



NINETY-THIRD ANNUAL REPORT

**THE AMERICAN MUSEUM
OF NATURAL HISTORY**

JULY, 1961, THROUGH JUNE, 1962



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THE CITY OF NEW YORK
1962

NINETY-THIRD 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*

In the American Museum of Natural History the distance between the Roosevelt Memorial Hall and the Corner Gallery is barely the length of a city block. Yet in the few minutes that it takes for a Museum visitor to walk from one hall to the other, he spans nearly five billion years. The exhibit "Man in Space" in Roosevelt Memorial shows how scientists are preparing to explore new worlds in the future. The Corner Gallery exhibit, "Dating the Past with Atoms," shows how they reconstruct the history of the earth.

These two special exhibits, opened during the past year, illustrate both the vast range of time spanned by the Museum and the rapid pace of progress in certain branches of science. They provide an effective supplement to the permanent halls in which the Museum tells the continuing story of the world in which we live.

Filling the entire Roosevelt rotunda, the first of these exhibits, "Man in Space," was opened to the public on Columbus Day, October 12, 1961, by Mr. James E. Webb, administrator of the National Aeronautics and Space Administration (NASA), and to date we estimate that approximately 2,000,000 people have visited this exhibit. An educational grant of \$110,000 for the exhibit, made by the Martin Marietta Corporation, as well as generous co-sponsorship by the McDonnell Aircraft Corporation and *Newsweek*, is most gratifying evidence of the support

by industry of the educational responsibilities of the Museum.

Equally welcome was the generous cooperation of the Frick Laboratory and the Lamont Geological Observatory in the preparation of "Dating the Past with Atoms."

The development of Museum exhibits is, of course, an unending process. As one hall nears completion, others take shape on the drawing board. Next year we plan to open the Hall of North American Birds and the Corridor of North American Small Mammals. By 1964 the halls of Ocean Life and of the Biology of Living Invertebrates will have been completed, in time to be enjoyed by the millions of visitors that the New York World's Fair will bring to the city.

Although the Museum is best known for the exhibits inside its buildings, in an ever-increasing number of ways the institution goes out to the public.

The Museum radio program, "Journey Into Nature," now in its third year, is broadcast every Sunday morning by WNBC to an audience that shares with our scientists the latest results of research and field work and the excitement that comes with discovery.

I am also pleased to report that in December, 1961, the American Association for the Advancement of Science-Westinghouse Award for excellence in scientific writing was presented to *Natural History* and to the noted science writer John Pfeiffer for his article "DNA: Master Substance of Life."

During the spring of the year the Trustees, Director, and staff worked closely with Doubleday & Company, Inc., in connection with the establishment by Doubleday of the Natural History Press. This new enterprise will help to further the educational goals of the Museum on a national scale. Doubleday brings to the Press and to the Museum's publication program the services of a diversified publishing house.

The Natural History Press, organized as a division of Doubleday, will act as the Museum's publisher and will publish both periodicals and books for the elementary, high school, and col-

lege student, and for the growing audience of adults with a serious interest in the many facets of natural history and the life sciences. The magazine *Natural History* will continue to be published by the Museum, and its editorial staff will work closely with the editors of the Press and thus extend the magazine's high standards in the fields of science, education, and publishing into all projects of the Press.

The Press is now developing a national periodical for use in science teaching; other publications to further the growing needs of science education are planned.

The Press will publish several series of books, the first of which will be short, well-illustrated, paperback handbooks in the life and earth sciences, anthropology, and astronomy. These will be written primarily by members of the Museum staff and directed to the high school student and the college undergraduate. This series will be launched in the fall of 1963. The Press will subsequently publish a variety of books in all areas of Museum interest, including texts, technical works, adult trade books, children's books, and specially illustrated editions.

The editorial activities of the Press, which will be based at the Museum, will be guided by a scientific-editorial board. The board will be headed by Dr. Franklyn M. Branley, well-known author-educator, who is Associate Astronomer on the staff of the American Museum-Hayden Planetarium, and will include members of the scientific, publication, and exhibition staffs of the Museum and appropriate staff members of Doubleday.

During the year the Museum continued to provide its long-established extension services. Schools, colleges, libraries, hospitals, and children's museums in the New York City area made heavy demands on the Department of Education for circulating exhibits. At the same time, specimens from the scientific collections were sent to scholars in many parts of the world to further scientific study.

Our Library, containing one of the finest collections of natural history volumes in the world, in addition to being essential to

research by the Museum staff, found itself providing increasing services caused by growing attendance, increased circulation, reference queries, and inter-library loans.

As usual, members of our scientific staff directed the laboratory and field work of undergraduate and graduate students and served on university faculties, thus further extending the activities of the Museum in science education.

From these highlights and from the report of the Director, which follows, it is evident that this Museum provides an indispensable educational bridge between science and the public.

Existing financial resources are hard pressed to meet the growing need for scientific knowledge. Support for the Museum now comes from a number of sources. The City of New York owns the property on which the Museum stands and provides for building maintenance, for structural changes in halls, and for teaching and custodial personnel. This relationship between the city and the Museum is farsighted, cooperative, and effective. The support provided by the city keeps open our doors, turns on our lights, and protects our exhibits, thus enabling more than 2,500,000 people who visit the Museum each year to enjoy our complete facilities seven days a week. Income from endowments, foundation grants, gifts, memberships, and sales and service fees represent the remaining, presently existing sources of income.

In this respect I speak for the Museum staff and our Board of Trustees in expressing our gratitude to a host of members, subscribers, and friends who by their generous support approve our program and encourage us to go forward with our plans.

Obviously, growing and new sources of support must be developed if the Museum is to fulfill its expanding responsibilities. It is important, therefore, to note the report that was issued early this summer by the Commissioner's Committee on Museum Resources of the State of New York. The Committee was appointed by Dr. James E. Allen, Jr., State Commissioner of Education, to study the programs of the museums of the state, their

educational contributions, and their financial needs. Dr. Oliver is a member of this Committee.

After a careful study, the Committee recommended an annual appropriation toward the support of museums in order to provide for the continuance, improvement, and expansion of educational services of existing museums and for the development of regional museum systems.

The need for such state support is manifest. As Dr. Allen said in accepting the Committee's report: "Museums are one of education's principal resources and contribute in great measure to the educational opportunities afforded school-age youth as well as adults. . . . To keep pace with increasing demands and rising costs, the museums of New York State need the understanding and support of everyone interested in the educational and cultural well-being of our people."

We are faced with a dual responsibility: first, to assure that the Museum will always speak with the voice of scientific authority in the field of natural history, and, second, to follow sound business practices in the conduct of our affairs. In this respect every intelligent means is being used to reduce the gap between income and expense without interfering with our Museum's principal objectives—the increase and dissemination of scientific knowledge.

I wish to express my appreciation for the understanding response and cooperation on the part of all Museum employees and thank them for their part in our joint effort to make the Museum operation one of excellence.

We were saddened this year by the death of one of our Honorary Trustees, Mr. Robert Woods Bliss, who became interested in the Museum in 1916. For 24 years he served on our Board, first as an active and later as an honorary member.

Three new Trustees were elected during the year. We welcome Messrs. Arthur Gray, Jr., Robert P. Koenig, and Henry Sears to the Board.

The Men's and Women's Committees, with Mr. Robert G. Goelet and Mrs. Francis H. Low as Chairmen, had a very successful year. These two active Committees raised \$227,497 in contributions. Mr. Goelet, having completed his third year as Chairman of the Men's Committee, during which time his Committee established a new record, is handing the chairmanship over to Mr. Peter M. Flanigan. Mrs. Low will continue as Chairman of the Women's Committee.

In the twelve-month period ending June 30, 1962, the combined sources of income of the Museum, consisting of appropriations from the city, income from endowments, donations, memberships, sales, and services, totaled \$3,510,397. This fell short by \$94,376 of meeting the operating costs of the Museum. The deficit was made up by our drawing on unrestricted capital funds. The endowment funds had a book value of \$31,192,863 and a market value of \$34,526,497 on June 30, 1962.

Alexander M. White

REPORT OF THE DIRECTOR

Members of a number of museum organizations currently are engaged in reëxamining the definition of the word "museum." At first glance this seems to be a waste of precious time. Certainly anyone associated with a museum knows what such an institution is, so why bother about a definition? The fact is, however, that no simple definition covers the scope of museums and at the same time distinguishes institutions that actually qualify as museums from those that have just adopted the name.

This current interest in what is a museum and what is not a museum is a healthy one. It stems from an increasing public awareness of the role that authentic museums play in science, in the arts, and in education. The new awareness brings about greater use of museums and greater potential use of museums. This puts new pressures not only on the institutions themselves but also on the individuals and agencies to which the museums turn for support. Therefore, it has become mandatory that criteria be established for defining the institutions to which support is to be given.

What is it that museums do that makes them worthy of public and private support? How do they complement the functions of colleges, libraries, or other educational institutions? What do they contribute to society that is not already covered by other organizations? These questions are timely and deserve review by all who are concerned with the future of museums.

First, all museums collect objects and preserve them. One might say that the objects collected constitute the reference materials of a museum. However, it is not the collecting and

storing of objects that make a good museum; it is the use to which they are put.

Museums must use their collections to increase and to interpret knowledge, or they are simply storehouses. Some institutions use their collections solely for research, whereas others use them only for man's enjoyment or the interpretation of knowledge. The greatest contributions museums can make occur through equal attention to both the increase of knowledge through research and the interpretation and communication of knowledge through exhibits, teaching, and publications.

Since the foundation of a museum is its collections, it follows axiomatically that, with the passage of time and normal growth of the institution to meet the demands of changing times, the collections must increase and grow. This growth presents one of the fundamental and inescapable problems of an active natural history museum in particular: it has constantly increasing demands for space to house and protect its collections. If so, why do museums continue to collect specimens, or to keep the collections after a scientist has reported his studies on them?

Scientists are always pitted against the changes that may wipe out many life forms directly or so upset natural conditions that it will be impossible to evaluate them accurately. Thus the need for haste to collect and study. We need consider only a few well-known examples. Nowhere today can one see the colorful Carolina Parakeet or the graceful Passenger Pigeon except in natural history museums. See their pictures in a book? Yes. But one can appreciate their character and beauty only in the three-dimensional, realistic, museum specimens.

As our knowledge and techniques for analysis increase, we find that the collections yield more and more information. For example, an ornithologist in the year 1900 may have studied a collection of ten quail from Minnesota in order to know what geographic race occurred in the state. By 1960, another scientist may find the ten quail collected in 1900 of great value in showing what the characteristics of the native quail of

Minnesota were before the state introduced additional birds of another race, from another part of the country, to try to improve the quail hunting. Or, another scientist might want to check the amount of strontium-90 in the 1900 population compared with that present in the birds occupying the area today.

These are oversimplified, hypothetical examples, but they *do* illustrate frequent types of use made of the reference collections. Also, older collections are of great value in indicating changes in the composition of the flora and fauna of the different parts of the world. The search for knowledge from the collections is limitless and challenges the imagination. A prominent Cleveland physician made arrangements recently to study our mammalian skeletal collections to learn more about the origin, causes, and distribution of arthritis. A New York dentist has gone over the skulls of fossil mammals in our collections to further the knowledge of dental occlusion. In the field of anthropology the collections tell the story of cultural interchange, temporal sequences of occupation of regions, migrations, and development of various implements and artifacts. Older collections are being reexamined and analyzed with modern computer processing methods to reveal new and fascinating information. The new atom-dating techniques have inspired new interest in old collections; scientists are returning to them to extract much valuable data on the time of occurrence of various people in certain areas or the duration of certain cultural patterns. In short, the collections reveal an almost limitless amount of knowledge, depending only on our abilities to extract and interpret the information.

While the collections form the basis of most museum research, studies on the preserved materials must be augmented by studies on living forms, both in the laboratory and in the field. For example, our Department of Micropaleontology, in its extensive investigations of the foraminifera of the world (which include mostly fossil species), has set up a facility for rearing living foraminifera so that we may learn something

more about fossil forms. Our herpetologists not only analyze the structural characters revealed in the study of preserved frogs, but they also correlate these characters with differences in calls obtained on tape recordings and spectrograms in order to learn more of the important results of speciation constantly going on in living forms. The Department of Anthropology studies both contemporary human cultures and the cultures from which these have evolved, and the department has been a pioneer in the application of recent biological developments to social anthropology. Moreover, one department is devoted entirely to the study of living animals—the Department of Animal Behavior, which is engaged in conducting a wide range of investigations, many of them in cooperation with other departments of the Museum.

Creative research in a great institution such as the American Museum is fascinating to regard. Sometimes it is slow and methodical; sometimes it surges forward. It is seldom that one new finding does not suggest ten other possibilities to be investigated. Our scientists last year engaged in myriad activities, including the study of the alluvial valley of the Mississippi in connection with an investigation of ancient civilizations there; field studies of Triassic sharks and coelacanths; the discovery of a striking new genus and species of bird; studies of the role of sound in the lives of amphibians and reptiles; evidence that environmental instabilities affect the behavior of small mammals; population studies of the mammals of Latin America, Africa, and New Guinea; and the use of ultrasonic equipment to track marine animals and of radar to check the flight speed of birds. Because the number and range of Museum research activities in the field and the laboratory are so great, the details are reserved for the departmental reports.

Thus does the Museum carry on its great scientific work, so little of which is seen by the public. What the public does see are the exhibits, the means by which the Museum interprets the knowledge it has gained through its collections and research.

The exhibits comprise the Museum's face; they have been rightly called a "three-dimensional text-book." They must be of top quality if the organization is to be recognized as a noteworthy educational force.

President White has mentioned plans for some of the future halls that we are building, all of which are being designed to achieve the highest educational result; and, at the present time, visitors of every age are using existing halls to gain a diversity of knowledge and experience. Youngsters ponder over treasure hunts keyed to the exhibit halls, a new activity conducted by the Department of Education. School groups correlate the subject matter of the exhibits with their studies in biological and social sciences. And the individual adult uses this "people's university" to further his interest in minerals and textiles, hummingbirds and elephants, prehistoric creatures and men in space, or any of the countless exhibits through which the Museum is interpreting nature and science.

In the field of publications, the scientific staff is doing an outstanding job in producing the numerous reports that appear in the Museum's *Bulletin*, *Novitates*, *Anthropological Papers*, *Curator*, *Contributions of the American Museum-Hayden Planetarium*, and in other scientific journals. And each day brings new efforts in the field of popular publication that increase significantly the communication of scientific knowledge to the student, the teacher, and the general public.

These are some of the means by which the American Museum of Natural History fulfills its responsibilities. Today, more than ever, the world is the Museum's laboratory and the Museum is the interpreter of that world.

REVIEW OF THE YEAR 1961-1962

It is a pleasure to begin a review of the year 1961-1962 with a list of the new honors conferred on Museum personnel by other institutions. Dr. William K. Emerson, Chairman and Associate Curator of the Department of Living Invertebrates, was elected President of the American Malacological Union. Dr. T. C. Schneirla, Curator of the Department of Animal Behavior, was elected a Fellow of the American Academy of Arts and Sciences. Dr. Margaret Mead, Associate Curator of Ethnology in the Department of Anthropology, received an honorary Doctor of Laws degree from Temple University. Dr. Junius B. Bird, Curator of South American Archeology in the Department of Anthropology, received the Peruvian Government Medal designating him as a Grand Official of the Order of Merit for "distinguished services to Peru." Dr. Leonard J. Brass, Associate Curator of the Archbold Collections in the Department of Mammalogy, received an honorary Doctor of Science degree from Florida State University.

Within the Museum itself, the following staff changes took place. Dr. Karl F. Koopman joined the staff of the Department of Mammalogy as Assistant Curator in August, 1961. Three new appointments were made to take effect July 1, 1962: Dr. Roger Lyman Batten, Associate Curator in the Department of Fossil Invertebrates; Dr. C. Lavett Smith, Assistant Curator in the Department of Ichthyology; and Dr. Petr W. Wygodzinsky, Associate Curator in the Department of Entomology. The following promotions of scientific staff members took effect July 1, 1962: Dr. E. Thomas Gilliard, from Associate Curator to Curator in the Department of Ornithology; Dr. Frederick H. Rindge, from Associate Curator to Curator in the Department of Entomology; Dr. Dorothy E. Bliss, from Assistant Curator to Associate Curator in the Department of Living Invertebrates; and Dr. Charles Vaurie, from Assistant Curator to Associate Curator in the Department of Ornithology. Two members of

the staff who retired after fruitful and devoted years of service to the Museum and to science were Miss Francesca R. LaMonte, Associate Curator in the Department of Ichthyology, who had been on the staff 37 years, and Mr. George G. Goodwin, Associate Curator in the Department of Mammalogy, who had been on the staff 42 years. Resignations from the staff were those of Dr. William A. Burns, Membership Chairman; Dr. Mont A. Cazier, Resident Director of the Southwestern Research Station; Mr. John Francis Purcell, Editor of *Natural History* Magazine and Publications Manager; and Dr. Donald F. Squires, Associate Curator in the Department of Fossil Invertebrates.

We were saddened by the loss of four associate members of the scientific staff. Mr. Charles H. Falkenbach, who had retired from his post as Field and Laboratory Associate of the Frick Laboratory in March, died on June 8. Mr. Falkenbach served the Museum for 46 years, having started as an apprentice preparator of fossil skeletons at the age of 14. Dr. William Beebe, the noted naturalist and author who was a Research Associate in the Department of Ichthyology, died on June 4. Dr. James H. McDunnough, Research Associate in the Department of Entomology, died on February 23. Dr. William Duncan Strong, Research Associate in Anthropology, died on January 29.

Two important projects of last year that involved several departments were the Undergraduate Research Participation Program and an interdisciplinary conference on telemetry.

The Undergraduate Research Participation Program, through which college students take part in scientific research at the Museum or at its field stations, had a successful year. During the summer of 1961, 21 students were selected from among 273 applicants, and during the academic year seven students were selected from among seventeen applicants. Among the projects carried out by the students, under the supervision of staff scientists, were studies in cultural and physical anthropology, the behavior and biology of fishes and mammals, the neurology and endocrinology of crabs and fishes, deep-sea pop-

ulations, the evolution of mollusks and birds, population ecology, and radio astronomy. The program is supported by a grant from the National Science Foundation.

In March a conference on "Telemetry in the Study of Animal Behavior and Physiology" was held at the Museum. Co-sponsors of the conference were the Museum, the Biology Branch of the Office of Naval Research, and the Foundation for Instrumentation, Education and Research, in co-operation with the American Institute of Biological Sciences and the Instrument Society of America. Representing the Museum as co-chairmen of the conference were Dr. Lester R. Aronson, Chairman of the Department of Animal Behavior, Dr. William N. Tavalga, Research Associate in the department, and Dr. Wesley E. Lanyon, Assistant Curator in the Department of Ornithology. The conference brought together for the first time a number of outstanding biologists who are currently using telemetry in their research on animal behavior, physiology, and ecology, and specialists in instrumentation who are creating new potentials for biological telemetry. Participants discussed problems in tracking the movements of Antarctic penguins, grizzly bears, migrating birds, and marine turtles by means of miniature radio transmitters attached to the animals themselves. Previously, most of the progress in the use of miniature instruments for the measuring and telemetering of the functions of biological systems had been in the field of aero-space medicine, but the results of this conference showed the vast potentialities of such techniques for the study of animal behavior and ecology.

DEPARTMENT OF ANIMAL BEHAVIOR

Lester R. Aronson, Chairman

The Department of Animal Behavior undertook several research projects, including investigations of the unusual behavior of the pearl-fish, emigrations of the Asian legionary ant, and the use of sensory cues for schooling among fishes. Continuing

projects on which good progress was made included studies of the sexual behavior of cats, the function of the forebrain in African mouth-breeding fish, the influence of stress in early life on individual behavior of animals, and navigational abilities of birds.

Dr. Aronson transferred his investigations of the pearl-fish from those of the Atlantic to those of the Pacific, in research at the Hawaii Marine Laboratory. These eel-like fishes, with sharply pointed tails, have the unusual behavior of living within invertebrate hosts. In the deep water off Wakiki Beach a species of pearl-fish was found to be living in the body cavity of large cushion stars, a form of starfish. In laboratory aquaria, many features of the fish were studied, especially the unique manner in which it enters the starfish. The pearl-fish flips its tail into one of the grooves on the bottom side of the cushion star and backs through the groove into the mouth. Then, piercing the intestinal wall, it finally comes to rest in the large, water-filled body cavity of the starfish. A large pearl-fish of a different species, which dwells in a species of sea cucumber (which is shorter than itself), enters through the mouth, pierces the wall of the digestive tract, and comes to rest coiled up in the smaller body cavity of its host.

Dr. T. C. Schneirla, in collaboration with Prof. Alfredo Reyes of Silliman University in the Philippines, studied the Asian legionary ant, which is found in the Philippines. Like their American relatives, the army ants, the Asian ants stage massive emigrations whenever a new brood matures. Thus each nomadic phase has a predictable duration, which is followed by a statary phase, also of predictable duration. Both are dependent upon the developmental stage of the brood. In contrast to their American counterparts, the Asian ants also stage irregular predatory raids during the daytime, starting at dawn and continuing for some 20 hours (a feature, Dr. Schneirla reports, that keeps investigating scientists on their toes).

Drs. Evelyn Shaw and E. R. Baylor used contact lenses, similar to those used in the correction of human vision, to study the

behavior of schooling herring at the Woods Hole Oceanographic Institute. The vision of the fish in a school was changed to near-sightedness or farsightedness in order to determine whether either affected their use of visual cues in maintaining a parallel orientation within the group. Preliminary results indicate that the inability of a fish to see distinctly does not affect the position it takes in the school.

Dr. William N. Tavolga, in studies carried out in collaboration with Dr. Jerome Wodinsky at the Lerner Marine Laboratory, determined thresholds of hearing at various pitch intervals in several species of marine fishes. The results are the first accurate figures on the hearing capacity of marine fishes. The findings also have considerable bearing on the general aspects of under-water sound as produced by marine animals and man.

Dr. Helmut E. Adler has obtained results showing that starlings and robins have night vision that is poor by human standards. Also, he finds that their ability to sense time is not accurate enough to allow them a good "position fix" in celestial navigation. It is therefore unlikely that these birds use celestial navigation for the determination of their location if they are in unknown territory. On the other hand, their characteristic degree of accuracy apparently suffices to give them a general direction when they are on a migratory flight.

Dr. Aronson, Mrs. Madeline Cooper, and Mr. Harold Silverman continued research on the sexual behavior of male cats. The current experiment is an investigation of the interaction of hormone level, sexual experience, and genital stimulation on the development and maintenance of sexual behavior.

Dr. Aronson, with Mrs. Harriet Kaplan, continued research on the function of the forebrain in African mouth-breeding fish. Subjects that had learned to strike at a paddle to get food were next trained to distinguish a paddle with vertical stripes from one with horizontal stripes. The next step in the study will be to remove the forebrain from these subjects, completely or partially. After the recovery period the fish will be retested

in comparison with a group of unoperated control fish.

Dr. Schneirla, with Drs. Ethel Tobach and Leo Vroman, completed research on the influence of early stress on individual behavior in mammals. Stressful conditions were introduced to litters of rats by a schedule of changes in their cages, such as odor patterns on the floor and visual features on the walls. These environmental instabilities affected the behavior of the mothers adversely in activities such as nursing and retrieving their young. They also disturbed behavioral development of the young, such as their reactions to their mothers and orientation. One important outcome of this project was the development of a system (the "ATSL": Aronson, Tobach, Schneirla, Laupheimer) for recording the behavior and the physiology of animals in a form that can be fed into a modern computer system for rapid and automatic processing.

DEPARTMENT OF ANTHROPOLOGY

Harry L. Shapiro, Chairman

The Department of Anthropology experienced a year of noteworthy accomplishment in field work, research, and exhibition, and in an extremely active record of publications and lectures, both scientific and popular.

In field work, a long-term study by Dr. James A. Ford, which still continues, is concerned with a survey of the alluvial valley of the Mississippi River and the changing course of the river. Both factors are being correlated with archeological sites, a number of which have already been dated at from 4000 to 800 B.C. By mapping the old channels of the Mississippi and its tributaries and by dating them, Dr. Ford has been able to assign dates to the associated sites and to work out the settlement patterns of the area.

This spring, Dr. Junius B. Bird cooperated with San Marcos University in a novel problem that involved relating old beach levels of the Peruvian coast with archeological cultural pe-

riods. The time involved covered a considerable span, possibly thousands of years, and some excavations were carried out to study the associations.

Members of the department engaged in a wide range of research activities. One point of special interest is the application of computer techniques to the textile research on which Dr. Bird has been engaged for many years. He has transferred a large quantity of detailed information regarding prehistoric textiles from Peru onto data-processing cards, and it is expected that he will derive information that would have been extremely difficult to obtain by the older methods of analysis.

Dr. Shapiro continued work on a project initiated several years ago on the dynamics of the skull. He also engaged in historical research for a conference on the history of anthropology, held in New York in April.

Dr. Margaret Mead made progress in a number of research problems that have been described in previous reports. Among these are the construction of a cross-cultural model of the way in which orientation in time and space and toward the unknown and the strange is learned, with special reference to sensory modalities and to change. Another project is concerned with the significance of the cultural evolution of human maturation and aging curves. A new research problem being conducted by Dr. Mead deals with the possible usefulness of cybernetic models as a method of cross-ideological communication, and with the general problem of cross-ideological communication.

Dr. Gordon F. Ekholm continued his analysis of collections excavated at Comalcalco, Mexico, during two seasons of field work that have been previously reported. Dr. Ford, in addition to his study of the alluvial history of the Mississippi, also studied the Hopewell culture in the same area.

Dr. Robert L. Carneiro continued work on a monograph on the Kuikuru Indians of central Brazil, and on the interpretation of field notes taken among the Amahuaca of eastern Peru.

Mr. Colin M. Turnbull documented material for the new

Hall of the Peoples of Africa, and completed analysis of his field notes on the Pygmies.

Dr. Stanley A. Freed wrote reports on two field trips undertaken before his appointment to the Museum: one among the Washo Indians of California and Nevada, the other in a village in northern India. The Washo research attempted to reconstruct the aboriginal culture and analyze the effects upon this culture of 100 years of contact with whites. The research on the village in India analyzed the effects upon traditional village culture of urban employment and residence of temporary migrants from the village.

In exhibition, the department has been engaged in the complete reorganization and reinstallation of three major halls. These are the Peoples of the Pacific, African, and Eastern Woodlands-Plains Indians halls, under the respective supervision of Dr. Mead, Mr. Turnbull, and Dr. Freed.

Two very successful temporary exhibits were set up by the department last year. One, entitled "Art and Life in Old Peru," was presented in honor of the visit of President Don Manuel Prado of Peru. It provided Dr. Bird with an opportunity to show pieces rarely exhibited and, in some cases, never previously displayed. The exhibit aroused widespread and highly favorable reaction. It also prompted a generous friend of the Museum to contribute the cost of printing an illustrated catalogue of the exhibit. The other exhibit, entitled "Recent Accessions from Africa," was supervised by Mr. Turnbull, and displayed some of the finest of the recent acquisitions.

As in the past, the study collections of the department were made available to a large number of students, writers, and artists who represented other museums and universities in this country and abroad.

DEPARTMENT OF ASTRONOMY AND
THE AMERICAN MUSEUM-HAYDEN PLANETARIUM

Joseph Miles Chamberlain, Chairman

In a year of dramatic advances in space exploration, accompanied by intense public interest, the sky presentations and temporary exhibits of the Planetarium emphasized the new ideas, instruments, and techniques associated with these advances.

The sky presentations, attended by more than 600,000 people, dealt with modern concepts of the design of the universe, problems of manned space travel, and the uses of color in astronomical research, among other themes. These presentations, under the supervision of Dr. Thomas D. Nicholson, utilized several major improvements in the projection system in the Planetarium, including new equipment whereby related horizon scenes can be dissolved slowly into one another. Emphasis was placed on a realistic portrayal of astronomy in settings that are as natural as can be simulated in the Sky Theater. Photographs were substituted for art work where possible and resulted in remarkable fidelity in the horizon scenes.

Mr. James S. Pickering, in charge of the Guest Relations Bureau, reports that the number of school children attending the morning presentations on a reservation basis reached an all-time peak of more than 140,000, some 30,000 over the number recorded in the previous year. Extra performances were scheduled, as needed, to accommodate them.

An important educational exhibit on the birth, life, and death of stars was opened to the public in January, 1962. This impressive display, provided by the Allied Chemical Corporation, illustrates the classification of the stars and shows the distribution in the universe of all the known chemical elements.

A second new exhibit that attracted considerable interest dealt with "Project Stratoscope" in which sharp astronomical photographs are being obtained by balloon-borne telescope and camera systems. A gift of the Perkin-Elmer Corporation, mak-

ers of the "Stratoscope" systems, the exhibit features a scale model of "Stratoscope II." Among other temporary displays during the year was a model of the new solar telescope, the world's largest, located at Kitt Peak National Observatory, New Mexico.

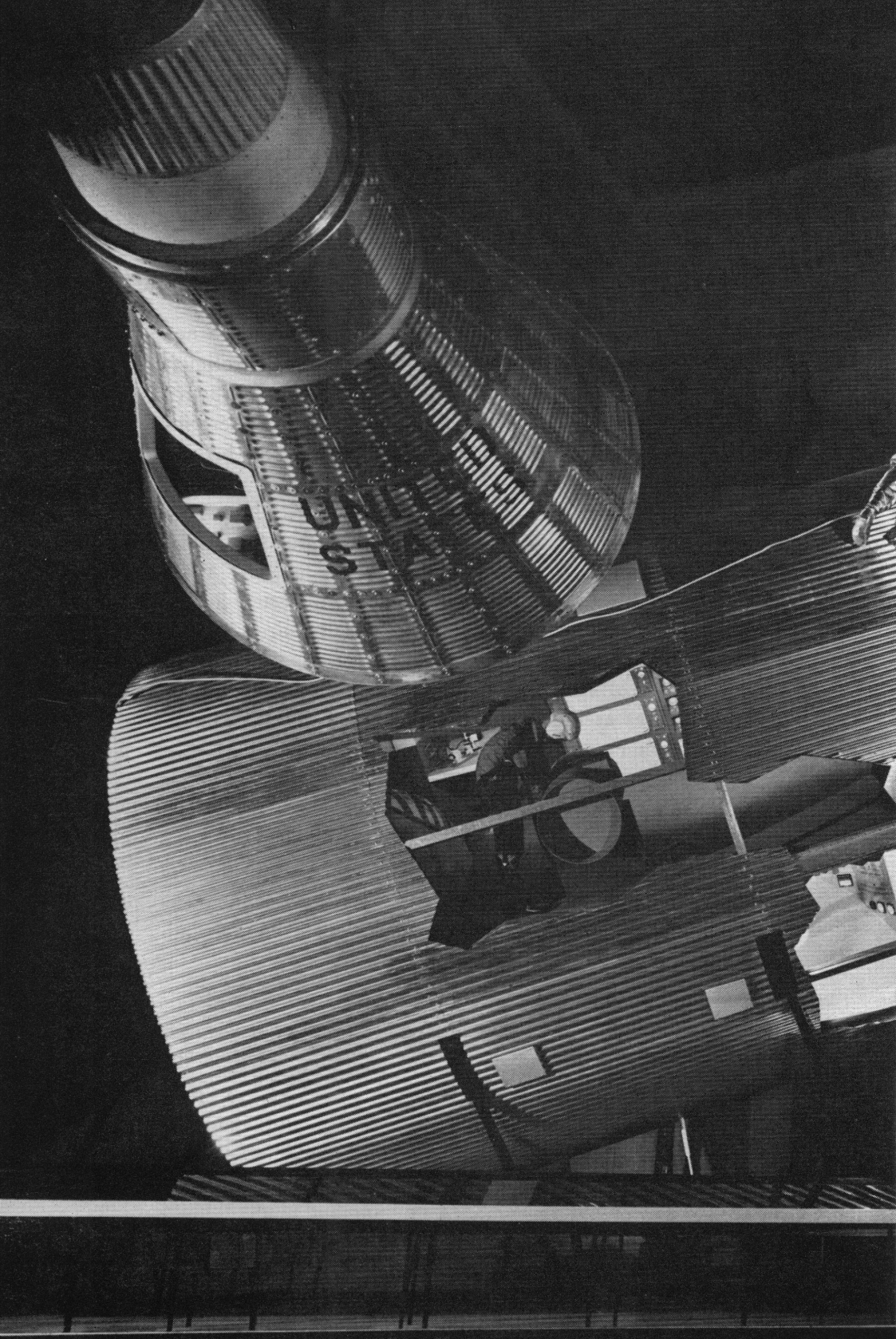
The program of evening and Saturday courses, supervised by Dr. Franklyn M. Branley, was expanded to include a new series of lectures in electronic navigation. The total enrollment in all courses was 736, an increase of 42 over last year's figure. Two of these courses, "Astronomy and Space Science," for high school students, and "Astronomy in the Space Age," for elementary school teachers, were again supported by the National Science Foundation. Continuing its cooperation with New York University, the Planetarium also provided a course for college credit in descriptive astronomy.

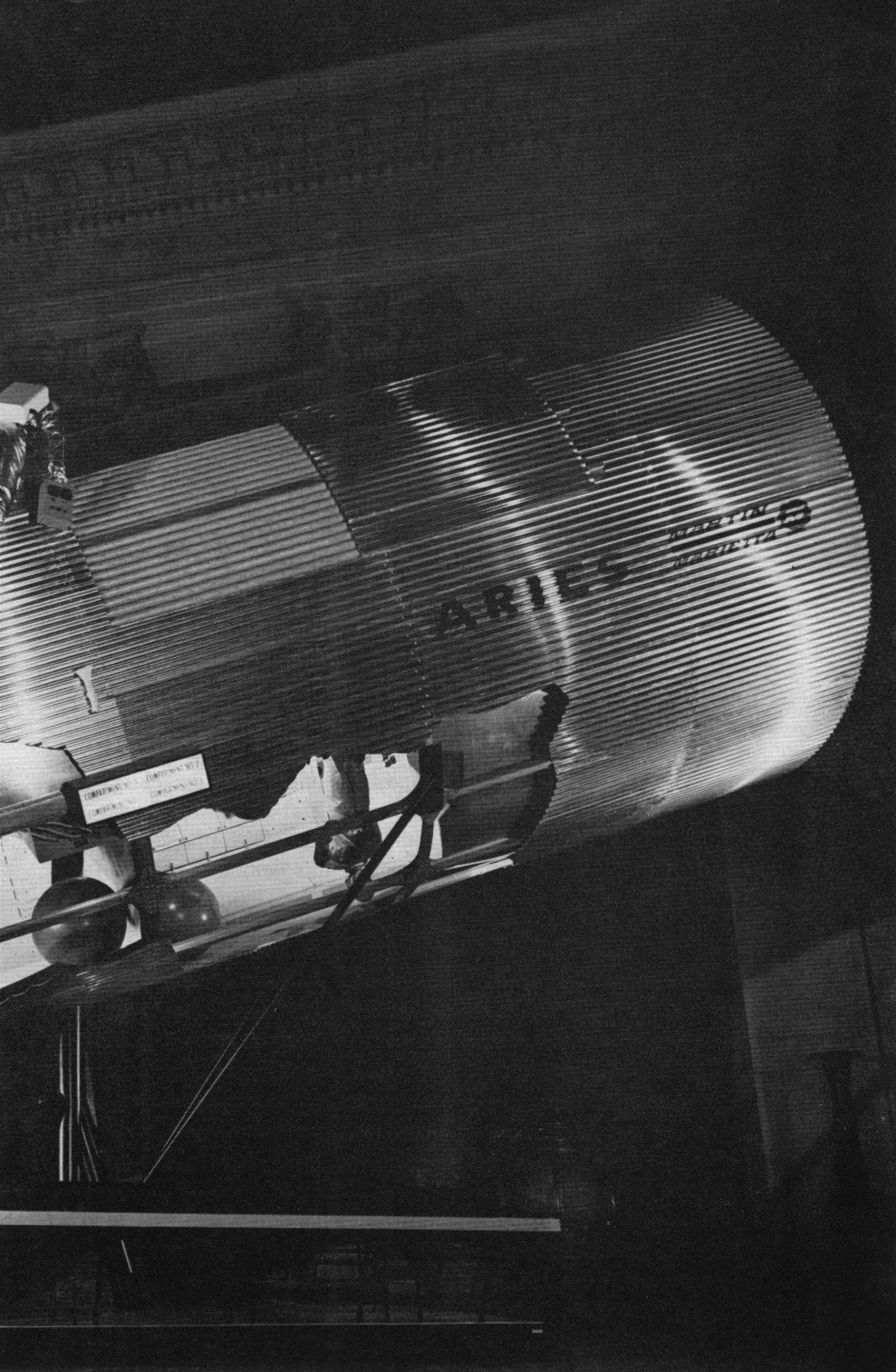
The research program in radio astronomy, directed by Dr. Kenneth L. Franklin at the Kalbfleisch Field Research Station, moved into a new area of study involving a comparison of the radial velocities of stars with similar data for radio hydrogen. Dr. Franklin was assisted in this work by two members of the National Science Foundation Undergraduate Research Participation Program.

Mr. Chamberlain was invited to Venezuela by Cagigal Observatory in Caracas to assist in the opening ceremonies for the new Humboldt Planetarium. Two staff members from that institution made study visits to New York to learn about the operations of the American Museum-Hayden Planetarium. In ad-

Expansion of the "Man in Space" exhibition featured a full-scale model of an orbital space laboratory called ARIES (for Authentic Representation of an Independent Earth Satellite). Designed by the Martin Marietta Corporation, it was unveiled on October 12, 1961. The Mercury capsule model, given by McDonnell Aircraft Corporation, had been placed on exhibit six months earlier, at the time of the first manned orbital flight.

Photograph: Philip Halsman.





ARIES

GASTIN B

COMPONENT 1
COMPONENT 2
COMPONENT 3

dition, the newly appointed director of the planetarium now under construction in St. Louis, Missouri, spent two weeks here on an orientation visit.

All members of the staff took active parts in the work of the professional societies in which they have memberships. The influence of the staff was also expressed through numerous outside lectures, appearances on television and radio, and by participation in panels and workshops for the National Science Foundation, the American Association for the Advancement of Science, and several other agencies of the museum, planetarium, and astronomy professions.

DEPARTMENT OF ENTOMOLOGY

Jerome G. Rozen, Jr., Chairman

The new direction that the Department of Entomology is gradually taking was evidenced this year by considerably increased activity in three areas—research productivity, curatorial accomplishments, and exhibition.

Dr. Rozen, working under a National Science Foundation grant, continued the biosystematic study of the parasitic bees in the genus *Oreopasites*. All species in this genus are obligatory parasites in the nests of the non-social bee genus *Nomadopsis*. Having previously completed the initial taxonomic work, Dr. Rozen devoted his attention this year to a study of the behavior and biology of the various species. During three field trips to the western and southwestern United States (in spring, summer, and early fall), he worked out comparative life histories and host associations, performed nutritional experiments in order to determine the nature of the intraspecific variation in these bees, and made extensive collections which included over-winter immature stages of eight different forms.

In addition, Dr. Rozen brought to completion an anatomical and systematic study of the larvae of the beetle family Nitidulidae, an investigation that was initiated by the late Dr.

Adam G. Boving of the United States National Museum in Washington. This manuscript represents the first major study of these larvae. As an outgrowth of the study, a preliminary investigation of the pupae was started and nearly completed. Ground work has been laid for a taxonomic and phylogenetic study of the larvae and pupae of the beetle family Lycidae of North America.

Dr. Willis J. Gertsch, doing field work in the western United States, searched Fly Cave near Canyon City, Colorado, for an undescribed spider belonging to the genus *Hypochilus*. The discovery of this spider earlier in the year was an event of major importance as it represents the third species of the relict genus *Hypochilus* to be taken in North America. The genus belongs to a group already present in Carboniferous times and is found today in the following disjunct areas: China, Tasmania, the United States, and southern Chile. In California Dr. Gertsch visited some fifteen caves in search of blind cave spiders and made a general survey of the fall spider fauna of the Coast Ranges of the Sierra Nevada.

Dr. Frederick H. Rindge nearly completed the revisionary investigations of the geometrid moth genera *Melanolophia* and *Pherotesia*. These two closely related genera are primarily Neotropical in distribution, with only five species occurring in the United States. As a result of the study, Dr. Rindge learned that the most primitive members of the genera occur in southern Brazil and that the areas of abundance are the Andes and Central America. With support from the National Science Foundation, Dr. Rindge also spent two months in collecting moths in New Mexico and southern Colorado, returning with 19,000 specimens, one of the largest collections of Lepidoptera ever taken in that poorly collected area.

Dr. Paul H. Arnaud, Jr., completed his revision of a section of the tachinid fly tribe Neominthoini. Species of the Tachinidae, a large family of Diptera, as larvae are parasitic on other insects. Nothing is known about the biology of the Neomin-

thoini, and this revision, the first for the tribe, should provide a basis for future biological studies. A revision of the larvae and adults of the genus *Protodejeania* and of several other tachinid genera is also in progress, as is a study of the biting midges of Polynesia.

Dr. Nicholas S. Obraztsov continued his study of the New World moths belonging to the family Tortricidae, with the objective of establishing a family classification that is coordinated with that for the European tortricids.

During the year the collection of insects and spiders was increased by 88,000 specimens, which brings the total collection to well over 12,000,000 specimens. The complete re-curating of the Hymenoptera collection progressed satisfactorily.

Through the curatorial efforts of Mr. Wilton Ivie, the usefulness of the agelenid spider collection was improved, and Dr. Arnaud curated the tachinid fly collection, identifying and segregating 370 holotypes. Most of the material collected by Drs. Rozen and Rindge during their field trips was mounted and labeled. Professor T. C. Maa of the Bernice P. Bishop Museum, Hawaii, who visited the Museum, collected ectoparasites from preserved bats in the Department of Mammalogy and the Archbold Collections. As a result, the Department of Entomology at the present time has the finest collection in the world of the bat-fly of the genus *Ascodipteron*.

Exhibition activities in the department centered around plans for the new Hall of the Biology of Invertebrates. Dr. Rozen and Miss Alice Gray worked with other members of an interdepartmental committee on plans for the following sections: the origin of life, viruses, evolution and speciation, classification, communication, and biological rhythms. In addition, Miss Gray spent considerable time collecting insects and other invertebrates in the New York area for use in the new hall.

DEPARTMENT OF FOSSIL INVERTEBRATES

Norman D. Newell, Chairman

Significant progress was made in a number of fields, despite a temporary curtailment of the departmental staff. For more than half of the period under consideration, Dr. Newell was the sole curator responsible for research, exhibition, and public inquiries in all matters with which the department is normally concerned. The vacancy resulting from the departure of Dr. Donald F. Squires, who transferred to the United States National Museum on December 1, 1961, was filled by the appointment of Dr. Roger L. Batten effective July 1, 1962.

Dr. Newell, continuing his studies of the phenomena of mass extinction in the fossil record of animals, completed a manuscript on paleontological interruptions as the chief basis for universal subdivision of the stratigraphic record. These interruptions are interpreted as the effects of widespread episodes of environmental change and consequent extinction, rather than simply epochs of erosion and hiatus, as was believed by Darwin.

Dr. Newell also completed the outlines of the classification of bivalved mollusks to be adopted in the encyclopedic "Treatise on Invertebrate Paleontology." This will be the first complete synthesis of all modern and fossil genera, and it constitutes a major effort on the part of 20 collaborators in Europe, America, and New Zealand. The classification represents a new departure from previous proposals in that orders and suborders are based on type families.

In collaboration with Dr. John Imbrie of Columbia University and Dr. E. G. Purdy of Rice University, Dr. Newell continued to investigate the geological history of the Bahama Islands. In addition, he was engaged in various studies of the upper Paleozoic bivalves of the southwestern United States.

Dr. Squires devoted his attention to deep-water corals and published two papers based on collections made by the "Vema," the research vessel of the Lamont Geological Observatory.

A study of fossil calcareous sponges was advanced substantially by Dr. Robert M. Finks. This work is the second part of Dr. Finks's monographic revision of the upper Paleozoic sponges of the southwestern United States. Dr. Imbrie continued to develop applications of digital computer systems to various problems in geology and paleontology. These brilliant and original studies in factor analysis received wide recognition, and Dr. Imbrie spent considerable time lecturing on the subject throughout the United States.

Under a collaborative arrangement with Columbia University, one doctoral dissertation project was sponsored and completed within the department, and four others were in progress.

Noteworthy among the acquisitions of the year was a fine collection of some 295 specimens of eurypterids from the Baltic region, donated by Dartmouth College.

DEPARTMENT OF HERPETOLOGY

Charles M. Bogert, Chairman

Researches dealing with heat and sound as elements of the environment that affect the activities of amphibians and reptiles occupied the attention of members of the department during most of the year. Several taxonomic and faunistic studies were continued, and research on toads at the Kalbfleisch Field Research Station yielded interesting preliminary results on growth rates and range of movement.

Investigations of the thermoregulatory capacities of amphibians and reptiles advanced our comprehension of the complex interplay of heredity, morphology, and behavior in the heat economy of these "cold-blooded" vertebrates. The tuatara, for example, may respond to light as well as to heat, so that during the day it seemingly shifts its activities toward the upper end of the thermal zone favorable for activity. But during the hours of darkness, its body temperature more closely approaches the threshold that permits activity.

Members of the department could also show that changes in temperature of amphibians and reptiles elicit physiological and behavioral responses with reciprocal effects. For example, in diurnal reptiles expansions or contractions of the melanophores in the skin result in changes in the albedo that play an important role in regulating the intake of radiant heat. It has long been known that such thermoregulatory mechanisms in reptiles are primarily under autonomic control. Changes in the melanophores, however, are in turn responsible for regulating the heat intake. Consequently any regulatory mechanism of the sort that is dependent upon temperature could not be wholly effective were it not for integrative behavioral responses that permit the individual to compensate when necessary for changes in the albedo by orienting the body with reference to the position of the sun.

Sound may not be so important as heat in the environments of many amphibians and reptiles, but recent investigations suggest that snakes can hear air-borne sounds, contrary to earlier evidence. Such discoveries suggest that sound may play a more significant role in the lives of amphibians and reptiles than earlier workers had realized. Evidence that Mr. Bogert obtained during 1961 supports the belief that mating calls are associated with the territorial behavior of hylid frogs at spawning sites. The analysis of the mating calls of toads also provides a means of revealing whether frogs or toads interbreed. Hybrids or the progeny of their back-crosses with parental species in the population may or may not be detectable by their external appearance. Spectrographic analysis of mating calls, however, commonly reveals hybrid origins.

The work of the department in systematics encompasses such diverse investigations as those of Mr. William Hosmer on the amphibian and reptile faunas of Australia, Dr. Richard G. Zweifel's review of Australian ant-eating frogs of the family Microhylidae, Dr. Zweifel's studies of the Papuan frogs of the genus *Cophixalus*, and his taxonomic studies of the whip-

tailed lizards (*Cnemidophorus*). Mr. Bogert utilized information derived from the spectrographic analysis of mating calls, supplemented by studies of breeding behavior, distributions, and structure to ascertain the systematic status of toads in Mexico and the adjacent portions of the United States.

At the Kalbfleisch Field Research Station, Dr. Zweifel obtained preliminary results in an ecological investigation of Fowler's toad (*Bufo woodhousei fowleri*). Subadults proved to be restricted in their movements, seldom traveling farther than 50 meters. The information thus far gathered suggests that during the summer months of their second year these toads increase in body length at a rate approximating 2.5 mm. per day. Dr. Zweifel was assisted in this work by a member of the Undergraduate Research Participation Program.

Mr. and Mrs. C. M. Bogert carried out herpetological explorations in the Sierra de Juarez and other mountains in Oaxaca and in the lowlands of other portions of southern Mexico. They obtained more than 500 specimens, many of which were new to the collection. The collection included such rarities as the blunt-tailed horned lizard (*Phrynosoma braconnieri*), a species previously known from but two definite localities, and the Oaxacan rattlesnake (*Crotalus basiliscus oaxacus*), individuals of which had not been seen alive since 1894 when only two specimens were taken. Mr. and Mrs. Bogert also obtained the fourth specimen of a small snake recently named *Tantalophis discolor*.

DEPARTMENT OF ICHTHYOLOGY

Charles M. Breder, Jr., Chairman

The outstanding accession of the year was a specimen of the coelacanth or lobe-finned fish *Latimeria*. This is approximately the fifteenth specimen caught and, like all others except the first, it came from the deep waters off the Comoro Islands in the Indian Ocean. It was presented as a gift to the Museum by the President of the Government Council of the Comoro Islands, Dr. Said

Mohamed Cheikh, and Dr. Georges W. Garrouste, a physician on the island of Anjouan, to whom the specimen was first brought by a native fisherman. It was obtained through the efforts of Dr. Bobb Schaeffer of the Department of Vertebrate Paleontology and is the only specimen in this hemisphere.

Dr. Donn E. Rosen continued his various studies on the osteology and relationships of the major groups of bony fishes, and parts of this project dealing with the cave fishes of North America and Middle America were completed. In another project, Dr. Rosen was successful in establishing a resident population of the common mosquito fish in the pond of the Kalbfleisch Field Research Station on Long Island. This activity was the first step in a study involving an analysis of the population growth and behavior of these fishes which belong to a cold-adapted strain. Pursuing his behavioral studies with euryhaline fishes in the laboratory, Dr. Rosen demonstrated for the first time the ability of a Cuban fresh-water fish, previously thought to be salt intolerant, to live comfortably in full-strength sea water.

Studies on the function of the lateral-line sensory structures of fishes were continued by Dr. Phyllis H. Cahn. Part of this work, on which Dr. Cahn is collaborating with Dr. Evelyn Shaw of the Department of Animal Behavior, involves the relationship of these structures to the schooling habits of fishes.

Dr. Breder continued his studies on fishes of the Gulf Coast, with field work both at Englewood, Florida, and at the Cape Haze Marine Laboratory. Samplings of the sounds made by fishes are being recorded on magnetic tape around the clock and throughout the seasons, and various water conditions are also recorded over the same periods. The purpose of this project is to determine correlations between the activities of the fishes, sonic and otherwise, with seasons, times of day, reproduction, and other aspects of life history, with special reference to the changing physical conditions of the water. Another project which progressed simultaneously deals with the behav-

ior of the young of many species of Gulf Coast fishes in relation to the shade and composition of natural backgrounds.

Dr. Breder and Dr. Rosen devoted considerable time to the completion of their monograph on the reproductive characteristics of fishes. Dr. Rosen, in collaboration with Dr. Reeve M. Bailey of the Museum of Zoology of the University of Michigan, completed work on a monograph of the Poeciliidae, a widespread family of New World, live-bearing fishes.

Difficulties encountered previously in the development of a tracking device for the tuna-tracking project were largely resolved this year. This work, which is being done by Mr. George A. Bass and Mr. Mark R. Rascovich, progressed to a point at which small transmitters suitable in size for use on tuna were constructed and successfully tested.

Dr. Perihan Sadoglu, formerly of the University of Istanbul, now of Brown University, visited the department in connection with her studies on the genetics of the Mexican cave characins, a project she had started in the department laboratories in 1954 under the auspices of Dr. Breder. Since that time she has continued to utilize the descendants of cave fishes from the live collections of the department in pursuing her studies at Istanbul, Naples, and more recently at Brown University.

Miss Francesca R. LaMonte, who retired to the status of Curator Emeritus, on February 14, 1962, has continued her studies on the speared fishes.

The department accessioned approximately 4000 new fishes from the Arctic, Antarctic, mid-Atlantic Ocean, Mexico, South America, and Roumania. These included valuable collections made by the "Vema," the research vessel of the Lamont Geological Observatory. Specimens in the study collection continued to be used by investigators from other institutions both in this country and abroad.

In exhibition activities, department members contributed plans for the redesigning of the Hall of Ocean Life.

DEPARTMENT OF LIVING INVERTEBRATES

William K. Emerson, Chairman

During March and April, Dr. Emerson joined the Vermilion Sea Expedition to the Gulf of California. Under the sponsorship of the Belvedere Fund, scientists from several other institutions, including Stanford University, San Diego State College, San Diego Zoo, and the San Diego Natural History Museum, participated in this expedition and made an extensive survey of the biota of the islands of the Gulf of California. Dr. Emerson was able to continue the distributional studies on the mollusks of the area that were initiated during the Puritan-American Museum Expedition to Western Mexico in 1957. In collaboration with Mr. William E. Old, Jr., specialist in the department, he completed a manuscript describing the species of Conidae obtained by the expedition of 1957 and brought to the final stages of preparation a second manuscript concerning four superfamilies of gastropods. As time permitted, Dr. Emerson continued his long-range studies of the scaphopod mollusks of the eastern Pacific and published a paper proposing a revised classification for the Scaphopoda.

The research activities of Dr. Dorothy E. Bliss centered around her investigations of the neuroendocrine control of locomotor activity in the land crab, *Gecarcinus lateralis*. In September, she presented a paper describing her studies at the Third International Symposium on Neurosecretion at Bristol, England. She also attended the Conference on Rhythmic Functions in the Living System at the New York Academy of Sciences, and the Conference on the Evolution of Crustacea sponsored by the Museum of Comparative Zoölogy of Harvard University. With the support of a grant from the National Science Foundation, Dr. Bliss and her research assistants continued their studies on the neurohormones that control limb regeneration and growth in *Gecarcinus lateralis*. These studies were extended to include the preparation, analysis, and bioassay of active ex-

tracts, as well as the implantation of living tissues.

Dr. Meredith L. Jones continued his work on the taxonomy of the polychaetous annelids, completing the study of a collection from Jamaica which included two new genera and six new species, as well as progressing in a study of five new species of the family Magelonidae. His study dealing with the spatial distribution of the benthonic meiofauna off Point Richmond, San Francisco Bay, was advanced almost to completion. As time permitted, he continued the preliminary curation of the collections made by the "Vema," research vessel of the Lamont Geological Observatory, and initiated the taxonomic study of extensive collections of polychaetes from northwest Florida.

Dr. Libbie H. Hyman advanced her work on the Mollusca, volume 6 of the series "The Invertebrates," and completed a paper on some terrestrial flatworms from the Caribbean area. Dr. Horace W. Stunkard received a grant from the National Science Foundation to aid in his long-term studies of the morphology, life cycles, and systematics of parasitic flatworms. Dr. H. E. Coomans continued his investigations of the marine mollusks of the Netherlands West Indies.

Curatorial activities continued to be a major departmental project. More than 100,000 invertebrates were catalogued. Among the 106 accessions received during the year, most noteworthy was the R. L. Stuart Collection of mollusks, totaling some 35,000 specimens. Considerable progress was made in the reorganization of the mollusk reference collection with the aid of a grant from the National Science Foundation. Mrs. Rodney Procter made a generous contribution to the Beatrice S. Procter Fund which is used to purchase molluscan specimens not represented in this collection.

The year saw the virtual completion of five years of work, when a long manuscript on tissue respiration in invertebrates by Dr. Bliss and Dr. Dorothy M. Skinner of the New York University School of Medicine reached page proof. A popular handbook, "Shells of the New York City Area," co-authored by

Mr. Morris K. Jacobson and Dr. Emerson, appeared in print. A total of 21 papers by members of the department were published during the year, and an additional fourteen papers were submitted for publication.

In cooperation with the Department of Exhibition, staff members completed the panel scripts for some of the exhibits in the Hall of the Biology of Invertebrates, and finished preliminary plans for exhibits in the Hall of Ocean Life.

DEPARTMENT OF MAMMALOGY

Richard G. Van Gelder, Chairman

Major research problems during the year included long-range surveys of mammals in Mexico, on New Guinea, and on Long Island, as well as continuing taxonomic and distributional studies of skunks and bats.

Dr. Van Gelder traveled extensively in Latin America to gather data for his revision of the classification of the skunks of the world. In addition, he made some 30,000 measurements on skunk specimens in collections in this country. Mr. Richard E. Graham served as Dr. Van Gelder's research assistant for this project, which is sponsored by the National Science Foundation.

Population studies of small mammals at the Kalbfleisch Field Research Station on Long Island were continued under Dr. Van Gelder's supervision, with the assistance of two college students—one a member of the Undergraduate Research Participation Program, the other an Ellsworth Fellow—and three high school student volunteers.

Dr. Sydney Anderson's research on the mammals of Chihuahua, Mexico, proceeded with the completion of more than 90 per cent of the accounts of the 117 species involved in the study. In this connection, Dr. Anderson and Dr. Karl F. Koopman spent several weeks doing field work in Chihuahua in the spring. Dr. Anderson published a number of papers on his Mexican research as well as a short paper reporting a new northern record for the bog lemming in Ungava, Canada.

Dr. Koopman, formerly on the staff of the Chicago Natural History Museum, joined the department in August. He has devoted the major portion of his time since his appointment to studies of the bats of Africa, particularly of the Sudan and the Congo. He also spent two weeks in the Virgin Islands in search of specimens of *Stenoderma*, a bat that had previously been believed to be extinct but is now known to persist on St. John. Although he was unsuccessful in this endeavor, he collected a number of other interesting bats and obtained sufficient data for the preparation of a paper.

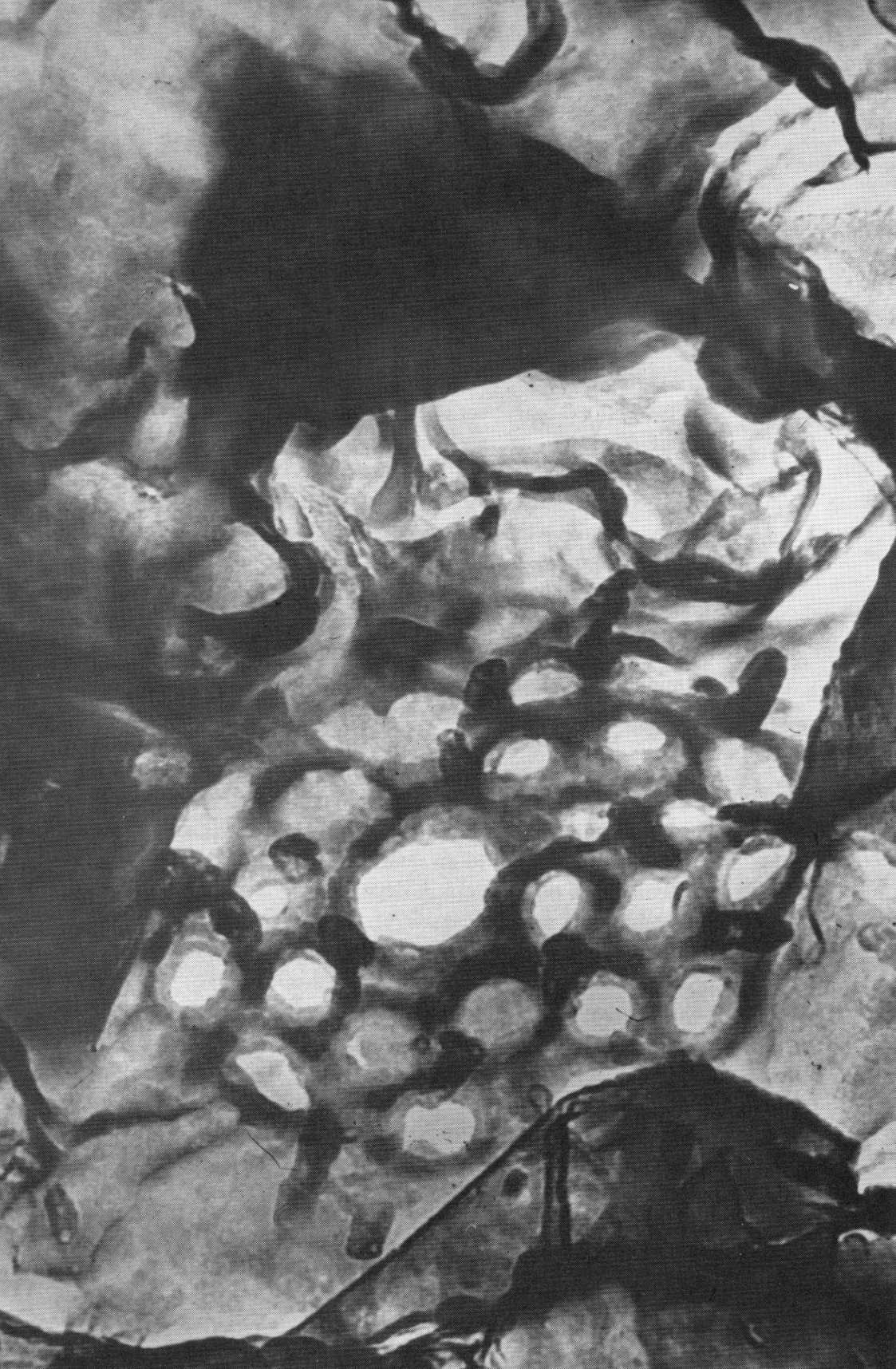
Mr. Hobart M. Van Deusen continued his investigations of the mammals of New Guinea based primarily on material collected by the 1953, 1956, and 1959 Archbold Expeditions to New Guinea. He also devoted considerable time to collaborative work with investigators from other institutions. This included identifying, for the Department of Health in Trenton, New Jersey, local bats that were suspected of carrying rabies.

Mr. George G. Goodwin, who retired from active duty in October, 1961, continues to devote full time to his study of the mammals of Oaxaca, Mexico. He also pursues his interest in the mammals of Trinidad and Tobago and published several papers on the bats of these islands of the West Indies, supplementing the major study, published last year, on which he collaborated with Mr. Arthur M. Greenhall.

With the exhibits for the Corridor of Small North American Mammals virtually completed, new exhibition projects to which staff members devoted attention included the Hall of Ocean Life, the Primate Hall, the polar bear group in the Eskimo Hall, the Saiga antelope group in the North Asiatic Mammal Alcove, and the proposed African Small Mammal Corridor.

Notable among the 2983 specimens acquired by the depart-

This is the sieve-plate in a single pore of a foraminifer magnified 140,000 times under the electron microscope. These minute organisms are studied in the Department of Micropaleontology. Photograph: Kenneth M. Towe.



ment during the year was an Abyssinian ibex, a gift from Dr. J. O'Malley and Dr. P. Anderson of Florida. The second specimen of its kind in the department collections, it is probably the only example of this rare animal that has been obtained by any museum in almost 30 years.

DEPARTMENT OF MICROPALAEONTOLOGY

Brooks F. Ellis, Chairman

In 1961, the Department of Micropaleontology completed 20 years of service to science and especially to scientists and industries concerned with oil exploration. A board of advisers, established to insure close liaison with the oil industry, still functions, with much benefit to the department and industry.

During the period since its establishment, the department distributed the "Catalogue of Foraminifera," which it compiles and publishes, to more than 335 subscribing oil companies, universities, geologic surveys, and museums throughout the world. The number of volumes in this reference work was increased from 30 to 61, and the first sixteen volumes of a companion study, the "Catalogue of Ostracoda," were published. Thousands of samples from many parts of the world were studied, and reports were made on their significance. Laboratories for the study of living foraminifera were established, and much progress was made toward an understanding of the ecology and paleoecology of this group. A depository of types and faunas was established, and thousands of samples were added to it. Collections were made by staff members in the Middle East, Europe, Africa, South America, and in this country.

Three noteworthy developments occurred during the past year. One was the expansion of the research on living foraminifera, which made it necessary to build and equip a second microbiological laboratory. A portion of this expansion included cytological projects, and the remainder included the beginning of work on planktonic foraminifera. The latter undertaking

will be carried out in cooperation with Dr. Allan Bé of the Lamont Geological Observatory.

A second development involved a significant expansion of the exchange of literature between micropaleontologists of the United States and those of the Soviet Union, an arrangement through which the department has been designated as the American depository for Soviet publications on micropaleontology. The ground work for this cooperation was established during a visit made to the Soviet Union in 1960 by Miss Angelina R. Messina, Associate Curator.

A third development was the beginning of work on a new series, the "Catalogue of Index Foraminifera," which is being supported by a grant from the National Science Foundation. This will be a compilation of pertinent data on the guide fossils of this group, and will be published in a format similar to that of the more general "Catalogue of Foraminifera."

It should be noted that the general world-wide reduction in petroleum exploration, which had so adversely affected the department for several years past, now appears to have passed its lowest ebb, and brighter prospects are ahead.

DEPARTMENT OF MINERALOGY

Brian H. Mason, Chairman

The Department of Mineralogy maintained steady growth during the past year. The collection was improved by the addition of several new minerals and the selective acquisition of fine and rare specimens. A number of exchanges, including one with the Soviet Academy of Sciences, resulted in considerable additions to the meteorite collection. Eight more meteorites from the Museum collection were chemically analyzed, and detailed descriptions of four were completed for publication. Valuable research equipment was acquired, and is being used in new scientific investigations. Dr. H. B. Wiik joined the staff as a Research Associate and is currently engaged in a meteorite research program.

The meeting of the International Mineralogical Association in this country in April, 1962, brought more than 100 mineralogists from other nations as visitors to the Museum. They were naturally interested in the collections of minerals, gems, rocks, and meteorites, and also in the general operations of the department and of the entire Museum. Many fruitful discussions resulted, and the contacts will undoubtedly be of mutual benefit.

The department received many requests for material and information. Its collections are widely known for their value in research and as study material, and requests for samples are filled whenever possible. The great expansion in space research has resulted in a large increase in requests for meteorite material. During the past year such material was supplied to a large number of scientists both in this country and abroad.

Dr. Mason returned from his five-months' visit to Japan in August, 1961. He visited several Japanese universities, as well as mines and mineral deposits in the central and northern sections of the country. Most of his time was spent at the University of Tokyo, where he lectured in geochemistry, and on the chemistry, mineralogy, and structure of meteorites. The latter lectures are scheduled for publication.

DEPARTMENT OF ORNITHOLOGY

Dean Amadon, Chairman

Micromacronus leytensis, a new genus and species of bird from Leyte Island in the Philippines, was acquired and described by Dr. Amadon, with the cooperation of the Philippine National Museum. It is probably the most distinctive new genus of living bird to be discovered in the last ten or fifteen years. Also, about half a dozen species heretofore missing from the collection of the Museum have been added in recent months. A total of about 6000 specimens of birds has been acquired. Some of these were in collections containing many rarities from Mexico, Argentina, the Philippines, and elsewhere.

Grants from the Frank M. Chapman Memorial Fund enabled

several ornithologists from abroad to work at the Museum. The fund, which is intended to support and foster research in ornithology on a world-wide basis, dispensed about \$35,000 during the past fiscal period. The fund awarded its first fellowship to Dr. William George, formerly of the University of Arizona, who during his stay at the Museum completed an important paper on the anatomy of birds. The fund also financed the attendance of several foreign ornithologists at the Thirteenth International Ornithological Congress in Ithaca, New York.

The twenty-third meeting of the International Council for Bird Preservation was held at the Museum in the middle of June, 1962. It was the first time the Council had met in the Western Hemisphere. The representatives of 31 countries who attended the meetings discussed the lethal effects of pesticides on birds, oil pollution of the sea, threats of extinction to certain birds, and the problem of birds as a factor in airplane accidents. Nearly every member of the Department of Ornithology took an active part, either in arrangements or in attendance at the meetings, or both.

Work on the Sanford Hall of the Biology of Birds was completed during the year. The Hall of North American Birds is very nearly completed and will be opened to the public in 1963.

Research programs made good progress. Dr. Amadon, in addition to his description of the new genus *Micromacronus*, mentioned above, completed a monograph on the birds of prey of the world, in co-authorship with Mr. L. H. Brown of Kenya. Dr. E. Thomas Gilliard continued his studies of the avifauna of the New Guinea area and of behavior patterns of certain birds. Dr. Charles Vaurie spent six months of study in museums abroad for the preparation of volume 2 of his "Birds of the Palearctic Fauna." This period included brief visits to Moscow and Leningrad where he was able to examine a number of rare birds from Central Asia which are poorly, if at all, represented in other museums. Dr. Wesley E. Lanyon performed field work in Mexico and Arizona, continuing his long-range studies of the meadow-

larks (genus *Sturnella*) and crested flycatchers (genus *Myiarchus*).

Dr. Robert Cushman Murphy and Dr. James P. Chapin have continued to spend much time at the Museum and to carry out considerable research as well as to aid the staff with various curatorial tasks. Dr. Murphy made substantial progress with his monograph on the petrels and albatrosses. Dr. Chapin continued to work on research problems concerning African birds.

Mr. Crawford H. Greenewalt led an expedition to Brazil which secured many valuable data on hummingbirds and other groups of birds. His important paper on the dimensional relationships of birds and insects, a byproduct of his research on hummingbirds, has just been published by the Smithsonian Institution. Mr. G. Stuart Keith is in Africa with his wife on an expedition to study cranes and their behavior. Upon observing the rapid destruction of the African forest and the uneasy political situation, however, Mr. Keith undertook extensive collecting and observations for the Departments of Ornithology and Herpetology. Captain Jean Delacour is spending more time in the American Museum of Natural History since his retirement from the Los Angeles County Museum and has made use of Museum facilities particularly while completing the fourth volume of his "Waterfowl of the World." Mr. Eugene Eisenmann was active throughout the year in curatorial and publishing projects. The staff of the department published 23 scientific papers and a number of popular articles.

DEPARTMENT OF VERTEBRATE PALEONTOLOGY

Edwin H. Colbert, Chairman

Long-range studies and field work in the Department of Vertebrate Paleontology continued to center around three particular areas of research, each involving a number of projects of varying duration.

Studies of the Triassic reptiles of the world, to which Dr. Col-

bert devoted most of his time, included the continuation of a large monograph on the Triassic dinosaurs of North America, research on the Triassic reptiles of Brazil, and new studies on Triassic reptiles that have been recently collected in New Jersey. Each of these projects bears on the larger problem of the evolution and intercontinental relationships of Triassic tetrapods. As part of his long-term work on this problem, Dr. Colbert began an extended field trip this year to Israel, South Africa, and Europe where he will study Triassic stratigraphy, collect fossils, and examine specimens in museum laboratories.

The Mesozoic fish faunas of the world were the subject of continuing study by Dr. Bobb Schaeffer. Considerable progress was made in his extensive analysis of the paleoecology, paleogeography, and evolution of these fishes, and a paper based on his study of the fishes from the continental Triassic beds of the western United States is now in preparation. In the summer of 1961, Dr. Schaeffer spent eight weeks examining collections of Mesozoic fishes in Italy, Austria, Germany, and Great Britain and made field studies at several locations in these countries. At the same time, as part of his research on fossil fishes, an expedition under the joint sponsorship of this Museum and the National Museum of Canada made a unique and valuable collection of Triassic sharks, coelacanths, and early ray-fin fishes at a remote mountain site in British Columbia. These specimens, which Dr. Schaeffer will describe following additional collecting in the summer of 1962, show interesting affinities with faunas of the same age from Greenland, Spitzbergen, and Madagascar.

The third major area of research in the department is concerned with very primitive mammals, particularly those of North America. Dr. Malcolm C. McKenna, in devoting his attention to these faunas, continued a comparative study of the cranial anatomy and the classification of the fossil and recent insectivores and their allies. A collecting expedition led by Dr. McKenna to the Cretaceous and early Tertiary beds of Colorado screened some 170 tons of rock during the summer of 1961.

Approximately 9000 complete teeth, along with jaws and other skeletal elements, of primitive mammals were taken from a quarry of early Eocene age. This collection, the largest sampling of such Eocene fossils ever collected from a single quarry, will prove invaluable in a statistical analysis of variation. In addition, the discovery of a new mammalian fauna in the Mesa-verde formation of Cretaceous age was an unexpected and welcome result of the work during the past year's field season. Dr. McKenna is continuing to explore the discovery site and its environs in the 1962 field season.

Exhibition activities during the year were concerned mainly with the new hall that is to be devoted to the reptiles that survived beyond the extinction of the dinosaurs, and to primitive mammals. The hall is still several years from completion. In addition, Dr. McKenna served as one of the scientific advisers on the temporary exhibition "Dating the Past with Atoms."

Important acquisitions of the year, in addition to those collected by the expeditions mentioned above, included the outstanding Patten Collection of Paleozoic fishes, a gift from Dartmouth College.

The department continued its regular educational functions, both at the Museum and in the graduate paleontology program of Columbia University. In addition, Dr. Colbert served as a member of the Biological Sciences Curriculum Study Group of the American Institute of Biological Sciences, which is engaged in the preparation of new texts in biology for high schools. The program is designed to bring new concepts, new methods, and new viewpoints into the teaching of high school biology in the United States. Dr. Schaeffer is serving on the Panel for Systematic Biology of the National Science Foundation.

SPECIAL ACTIVITIES
ARCHBOLD BIOLOGICAL STATION
LAKE PLACID, FLORIDA
Richard Archbold, Resident Director

Continuing studies on insect mimicry by Dr. Jane Van Zandt Brower of Mt. Holyoke College and Dr. Lincoln P. Brower of Amherst College produced results of unusual interest this year. In the first experiment to employ a large number of predators to test the effectiveness of mimicry, the Browsers determined that syrphid flies are effective visual mimics of honeybees. The purpose of the experiment was to separate and control the visual and acoustical aspects of mimicry, since the flies resemble their model bees both in appearance and sound. The test predators were 44 insect-eating toads (*Bufo terrestris*).

In other mimicry studies, Dr. L. P. Brower and Miss Florence P. Cranston of the Harvard Medical School investigated the role of the female queen butterfly in courtship, and Dr. J. V. Z. Brower used the Florida scrub jay and blue jay to test the protective effect of various insect mimics.

Parasitological investigations by Dr. Lawrence R. Penner, University of Connecticut, included a study of the endoparasites of wildlife, with the emphasis on predator-prey relationships, particularly those that involve the perpetuation of parasitism.

Dr. Stuart W. Frost of Pennsylvania State College, who operated insect light traps at the station for the fourth consecutive year, reports that this field work has yielded several new species of insects as well as many new records for Florida and a few new records for the United States. During 1962, Dr. Frost developed a new method of collecting insects with light traps that separate the specimens according to size.

Other activities included research on the behavior of doves and pigeons by Dr. Richard F. Johnston of the University of Kansas, a histological study of the endocrine glands of pelicans and cormorants by Dr. Frank A. Hartman of the Ohio State University, and a continuing investigation of the evolutionary mech-

anisms in certain highly variable moths by Dr. Roger W. Pease of Yale University. Blood samples of birds were collected at the station in connection with the study of arthropod-borne viruses of Florida, initiated last year by Dr. Richard M. Taylor of the Yale University School of Medicine.

Dr. Leonard J. Brass continued to serve as adviser to Dr. L. M. Perry of the Arnold Arboretum on a three-year research project on the medicinal plants of the western Pacific, and provided consultation to the British Museum (Natural History) on the organization and equipping of a botanical and entomological expedition which is to take the field in New Guinea in 1963. Dr. Brass received an honorary Doctor of Science degree from Florida State University in June, 1962.

KALBFLEISCH FIELD RESEARCH STATION

HUNTINGTON, LONG ISLAND, NEW YORK

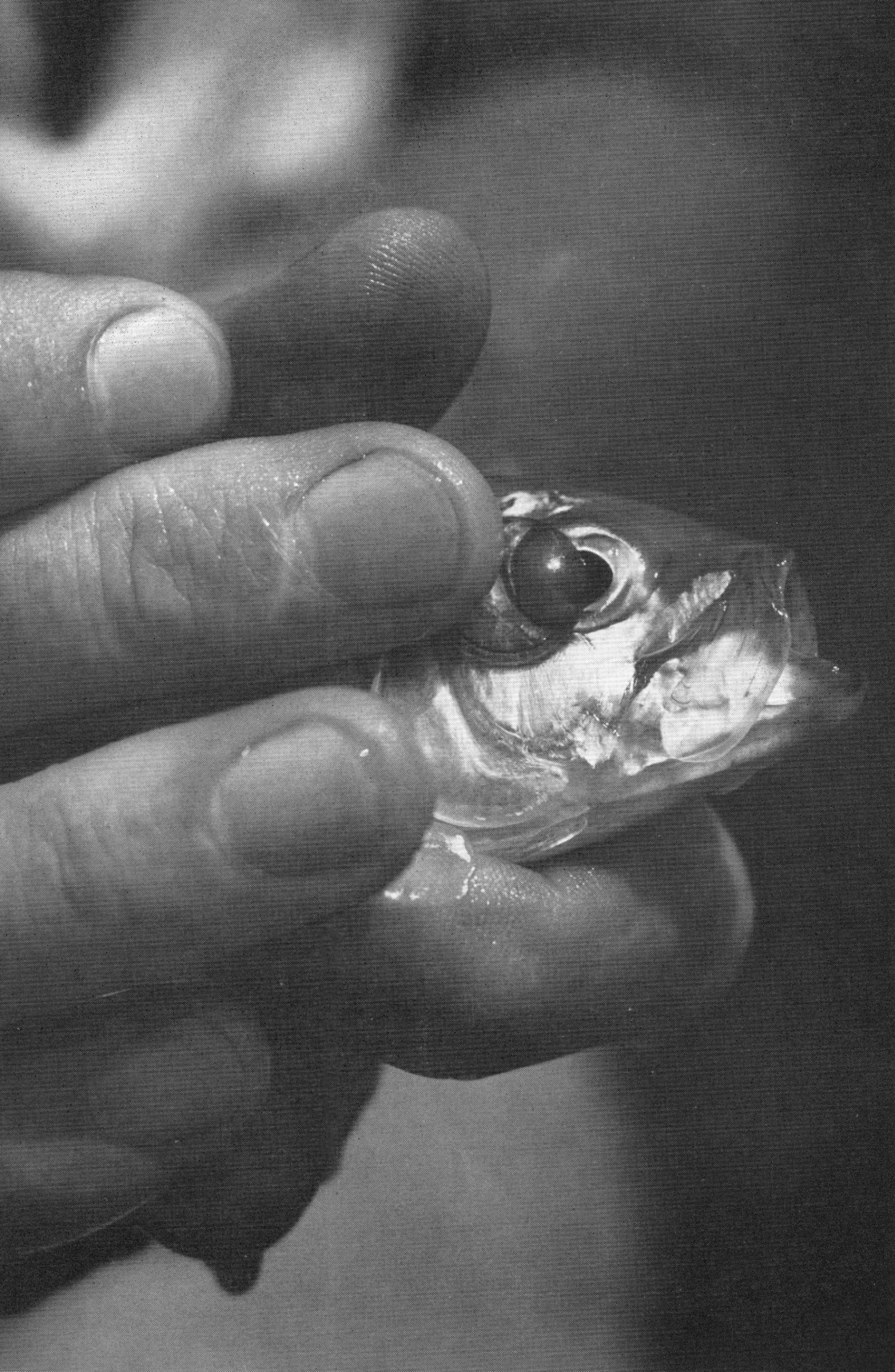
Wesley E. Lanyon, Resident Director

Studies by Museum scientists in the fields of astronomy, ornithology, ecology, fishes, mammalogy, and herpetology were conducted at the station this year. Most of the research activities contributed to a long-term, coordinated project involving the population dynamics, ecology, and behavior of the vertebrate fauna in relation to the plant communities at the station.

Particular attention is being given to the interrelationships involved in the natural succession of vegetation of abandoned farmland and its associated vertebrate populations. A provisional list of the vertebrates of the station was published during the year. A total of 168 vertebrates were described, including two fishes, ten amphibians, six reptiles, 129 birds (of which 47 were breeding), and 21 mammals. The list was based on a study of the spatial and temporal distribution and relative

A study of the role of vision in the schooling behavior of fishes involved the use of contact lenses, fitted over the eyes of herring, to alter the visual image on the retina.

Photograph: Lee Boltin.



abundance of these vertebrates. It was compiled by Museum staff members and their student assistants. A similar list of the vascular plants of the station is nearing completion.

Dr. Donn E. Rosen, Department of Ichthyology, initiated a study of the survival characteristics and population genetics of the mosquito-fish (*Gambusia affinis*), which he introduced into the permanent pond at the station. Dr. Kenneth L. Franklin, Department of Astronomy and the American Museum-Hayden Planetarium, continued his research in radio astronomy.

Staff members received student assistance through the participation of the station in the National Science Foundation Undergraduate Research Program. Seven college students were in residence during the summers of 1961 and 1962. In addition, a number of high school students were accepted as volunteer assistants during both summer programs.

LERNER MARINE LABORATORY

BIMINI, BAHAMAS

Robert F. Mathewson, Resident Director

The outstanding facilities for study offered by the Lerner Marine Laboratory at Bimini, Bahamas, and the easy access it affords to a tremendous variety of marine organisms, were reflected in capacity use of the installation during the past year. More than 100 scientists from this country and abroad were engaged in field work at the laboratory for periods of up to several months. Subjects of long-term studies included acoustical data of both biological and oceanographic origin, behavioral patterns of teleosts as well as marine mammals, physiologically active substances from marine organisms, and electrophysiological activity in neural tissues.

Expansion of both the laboratory and the residence facilities, according to plans formulated early in the year, increased the accommodations for visiting investigators by about 50 per cent, and additional space was assigned for the housing and maintenance, with humidity and temperature control, of the

delicate scientific instruments in the laboratory.

The installation of a new system for the supply of salt water, and the provision of an outside aquarium shed, have made it possible to remove a source of high humidity and corrosion from the main laboratory building. The new water system provides sea water from the Gulf Stream at a considerable pressure after it has been filtered through many feet of beach sand; hence, the supply is free of many contaminants that were present in the old system.

Through the generosity of Mr. William Knight of Toledo, Ohio, and with the interest and the support of the Biology Branch of the Office of Naval Research, three open-water porpoise pens were constructed adjacent to an existing dock. Each pen encompasses an area of 60 by 80 feet, with depths ranging from five to ten feet. This installation will provide excellent opportunities for extensive research programs with porpoises.

Important additions to the fleet of marine craft were two United States Navy buoy boats, made available through the helpful cooperation of the Biology Branch of the Office of Naval Research. One of these boats contains a large sea well, capable of transporting, alive, large sharks and porpoises or a great number of small fish. The other vessel is equipped with a laboratory in which marine research can be done on the open sea.

Among the scientific organizations that held meetings at the laboratory this year were the Shark Research Panel of the American Institute of Biological Sciences and the Damon Runyon Memorial Fund for Cancer Research.

SOUTHWESTERN RESEARCH STATION

PORTAL, ARIZONA

Willis J. Gertsch, Acting Resident Director

In its seventh year of operation, the Southwestern Research Station in Portal, Arizona, served the needs of 63 visiting investigators and 27 specialists and assistants. Their studies dealt with the following branches of science: arachnology, bot-

any, entomology, herpetology, ichthyology, malacology, mammalogy, and ornithology. In addition, astronomers of the American Museum-Hayden Planetarium surveyed a possible site at the station for the installation of a research telescope.

A total of 86 students or organized groups visited the station to study the local flora and fauna. This included a large group of wildlife management officials from Arizona and New Mexico.

The total number of residents during the year, including families of visiting investigators and volunteers, was 204.

Dr. Mont A. Cazier, who was primarily responsible for the present balanced installation with its excellent equipment for basic research in many fields, resigned as Resident Director on May 1. His research activities during the year included collaboration with other investigators on nearly one hundred projects, in addition to his own continuing studies in entomology.

Improvement of the physical facilities included the installation of a new pressure tank which provides constant, high pressure for the entire water system of the station. Maintenance activities were unusually heavy because of the record low January temperatures which caused considerable damage. However, the energetic efforts of the foreman and several volunteer workers put the station in excellent condition.

The importance of the Southwestern Research Station is further reflected by the increasing number of published papers resulting from studies carried out there.

DEPARTMENT OF EDUCATION

John R. Saunders, Chairman

The Department of Education began several new activities last year, in addition to maintaining most of the programs of previous years. The "Weekend Natural Science Bus Trip for Adults" was one of the most popular of the new programs. Messrs. Kenneth A. Chambers and Christopher J. Schubert led the group, which visited the region of the Delaware Water

Gap to study geology, and then traveled to Brigantine, New Jersey, to study shore birds. Similar trips are being planned for the coming year.

The staff of the Department of Education, in cooperation with the New York Biology Teachers Association, prepared and distributed a student study guide to the Hall of the Biology of Man. Five hundred master copies were distributed to the New York City high schools, which then reproduced the guide for individual student use. It is conservatively estimated that 5000 students have visited the Museum during the spring semester to use the study guide.

Another new activity was the presentation of a series of fourteen lectures, illustrated by slides, for adults on Monday afternoons supplementary to the regular Monday gallery talks.

More than 125 natural science kits, containing material for students and manuals for teachers, were used by approximately 45,000 children to supplement their studies in science. While the kits have formerly been used chiefly by junior high schools, this year a large number went to elementary schools as well.

Several training programs for individual students were reorganized by Miss Lois J. Hussey, Assistant Chairman, with the help of the Department of Animal Behavior and its Chairman, Dr. Lester R. Aronson. Thirty-six students participated in the programs last year; there were seventeen undergraduates, two graduates, sixteen high school students, and one elementary school student.

A survey of the adult education program of the department over the past ten years, conducted by Mr. Saunders, revealed that activities at this level increased considerably. In the year 1952-1953, the teaching program for adults represented 3.2 per cent of the total student hours of instruction provided for all age levels. Each succeeding year, with one exception, showed a steady increase in this percentage. In the year just completed, the percentage of student hours of instruction provided for adults at the Museum reached 16.3 per cent of the total. This

increase was not unexpected; it had been planned for some ten years ago. In 1955, a supervisorship of adult programs was established, with Mr. C. Bruce Hunter in this post; and in 1959, the Museum created its first division of adult education. The staff, consisting of the supervisor, three senior instructors, and one instructor, is augmented by members of the scientific staff and outside lecturers. Last year eighteen courses for teachers were given, each carrying college credit of two points. Two courses at graduate level were offered during the National Science Foundation Summer Institute, and 20 lecture courses were given in the adult school. In addition, the adult education division conducted a series of gallery talks and slide lectures, the "Wednesday Film Programs for Adults," the "Adult Student Council Programs," and the "Nurses Education Program," for a total of 3324 sessions of instruction.

Last year, the total student body for all the teaching and lecturing programs of the department was 233,390 individuals who received 435,463 student hours of instruction in 12,120 sessions in classrooms, laboratories, workshops, lecture rooms, and exhibition halls, as well as in the field.

DEPARTMENT OF EXHIBITION AND GRAPHIC ARTS

Gordon R. Reekie, Chairman

While planning and exhibit design for new halls continued, several long-term exhibition projects were completed, and the largest and most ambitious temporary exhibit in the history of the Museum was installed.

All fourteen of the habitat groups of small North American mammals have been finished. These are to be installed in the first-floor corridor connecting the Hall of North American Mammals with the Hall of Northwest Coast Indians.

Renovation of the Hall of Northwest Coast Indians was completed, and the new lighting, which provides dramatic contrast between brilliance and shadow, displays the totem poles to full

advantage for the first time. All exhibits were completed, and the audio-visual demonstrations of bird calls were installed in the alcove "Courtship in Birds" in the Hall of the Biology of Birds, thereby completing this hall.

Work continued in the Hall of North American Birds throughout the year. Eight more habitat groups were prepared, bringing the total finished to eighteen. Particularly noteworthy is the new Bald Eagle habitat, for which a field trip was made to Haines, Alaska, in October, 1961. In addition, the new Condor mural has been finished, and the old Flamingo background painting by Fuertes has been restored as a matching panel to the Condor mural.

Work progressed on the "Eocene Life," "Paleocene Life," and "Archaic Ungulates" exhibits in the Hall of Early Mammals. Several exhibits in the Hall of Oil Geology were revised and brought up to date.

The Halls of Fishes and Ocean Life were closed in May, 1962, as the first step in the program of exhibition hall building that will include the reconstruction of the Hall of Ocean Life, to take place in 1963, and the construction of the new Hall of the Biology of Invertebrates, which has already been started. Plans for the designs of exhibits in these two halls are continuing, and all the Fiberglas porpoise models for the Porpoise Group in the Hall of Ocean Life have been made.

Designs were also continued for the Halls of Eastern Woodlands and Plains Indians and the Peoples of Africa. Actual preparation of exhibits has been started in the Indian Hall.

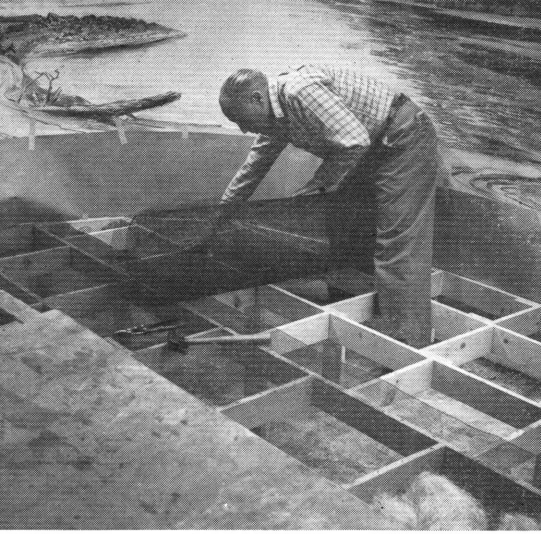
The "Man In Space" exhibit was an outstanding event in the 1961-1962 season. The exhibit, which opened early in 1961 with a reconstruction of the Mercury Space Capsule, was expanded to feature a facsimile of a manned space station, ARIES (Authentic Representation of an Independent Earth Satellite).

Another temporary exhibit, sponsored jointly by the Museum and the International Telephone and Telegraph Company, Inc., was "Art and Life in Old Peru," which was on display for



Progress on the new Hall of North American Birds included completion of the Bald Eagle habitat group, below. Steps in its preparation are shown above. 1. Material was collected at Kluckwan River site, Alaska, by Preparation Supervisor George E. Petersen. 2. Background scene was





sketched in charcoal before final rendering in paints. 3. Wire mesh underfloor was built to support foreground. 4. Accuracy of detail was observed in the placement of each rock, plant, and other feature of the environment. Photographs: The American Museum of Natural History.



nearly five months in the First Floor Annex. Still another was "Dating the Past with Atoms," in the Corner Gallery, opened in June and to remain on view for one year. Four other temporary exhibits were "Arctic Riviera," "Birds of Greenland," "The Death of a Lake," and "Butterflies of the American Tropics."

In the Division of Graphic Arts, in addition to the customary illustrations for scientific papers and *Natural History*, three special publications of note were produced. They were a new brief guide to the Museum designed to provide background information about exhibits at a price (25 cents) within the reach of the maximum number of visitors; an attractively illustrated brochure for the Museum Shop, and a 64-page catalogue for the exhibit "Art and Life In Old Peru," published as a supplement to *Curator* magazine.

LIBRARY

George H. Goodwin, Jr., Librarian

The Library's growth during the past twelve months was indicated by an attendance of 11,863 visitors and a circulation of 37,055 volumes. There were 11,240 reference queries and 1132 requests for loans. In each case the 1960-1961 figures were surpassed. Two thousand and forty-three volumes were added and 15,097 periodical issues were received.

The primary function of the Library has always been to aid and supplement the research activities of the scientific staff of the Museum. In addition, as an integral part of an institution devoted and committed to a program of education, the Library has naturally assumed the obligation of making its resources available to the scientific community at large as well as to members of the public who are pursuing studies in natural history.

Since the mid-twenties, groups of friends have been instrumental in promoting the growth of numerous college and public libraries. The Museum Library also must continue to grow,

so that it can keep pace with the research continuously being carried out in the natural sciences. If the Library is to operate efficiently and to provide the services expected of it, there must be adequate funds for the purchase of essential books and periodicals, the binding of thousands of volumes now in serious disrepair, and the refurbishing of the priceless collection of rare books.

Accordingly, an advisory group of Friends of the American Museum Library was formed in December, 1961. Members of the group are Messrs. Cyril F. dos Passos, Chairman, Richard Edes Harrison, Harrison D. Horblit, and H. Bradley Martin.

In February, 1962, Mrs. Nancy Russell, rare book restorer, was engaged to refurbish the collection of rare books. Since then more than 800 volumes have been repaired, cleaned, and treated. Several years of full-time activity will be required to complete this project. It is the Librarian's hope that the Friends will be instrumental in securing funds to underwrite the necessary expenses.

Mr. Leslie A. Taylor was appointed to the staff in September, 1961, as Assistant Librarian in charge of cataloguing.

More than 130 serial titles were secured in exchange for Museum publications. Of the 76 out-of-print books and serials added to the collection, several are of taxonomic importance. They include such rarities as Blackwall's "Researches in Zoology" (London, 1834), Goeze's "Entomologische Beyträge zu des Ritter Linné 12" (Leipzig, 1777-1783), and Soldani's "Saggio Orittografico, Ovvero Osservazioni Sopra le Terre Nautilitiche ed Ammonitiche della Toscana" (Siena, 1780).

The degree to which the Library's resources were utilized in research activities carried out by colleges and universities, commercial organizations, various departments of the Federal government, and other museums is dramatically indicated by the nearly 100 per cent increase in the number of loans during the past year. Of the 1132 loan requests processed this past year, 173 were filled by xerography. During this same period

the Library borrowed for use by Museum scientists a total of only 89 volumes.

The seriousness of the binding backlog continues to plague us and is by all odds our most pressing immediate problem. The 1961-1962 budget allowed us to bind 760 volumes, some 200 more than the previous year. Nonetheless, the backlog has been increased by 1500 volumes, and we are now in arrears to a total of 26,500 volumes.

PUBLICATIONS

Ruth Tyler, Chairman, Publications Committee

The publishing activities of the Museum include both scientific and popular publications. Scientific Publications, a service department for the scientific staff, is responsible for the editing and putting through the presses of the technical reports that are submitted to the three series *American Museum Novitates*, *Anthropological Papers*, and the *Bulletin*. These papers represent progress reports on continuing research by members of the staff, reports of the findings and the collected data of expeditions, or definitive summaries, in the form of monographs, of completed phases of long-term research programs.

The production of the department for the year was: *American Museum Novitates*, 63 papers representing 1464 printed pages; *Anthropological Papers*, three papers, 466 printed pages; *Bulletin*, ten papers, 754 printed pages. The separate publication of the *James Arthur Lecture on the Evolution of the Human Brain* for 1960 (32 printed pages) brought the total production of the department during the year to 2716 printed pages.

The major development of the year which will affect the popular publications program was the maturation of plans for the establishment by Doubleday & Company, Inc. of the Natural History Press. Details of the new enterprise are given in the report of the President.

Twenty-three titles were published in the *Natural History*

Library, a series of inexpensive, attractive paperback reprints of classics in the field of natural history. These are published by Doubleday Anchor Books in cooperation with the Museum. Members of the scientific staff of the Museum select titles that will introduce the reader to the study of man and to the whole natural world.

In December, 1961, Mr. John F. Purcell resigned from his positions as Publications Manager and Editor of *Natural History*. During his tenure as Editor, *Natural History* not only developed in quality but markedly increased in circulation. Mr. Purcell also guided the preliminary inquiries into the new publications program for the Museum. Mr. Robert E. Williamson continues as Managing Editor of *Natural History*, and Mrs. Helene Jordan was appointed Executive Editor.

Paid circulation of *Natural History* totaled 124,210 subscribers; this is a new high for the third consecutive year. In August, 1961, the magazine successfully met the requirements for membership in the Audit Bureau of Circulations.

During the past fiscal year, *Natural History* showed a 46 per cent increase in gross advertising billing over the previous year. This represents a 40 per cent gain in net advertising revenue, despite a 20 per cent increase in page rates. It also reflects a lineage increase of nearly 20 pages.

Editorially, the magazine continued to attract outstanding writers. In December, 1961, the American Association for the Advancement of Science-Westinghouse Award for excellence in scientific writing was presented to *Natural History* and the noted science writer, John Pfeiffer, for the latter's article, "DNA: Master Substance of Life."

Junior Natural History had a successful year under the editorship of Mrs. Marion B. Carr. An advisory committee was formed to develop further periodical publishing for young readers.

Curator, entering its fifth year of publication under the editorship of Dr. Edwin H. Colbert, was widely praised by

members of the museum profession for its clear and useful technical articles as well as for its stimulating expressions of museum philosophy.

PLANT OPERATION AND MAINTENANCE

Paul H. Grouleff, Plant Manager

Negotiations between the Museum and the American Federation of State, County, and Municipal Employees, Local 1306, which represents a majority of the non-supervisory personnel in the Custodial Services division of the Museum culminated in the mutual acceptance of a collective bargaining agreement, signed on May 8, 1962. The agreement will remain effective until June 30, 1963.

In an effort to utilize personnel more effectively, the employees and duties previously assigned to the Protection division were reassigned to the Custodial Services division. The total number of custodial personnel, however, remains inadequate for the needs of the Museum; at least twenty more attendants are considered necessary.

The Architectural Planning section prepared sketches, plans, specifications, and cost estimates for various projects throughout the Museum, including the Hall of the Biology of Invertebrates and the Hall of Ocean Life.

Continuing maintenance by the mechanical force involved repair or replacement of some 200 locks and 400 windows, extensive repairs to various roofs, complete repainting of 50 individual areas, and replacement of more than 40,000 incandescent and fluorescent lights.

Among the capital program projects carried out with funds supplied by New York City and completed during the year were the adaptation of the former quarters of the Library on the fifth floor to serve as storage space for anthropology and mammalogy collections, the installation of new fluorescent lighting in the school cafeteria, and improvements of the Columbus Avenue

service driveway. Other major capital improvements included the installation of new fire doors, the overhauling of elevator-operating mechanisms, and the replacement of some 395 large air filters in the ventilation systems. The construction of a paved, lighted parking lot adjacent to the Planetarium was accomplished through joint efforts of the city and the Trustees.

ATTENDANCE

During the fiscal year here reported on, 2,307,991 people visited the Museum, and 600,463 visited the Planetarium, making a combined total of 2,908,454. This figure represents an increase of 303,959 over the combined attendance for the preceding fiscal year.

James A. Oliver

THE AMERICAN MUSEUM OF NATURAL HISTORY

FINANCIAL STATEMENTS

FOR THE YEARS ENDED JUNE 30, 1962 AND 1961

**THE AMERICAN MUSEUM OF
BALANCE SHEETS, JUNE**

ASSETS:	<i>1962</i>	<i>1961</i>
Current funds:		
General funds:		
Cash	\$ 105,363	\$ 46,221
Accounts receivable	304,849	280,995
Inventories, principally publications	65,496	58,605
Prepaid expenses	86,397	119,538
	<u>\$ 562,105</u>	<u>\$ 505,359</u>
Special funds:		
Cash:		
Demand deposits	\$ 373,572	\$ 340,698
Time deposits	250,500	200,000
Investments (market June 30, 1962, \$592,000)		
(Note 1):		
U. S. Government bonds	600,000	900,000
Preferred stock	2,387	2,387
Accounts receivable	30,975	26,462
	<u>\$ 1,257,434</u>	<u>\$ 1,469,547</u>
	<u>\$ 1,819,539</u>	<u>\$ 1,974,906</u>
Endowment funds:		
Cash:		
Demand deposit	\$ 6,497	\$ 11,706
Time deposit	400,000	—
Investments (market June 30, 1962, \$34,120,000)		
(Note 1):		
Bonds	16,476,007	16,249,117
Preferred stocks	1,602,700	1,557,104
Common stocks	12,707,659	12,008,923
Other	—	3,775
	<u>\$31,192,863</u>	<u>\$29,830,625</u>
Investment in bonds of The American Museum of Natural History Planetarium Authority, \$570,000 principal amount, at cost (Note 3)	<u>\$ 425,000</u>	<u>\$ 425,000</u>
Pension funds:		
Cash:		
Demand deposits	\$ 79,578	\$ 59,861
Time deposits	200,000	—
Investments, at cost (market June 30, 1962, \$7,689,000):		
Bonds	5,615,470	5,331,175
Preferred stocks	500,758	529,645
Common stocks	1,172,127	1,242,401
	<u>\$ 7,567,933</u>	<u>\$ 7,163,082</u>
	<u>\$41,005,335</u>	<u>\$39,393,613</u>

The accompanying notes are an integral part of these statements.

NATURAL HISTORY

), 1962 and 1961

FUNDS AND LIABILITIES:	1962	1961
Current funds:		
General funds:		
Accounts payable and payroll taxes withheld	\$ 90,397	\$ 92,677
Deferred income, principally unearned subscriptions	566,084	509,371
	656,481	602,048
Deficit	94,376	96,689
	<u>\$ 562,105</u>	<u>\$ 505,359</u>
 Special funds:		
Balances of funds received or appropriated for specific purposes	\$ 1,257,434	\$ 1,469,547
	<u>\$ 1,819,539</u>	<u>\$ 1,974,906</u>
 Endowment funds:		
Endowment funds, income available for:		
Restricted purposes	\$13,375,741	\$12,758,792
Unrestricted purposes	7,593,114	7,231,538
Funds functioning as endowment, principal and income available for:		
Restricted purposes	2,449,378	2,351,364
Unrestricted purposes (Notes 2 and 5)	7,774,630	7,488,931
	<u>\$31,192,863</u>	<u>\$29,830,625</u>
 Funds invested in bonds of The American Museum of Natural History Planetarium Authority	 \$ 425,000	 \$ 425,000
 Pension funds:		
Pension fund balance	\$ 7,565,806	\$ 7,160,955
Welfare fund balance	2,127	2,127
	<u>\$ 7,567,933</u>	<u>\$ 7,163,082</u>
	<u>\$41,005,335</u>	<u>\$39,393,613</u>

The accompanying notes are an integral part of these statements.

GENERAL FUNDS
SUMMARY STATEMENTS OF CHANGES
for the years ended June 30, 1962 and 1961

	<i>1962</i>	<i>1961</i>
Deficit, beginning of year	\$ 96,689	\$ 97,449
Less, Transfer from unrestricted funds functioning as endowment	<u>96,689</u>	<u>97,449</u>
	<u>—</u>	<u>—</u>
Income:		
Appropriation from the City of New York	\$1,625,300	\$1,504,855
Endowment funds	1,183,195	1,150,142
Outside trusts and foundations	59,144	63,150
Gifts and grants	227,497	231,538
Other (Notes 2, 3 and 4)	<u>415,261</u>	<u>345,182</u>
	<u>\$3,510,397</u>	<u>\$3,294,867</u>
Expenses and appropriations:		
General administration	\$ 685,367	\$ 671,723
Educational activities	1,389,075	1,312,653
Operation and maintenance of physical plant	1,227,301	1,169,825
Pension and other social benefits	<u>303,030</u>	<u>290,685</u>
	3,604,773	3,444,886
Less, Appropriation for outstanding budgetary commitments at beginning of year	<u>—</u>	53,330
	<u>\$3,604,773</u>	<u>\$3,391,556</u>
Deficit, end of year	<u>\$ 94,376</u>	<u>\$ 96,689</u>

The accompanying notes are an integral part of these statements.

SPECIAL FUNDS
SUMMARY STATEMENTS OF CHANGES IN FUND BALANCES
for the years ended June 30, 1962 and 1961

	<i>1962</i>	<i>1961</i>
Balance, beginning of year	<u><u>\$1,469,547</u></u>	<u><u>\$1,639,426</u></u>
Income:		
Endowment funds	\$ 216,984	\$ 206,108
Gifts and grants	714,058	726,458
Other	220,914	248,555
Transfer from endowment funds	30,000	—
	<u><u>\$1,181,956</u></u>	<u><u>\$1,181,121</u></u>
Expenditures for the special purposes and objects for which the funds were established	\$1,352,345	\$1,346,000
Transfer to general funds (included in general funds, other income)	41,724	—
Transfer to endowment funds	—	5,000
	<u><u>\$1,394,069</u></u>	<u><u>\$1,351,000</u></u>
Balance, end of year	<u><u>\$1,257,434</u></u>	<u><u>\$1,469,547</u></u>

The accompanying notes are an integral part of these statements.

ENDOWMENT FUNDS
SUMMARY STATEMENTS OF CHANGES IN PRINCIPAL
for the years ended June 30, 1962 and 1961

	<i>1962</i>	<i>1961</i>
Balance, beginning of year	<u>\$29,830,625</u>	<u>\$28,824,618</u>
Additions:		
Gifts, bequests, etc. (Note 2)	\$ 106,817	\$ 548,255
Net profit on sales of investments	1,398,710	585,175
Transfer from special funds	—	5,000
	<u>\$ 1,505,527</u>	<u>\$ 1,138,430</u>
Deductions:		
Expenditure for custodian fee	\$ 5,000	\$ 5,000
Transfers to general funds:		
For payment of certain expenses (included in general funds, other income)	11,600	29,974
To dispose of operating deficit of preceding year	96,689	97,449
Transfer to special funds	30,000	—
	<u>\$ 143,289</u>	<u>\$ 132,423</u>
Net additions	<u>\$ 1,362,238</u>	<u>\$ 1,006,007</u>
Balance, end of year	<u>\$31,192,863</u>	<u>\$29,830,625</u>

The accompanying notes are an integral part of these statements.

PENSION FUNDS
SUMMARY STATEMENTS OF CHANGES IN PRINCIPAL
for the years ended June 30, 1962 and 1961

	<i>1962</i>	<i>1961</i>
Balance, beginning of year	<u>\$7,163,082</u>	<u>\$6,816,038</u>
Additions:		
Contributions of members	\$ 158,492	\$ 154,620
Contributions of Museum	189,070	184,322
Income from investments	312,543	290,397
Net profit on sales of investments	64,058	12,677
	<u>\$ 724,163</u>	<u>\$ 642,016</u>
Deductions:		
Payments to members and beneficiaries	\$ 314,357	\$ 289,969
Expenses	4,955	5,003
	<u>\$ 319,312</u>	<u>\$ 294,972</u>
Net additions	<u>\$ 404,851</u>	<u>\$ 347,044</u>
Balance, end of year	<u>\$7,567,933</u>	<u>\$7,163,082</u>

The accompanying notes are an integral part of these statements.

NOTES TO FINANCIAL STATEMENTS

1. The land, buildings and equipment utilized by the Museum are either owned by the City of New York or were charged off at the time of purchase and, therefore, are not reflected in the balance sheet. Land and buildings owned by the Museum are not significant in amount. No valuation of exhibits, collections, library, etc., has been established for balance sheet purposes.

Investments are recorded at cost in respect of those purchased, and in respect of those acquired by gift, bequest or otherwise, at market valuations at the dates of acquisition, probate court valuations or valuations established by the trustees.

2. The Museum owns an interest in certain mining properties acquired through a bequest. No valuation has been recorded on the books for the interest in these properties and, therefore, it is not reflected in the balance sheet. However, the Museum receives royalties from this source and such royalties are recorded, when received, as additions to unrestricted funds functioning as endowment (as bequests) or to current general funds. During the years ended in 1962 and 1961 royalties received, net of expenses, amounted to \$50,323 and \$91,763, respectively, of which approximately \$50,000 was credited to general funds (other income) in each year.
3. The Planetarium Authority is operated under the supervision of the Museum's management. Its financial statements and the auditors' opinion with respect thereto are annexed. Interest income received from the Planetarium amounted to \$25,650 in each of the years ended in 1962 and 1961. These amounts are included in other income of the general funds.
4. Other income of the general funds for the years ended in 1962 and 1961 includes net income from magazine and book shop operations of \$6,569 and \$16,357, respectively. Gross income from magazine and book shop operations amounted to \$1,024,241 and \$1,005,819 for the respective years.
5. The Museum has remaining commitments of unrestricted funds of \$140,000 and \$47,100 representing the respective maximum amounts which the Museum may be required to expend in connection with completion of alterations to the existing electrical system and modernization of the auditorium.

LYBRAND, ROSS BROS. & MONTGOMERY
Certified Public Accountants

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

We have examined the balance sheet of THE AMERICAN MUSEUM of NATURAL HISTORY as of June 30, 1962 and the related statements of funds for the year then ended. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances. We made a similar examination for the year ended June 30, 1961.

In our opinion, the accompanying balance sheets and related statements of funds present fairly the financial position of the Museum at June 30, 1962 and 1961 and the results of its operations for the years then ended, on a consistent basis.

Lybrand, Ross Bros. & Montgomery
New York, August 10, 1962.

**THE AMERICAN MUSEUM OF NATURAL HISTORY
PLANETARIUM AUTHORITY**

FINANCIAL STATEMENTS

FOR THE YEARS ENDED JUNE 30, 1962 and 1961

**THE AMERICAN MUSEUM
PLANETARIUM
BALANCE SHEETS, JUNE**

ASSETS:	1962	1961
Cash	\$ 57,559	\$ 29,157
Accounts receivable	2,131	937
Inventory, principally publications	<u>23,386</u>	<u>24,825</u>
	<u>\$ 83,076</u>	<u>\$ 54,919</u>
Equipment, fixtures, etc. (Note 1) :		
Furniture and fixtures	\$ 38,870	\$ 38,870
Plant equipment, machinery and tools	70,222	70,222
Zeiss planetarium instrument	135,059	135,059
Copernican planetarium instrument	<u>30,435</u>	<u>30,435</u>
	274,586	274,586
Less, Allowances for depreciation	<u>156,405</u>	<u>149,652</u>
	\$118,181	\$124,934
Building, at cost (Note 1)	569,209	569,209
Land (donated by the City of New York)	<u>—</u>	<u>—</u>
	<u>\$687,390</u>	<u>\$694,143</u>
Prepaid insurance	<u>\$ 3,323</u>	<u>\$ 5,263</u>
	<u>\$773,789</u>	<u>\$754,325</u>

The accompanying notes are an integral part of these statements.

OF NATURAL HISTORY
 AUTHORITY
 30, 1962 and 1961

	1962	1961
LIABILITIES:		
Accounts payable	\$ 2,210	\$ 836
4½% Refunding Serial Revenue bonds, and interest thereon (Note 2) :		
Interest:		
Unpaid coupons, past due	\$259,830	\$259,830
Accrued on past-due unpaid bonds	321,570	295,920
	581,400	555,750
Less, Payments on account, including \$25,650 in each of the respective years	265,950	240,300
	\$315,450	\$315,450
Principal, past due	\$570,000	\$570,000
	\$887,660	\$886,286

CONTRIBUTED CAPITAL AND DEFICIT:		
Contributed capital:		
Charles Hayden	\$156,869	\$156,869
Charles Hayden Foundation	250,925	250,925
	407,794	407,794
Deficit, as annexed	521,665	539,755
	\$113,871*	\$131,961*
	\$773,789	\$754,325

*Denotes deduction.

The accompanying notes are an integral part of these statements.

STATEMENTS OF INCOME, EXPENSES AND DEFICIT

for the years ended June 30, 1962 and 1961

Income:	1962	1961
Admission fees less allowances and commissions	\$364,141	\$350,337
Special lectures and courses	14,477	15,509
Miscellaneous	4,788	7,981
	<u>\$383,406</u>	<u>\$373,827</u>
Auxiliary activity, sales booth	79,039	75,387
Total	<u>\$462,445</u>	<u>\$449,214</u>
Expenses:		
Preparation, presentation and promotional:		
Salaries	\$149,533	\$148,728
Supplies and expenses	31,377	32,822
	<u>180,910</u>	<u>181,550</u>
Operation and maintenance:		
Salaries	96,048	94,496
Supplies and expenses	31,984	33,064
	<u>128,032</u>	<u>127,560</u>
Administrative and general:		
Salaries	7,500	7,500
Pension fund, social security and other employee benefits	22,848	22,583
Miscellaneous	8,775	8,446
	<u>39,123</u>	<u>38,529</u>
Auxiliary activity, sales booth	63,887	53,944
Total	<u>\$411,952</u>	<u>\$401,583</u>
Income before interest and depreciation	<u>\$ 50,493</u>	<u>\$ 47,631</u>
Interest on past-due 4½% Refunding Serial Revenue bonds	\$ 25,650	\$ 25,650
Provision for depreciation (Note 1)	6,753	9,905
Total interest and depreciation	<u>32,403</u>	<u>35,555</u>
Net income for year	18,090	12,076
Deficit, beginning of year	539,755	551,831
Deficit, end of year	<u>\$521,665</u>	<u>\$539,755</u>

The accompanying notes are an integral part of these statements.

NOTES TO FINANCIAL STATEMENTS

1. The Authority's corporate charter terminates when all its liabilities, including its bonds, have been paid in full or have otherwise been discharged. At that time title to its personal property passes to The American Museum of Natural History and title to 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. Because of the nature of the ownership of the property, provision for depreciation of the building is considered unnecessary.
2. 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.

LYBRAND, ROSS BROS. & MONTGOMERY
Certified Public Accountants

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

We have examined the balance sheet of THE AMERICAN MUSEUM of NATURAL HISTORY PLANETARIUM AUTHORITY as of June 30, 1962 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 made a similar examination for the year ended June 30, 1961.

In our opinion, the accompanying balance sheets and related statements of income, expenses and deficit present fairly the financial position of the Authority at June 30, 1962 and 1961 and the results of its operations for the years then ended, on a consistent basis.

Lybrand, Ross Bros. & Montgomery

New York, August 10, 1962.

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* Deceased August 26, 1962.

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* Effective October 1, 1962.

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