207,716	
Advances from the City of New York	190,263	
Funds:		
General fund (deficit)	(527,553)	
Special funds (Note 4)		1,088,275
Endowment funds (Note 5)		
Investment in Planetarium Authority bonds		
Pension Fund		
Frick Employees Retirement Fund		
	$1,134,531	$1,574,609

BALANCE SHEETS, JUNE 30, 1971 AND 1970

1971				
Endowment Funds	Investment in Planetarium Authority Bonds	Pension and Frick Employees Retirement Funds	Total	1970 Total
($ 386,800)		$ 39,929	$ 922,377	$ 1,153,008
475,000		20,000	1,002,961	523,058
937,633			937,633	
			650,210	499,651
16,506,244		5,469,669	21,985,488	33,246,532
3,095,200		741,087	3,836,287	2,990,228
29,411,492		6,252,587	35,664,079	24,246,506
49,012,936		12,463,343	61,485,854	60,483,266
	$425,000		425,000	425,000
			272,146	253,205
$50,038,769	$425,000	$12,523,272	$65,696,181	$63,337,188
			$ 750,439	$ 238,118
			1,207,716	1,085,657
			190,263	184,249
			(527,553)	(678,596)
			1,088,275	2,960,123
$50,038,769			50,038,769	47,194,091
	$425,000		425,000	425,000
		$12,004,389	12,004,389	11,398,298
		518,883	518,883	530,248
$50,038,769	$425,000	$12,523,272	$65,696,181	$63,337,188

The accompanying notes are an integral part of these statements.

SUMMARY STATEMENTS
FOR THE YEARS ENDED

	General Fund
Balance (deficit), beginning of year	($ 678,596)
Additions:	
Appropriation from the City of New York	2,635,285
Gifts, bequests and grants	491,570
Interest and dividend income:	
Endowment funds	1,521,899
Other	31,365
Net profit on sales of investments	
Contributions of pension fund members and Museum (Note 7)	
Other income (Notes 3 and 6)	546,103
	5,226,222
Deductions:	
Expenditures for:	
Educational activities	2,258,741
Special purposes and objects for which the funds were established	
Payments to pensioners and beneficiaries	
General administrative expenses	1,043,580
Plant operating and maintenance expenses	1,827,677
Pension and other social benefit expenses (Note 7)	650,740
	5,780,738
Transfers between funds	705,559
Balance (deficit), end of year	($ 527,553)

OF CHANGES IN FUNDS
JUNE 30, 1971 AND 1970

1971				1970
Special Funds	Endowment Funds	Pension and Frick Employees Retirement Funds	Total	Total
$2,960,123	$47,194,091	$11,928,546	$61,404,164	$60,436,561
			2,635,285	2,254,134
1,608,251	3,067,149		5,166,970	3,616,285
389,545			1,911,444	1,767,084
34,510		514,416	580,291	634,283
	2,293,755	68,199	2,361,954	74,485
		616,059	616,059	556,472
614,682			1,160,785	1,206,662
2,646,988	5,360,904	1,198,674	14,432,788	10,109,405
			2,258,741	2,236,679
6,045,863			6,045,863	2,908,009
		599,198	599,198	580,823
209,511	15,652	4,750	1,273,493	1,106,627
			1,827,677	1,644,760
58,477			709,217	664,904
6,313,851	15,652	603,948	12,714,189	9,141,802
1,795,015	(2,500,574)			
$1,088,275	$50,038,769	$12,523,272	$63,122,763	$61,404,164

The accompanying notes are an integral part of these statements.

NOTES TO FINANCIAL STATEMENTS

1. The Museum maintains its accounts generally on an accrual basis; however, fixed assets (charged off at time of purchase), exhibits, collections, library, etc., are not reflected in the balance sheet. The land and buildings utilized by the Museum are principally owned by the City of New York.

   Purchased investments are recorded at cost and investments acquired by gift, bequest or otherwise are recorded at market valuations at the dates of acquisition, probate court valuations or valuations established by the trustees.

2. Market valuations of investments at June 30, 1971 are as follows:

	Bonds	Stocks	Total
Special Funds	$ 10,000		$ 10,000
Endowment Funds	14,836,000	$38,539,000	53,375,000
Pension and Frick Employees Retirement Funds	4,610,000	8,431,000	13,041,000
Total	$19,456,000	$46,970,000	$66,426,000

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's management, are annexed. Interest income of $25,650 received from the Planetarium in each of the years ended in 1971 and 1970 is included in other income of the general fund.

4. The balances at June 30, 1971 and 1970 of special funds (funds which are received or appropriated for specific purposes) is net of overdrafts of approximately $727,000 and $160,000, respectively. These overdrafts represent expenditures in anticipation of gifts, grants, other income and transfers from other funds.

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

	June 30 1971	June 30 1970
Endowment funds, income available for:		
Restricted purposes	$22,875,118	$21,690,792
Unrestricted purposes	9,012,461	8,978,479
Funds functioning as endowment, principal and income available for:		
Restricted purposes	3,440,432	3,244,226
Unrestricted purposes	14,710,758	13,280,594
	$50,038,769	$47,194,091

6. Other income of the general fund includes the following:

	year ended June 30 1971	year ended June 30 1970
Natural History Magazine:		
Gross revenue	$1,979,125	$1,574,145
Net income (loss)	(104,534)	150,563
Museum Shops:		
Gross revenue	512,097	530,186
Net income	74,553	104,706

   Commencing April 23, 1971 contributions were requested from visitors to the Museum. Such contributions, which amounted to $69,908 through June 30, 1971, are included in other income of special funds.

7. The pension plan of the Museum covers substantially all its employees. The Museum and each member generally contribute to the Pension Fund 6% and 5%, respectively, of the member's compensation as defined. Contributions by the Museum (including the Planetarium Authority) amounted to $357,967 and $303,452 for the years 1971 and 1970, respectively.

   Effective July 1, 1971, the Museum and most of its employees will participate in The Cultural Institution Pension Plan. In this connection, a substantial payment will be made to this plan from the Museum's Pension Fund.

AUDITOR'S REPORT

The Board of Trustees,
The American Museum of Natural History,
New York, New York

We have examined the balance sheet of THE AMERICAN MUSEUM of NATURAL HISTORY as of June 30, 1971 and the related summary statements of changes in funds for the year then ended. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances. It was impracticable for us to extend our examination of gifts, bequests and grants beyond tests of amounts so recorded in the accounts. We previously examined and reported upon the financial statements for the year ended June 30, 1970.

In our opinion, the aforementioned statements present fairly the financial position of The American Museum of Natural History at June 30, 1971 and 1970 and the results of its operations for the years then ended, in conformity with the accounting principles referred to in Note 1 applied on a consistent basis.

Lybrand, Ross Bros. & Montgomery

New York, August 20, 1971.

THE AMERICAN MUSEUM
PLANETARIUM
BALANCE SHEETS,

	1971	1970
ASSETS:		
Cash	$ 77,045	$107,435
Accounts receivable	5,040	1,273
Inventory, publications and souvenirs, at cost	25,643	24,050
	107,728	132,758
Equipment, fixtures, etc. (Note 1):		
Zeiss planetarium instrument, at cost	221,928	221,928
Less, Allowance for depreciation	19,418	8,322
	202,510	213,606
Furniture, fixtures and equipment	1	1
	202,511	213,607
Building, at cost (Note 1)	569,209	569,209
Land (donated by the City of New York)	—	—
Deferred expense—space theatre (Note 2)	37,000	—
	$916,448	$915,574

OF NATURAL HISTORY AUTHORITY

JUNE 30, 1971 AND 1970

	1971	1970
LIABILITIES:		
Accounts payable	$ 14,870	$ 14,939
4½ % Refunding Serial Revenue bonds, past due (Note 3)	570,000	570,000
Accrued interest, past due	315,450	315,450
	900,320	900,389
FUND:		
Trust Agreement fund	2,500	2,000
CONTRIBUTED CAPITAL AND DEFICIT:		
Contributed capital:		
Charles Hayden	156,869	156,869
Charles Hayden Foundation	379,455	379,455
	536,324	536,324
Deficit, as annexed	522,696	523,139
	13,628	13,185
	$916,448	$915,574

The accompanying notes are an integral part of these statements.

One hundred representatives of corporations and foundations met for lunch at the Museum in September to hear Mayor John V. Lindsay discuss the importance of supporting the cultural institutions. The guests met Museum curators, Trustees, and members of the Men's Committee. They also had tours of the laboratories.

STATEMENTS OF INCOME, EXPENSES AND DEFICIT FOR THE YEARS ENDED JUNE 30, 1971 AND 1970

	1971	1970
Income:		
Admission fees, less allowances and commissions	$483,192	$501,762
Auxiliary activity, sales booth	99,020	102,091
Special lectures and courses	33,923	29,946
Miscellaneous	9,935	8,856
Total income	626,070	642,655
Expenses:		
Preparation, presentation and promotional	264,323	238,226
Operation and maintenance	176,525	169,016
Special repairs and improvements		97,169
Auxiliary activity, sales booth	77,594	76,890
Administrative and general	26,052	21,756
Pension fund, social security and other employee benefits (Note 4)	44,387	40,830
Total expenses	588,881	643,887
Income (loss) before interest and depreciation	37,189	(1,232)
Interest on past due 4½% Refunding Serial Revenue Bonds	25,650	25,650
Provision for depreciation (straight-line method) (Note 1)	11,096	10,011
Net income (loss) for year	443	(36,893)
Deficit, beginning of year	523,139	486,246
Deficit, end of year	$522,696	$523,139

The accompanying notes are an integral part of these statements.

NOTES TO FINANCIAL STATEMENTS

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

   It is the policy of the Planetarium 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 a nominal value of $1. Because of the nature of the ownership of the property, provision for depreciation of the building is considered unnecessary.

2. In fiscal 1971, the Daniel and Florence Guggenheim Foundation granted the Planetarium $188,000 to establish a space theatre at the Planetarium to replace the Copernican Theatre. The grant will be paid in fiscal 1972. The Planetarium spent $37,000 of this grant through June 30, 1971.

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. Substantially, all the Planetarium's employees are members of The American Museum of Natural History Pension Plan. Contributions to the plan by the Planetarium amounted to $16,229 and $13,723 for the years ended in 1971 and 1970, respectively.

AUDITOR'S REPORT

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

We have examined the balance sheet of THE AMERICAN MUSEUM of NATURAL HISTORY PLANETARIUM AUTHORITY as of June 30, 1971 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, 1970.

In our opinion, the aforementioned statements present fairly the financial position of The American Museum of Natural History Planetarium Authority at June 30, 1971 and 1970 and the results of its operations for the years then ended, in conformity with the accounting principles referred to in Note 1 applied on a consistent basis.

Lybrand, Ross Bros. & Montgomery

New York, August 20, 1971

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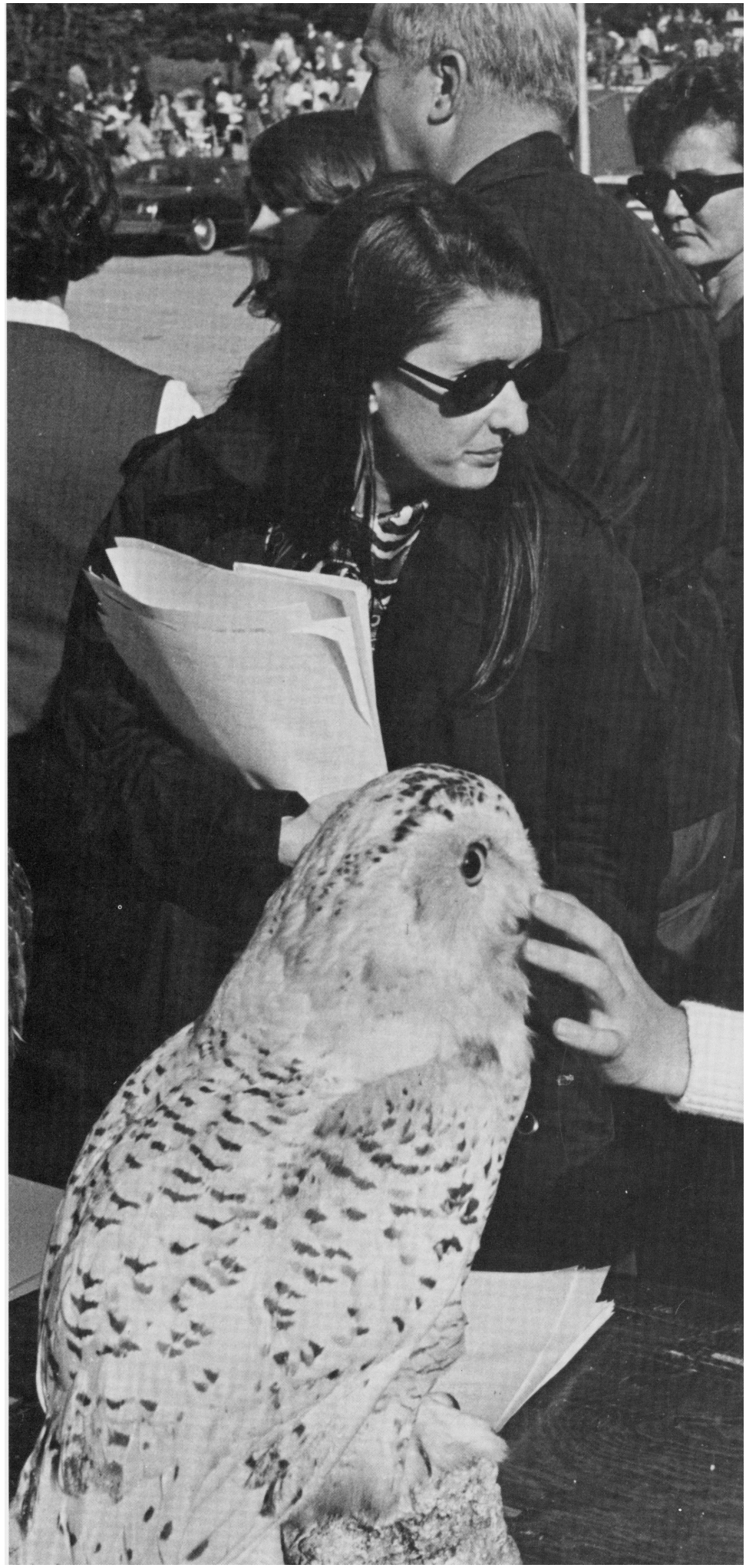


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COVER . . . The good cheer of these youngsters is characteristic of first-time visitors to the Museum who are invariably impressed with the number and diversity of the exhibitions. The discretionary admission fee that was initiated this year was well accepted by the public. Visitors were asked to "pay what you wish, but you must pay something." The boys in the picture are displaying the small contributors buttons indicating that, by paying an admission fee, they have made a contribution to the exhibition programs of The American Museum of Natural History.