



NINETY-SECOND ANNUAL REPORT

THE AMERICAN MUSEUM
OF NATURAL HISTORY

JULY, 1960, THROUGH JUNE, 1961



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THE CITY OF NEW YORK
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NINETY-SECOND ANNUAL REPORT OF THE PRESIDENT

*To the Trustees of
The American Museum of Natural History
and to the
Municipal Authorities of the City of New York*

It has been ten years since I took over the Presidency of this Museum from Mr. F. Trubee Davison. Through the devoted efforts of Mr. Davison, of his associates and predecessors on the Board of Trustees, and of the men and women who have served on the staff since the founding of the Museum, the reputation of this institution was well established by 1951. Each decade of its history had been marked by progress and growth.

To continue this tradition has been the aim of all of us connected with the Museum during the past ten years, as it has been our continuing challenge. It is no secret that this period has brought a dramatic change in the emphasis on science in our society. It has brought rapid proliferation of knowledge, an almost incredible expansion of the horizons of science, and the need for clear, rapid, and widespread dissemination of scientific information. What the biologist sees beneath the microscope and what the astronomer views through the telescope are becoming, with increasing urgency, the concern of each of us.

In order to fulfill the responsibilities of the Museum for both the discovery and the dissemination of knowledge we have, during the past decade, kept exploring new avenues of operation. Within our financial limitations we have increased the size of our scientific staff, expanded our programs of exhibition and instruction, pioneered in new forms of interpretation, and experimented with new media of communication.

Some of the changes that have come about are readily visible to our public. During the past ten years we have completed seven major halls, reconstructed five permanent exhibitions, installed more than one hundred temporary shows, and embarked on a large-scale exhibition expansion program leading to our centennial celebration in 1969. We have added two new field research stations, providing additional, needed facilities for investigation of a wide range of research problems. With the cooperation of the National Science Foundation we have initiated science training programs for young people and institutes for teachers. Finally, we have enlarged both our library facilities and our publications program to meet the needs of scholars and the science-oriented public.

All these achievements have been the result of the competence of our staff and the interest and support of our Trustees, members, and friends. The year just past has been worthy of the decade. In his report Dr. Oliver will examine the role of the Museum as an educational force and will review the progress of this past year in appropriate detail, but I would like to present here a few of the highlights of this period.

Our exhibition program is the visual product of research and exploration. One of the most memorable events in the Museum's history was the opening in March of the Hall of the Biology of Man. After years of planning, preparation, and construction, at a cost of \$450,000, this new hall has clearly demonstrated its value to the general public and to the scientific and educational community.

The growth and development, during this decade, of the American Museum-Hayden Planetarium quite naturally reflect the tremendous popular interest in space exploration generated by the extraordinary technological achievements in this area. But the Planetarium also played a significant part in stimulating an informed public interest well before the actual opening of the space age in 1957. A series of space symposia beginning in 1951 served as a platform for the initial public discus-

sion by scientists of many of the rocket and satellite projects that are now realities. Simultaneously, in the early 1950's, the Planetarium placed greater emphasis on its program of evening courses for laymen. The number of courses given annually has increased, in these ten years, from six to sixteen, and total registration has more than doubled.

A month after the opening of the Hall of the Biology of Man, the Museum launched the first phase of a new series of exhibits on a subject of widespread public interest—Man in Space. The main feature of this timely display is a full-scale model of the Mercury Spacecraft in which Commander Alan B. Shepard, Jr., made his historic flight. Plans for expansion of this exhibit in the fall include a full-scale model of an orbiting space laboratory to be known as ARIES (Authentic Representation of an Independent Earth Satellite). The laboratory will contain a complete life-support system in which five men could reside for as long as 60 days while conducting experiments on various bio-medical problems of man in space.

While the City of New York—our municipal partner—helpfully finances structural changes that may be required, we are dependent on private support to supplement our own funds before proceeding on a major exhibit. For projects recently completed or currently under way, we received particularly generous gifts from the James Foundation, the McDonnell Aircraft Corporation, the Martin Company, *Newsweek* Magazine, and Mr. John D. Rockefeller, III.

The Library, containing more than 175,000 catalogued volumes, has one of the most extensive collections of natural science books in the world. This year, having long outgrown its old facilities, the Library was moved into modern, air-conditioned space and is now able to serve more usefully the growing scientific demand of the staff, students, and the public.

This past year has been marked by particular activity in the field of books and periodicals, both scientific and popular. Under Museum auspices Doubleday and Company published Craw-

ford H. Greenewalt's remarkable volume, "Hummingbirds." Illustrated throughout with ultra-high-speed photographs in full color, this distinguished book received widespread critical acclaim here and abroad. The first two printings were quickly sold out, and a third printing is now in press. Mr. Greenewalt is a Trustee and a Research Associate of the Department of Ornithology.

The fall season will bring another publication "first" with the launching of *The Natural History Library*, also published in cooperation with Doubleday and Company. This series will consist of reprints of distinguished works in the life and earth sciences, selected by Museum scientists. The books are attractively presented in paper-bound form, thus making them available to a wide public.

The quality of our magazine *Natural History* continues to attract national attention, and paid circulation is well in excess of 100,000. Current plans call for an increased school distribution of *Junior Natural History* in an enlarged format and with an editorial approach embracing the whole range of the sciences.

Looking back over this past decade, I do not think it is an exaggeration to say that the Museum has been, and by definition will continue to be, engaged in pursuits synonymous with our national necessity. At the same time these ten years have brought with them very heavy management problems. No one can foresee when the pressures of this period will ease. Of only one thing can we be certain—that it will take hard work and ingenuity to carry on, uncurtailed, the range and quality of our scientific work and public services.

Because of bequests and the steady rise in the value of our common stock holdings, the Endowment Fund has increased substantially. The record of the fund ten years ago showed a book value of \$15,961,000 and a market value of \$17,581,000. Figures for 1961 show a book value of \$29,830,000 and a market value of \$37,817,000. Still, these figures are de-

ceptive and imply an affluence which we do not in fact enjoy. Our rate of growth is gratifying, but it must continue in the decade ahead if we are merely to hold our present position. Like all institutions, the Museum has been caught in the squeeze of spiraling costs. Our endowment income has never been sufficient to prevent sizable and continuing yearly deficits. While these have been substantially reduced by active annual campaign contributions, we have had to make allocations from our unrestricted capital funds over the past ten years for a total approximating \$750,000. The Pension Fund has had a significant record and covers adequately our obligations. Its healthy growth is indicated by the fact that the book and market values of Pension Fund investments have more than doubled in the past decade. On June 30 the book value of the Pension Fund stood at \$7,163,000 and the market value at \$7,910,000.

Happily, in addition to an increase in members, this past year has seen an unusually active Contributors' Program, and the \$231,538 raised has helped significantly in the financing of scientific and educational programs. The Men's Committee was again headed by Mr. Robert G. Goelet, and the Women's Committee by Mrs. Alexander P. Morgan who has completed her third successful year as chairman. Mrs. Morgan's co-chairman, Mrs. Francis H. Low, will succeed her as head of next year's drive.

It is a pleasure to note the re-election of the following persons to the Board of Trustees: Mrs. Richard Derby and Messrs. Luke B. Lockwood, Richard K. Mellon, Gerard Piel, and Edgar M. Queeny. Messrs. James C. Greenway, Jr., and Gardner D. Stout were elected to the Board for their first terms.

That the appeal by the Museum for contributions is based on the educational opportunities offered by the Museum to people of all ages and cultural backgrounds is, I believe, especially fitting. The preservation, organization, and understanding of knowledge are basic functions of the Museum. Stimulation of interest in these goals must never be confined to any single group. No one who appreciates the speed at which the

world is moving can fail to evaluate the importance of this aspect of the Museum undertaking. If we are to find answers to the pressing questions of our time, we must develop men and women who have the desire to *know!* To play its proper part in the achievement of this goal, the Museum must be able to count on the continued understanding support of its contributors and friends.

Alexander M. White

During the year we were saddened by the loss of two valued Trustees of the Museum. On October 25, 1960, Mr. Arthur Stannard Vernay died, thus bringing to a close a Museum association of nearly 40 years during which time he made fifteen major expeditions for this institution. Mr. Vernay was elected to the Board of Trustees in 1935 and continued to serve as an active and later as an Honorary Trustee until the time of his death. Mr. Keith Spalding, a Trustee since 1944, died June 25, 1961. He had been elected Honorary Trustee in 1949 and Associate Benefactor on April 22, 1943.

REPORT OF THE DIRECTOR

One of the most important, yet least recognized, forces in contemporary American education is the natural science museum. It has grown to an educational stature that demands universal recognition as an integral part of our teaching system. Yet, because the dynamic role played by natural science museums has been so greatly accelerated and within so short a span of time, there is little awareness of the true significance of that growth, even among the institutions themselves.

It has become almost a fetish to hitch one's functional wagon to the sometimes erratic, but currently rising, star of education. We may rightly inquire, therefore, just how the present-day natural science museums qualify as institutions that may be considered vital parts of our over-all teaching system.

Natural science museums have always been educational institutions in the sense that they provide real or simulated objects that form the basis for the acquisition of empirical knowledge. Still, it is not possible to consider the museum as a *major* educational force solely on the basis of excellent exhibitions. There is wide variation in the instructional value as well as in the impact of exhibits, even within the same institution. This fact does not negate the importance of good displays. Rather, it leads us to the changes that have come about in natural science museums and the role they have recently assumed.

Now, more than ever before, natural science museums build study programs around their exhibits. They see their educational function as the sound presentation of their material by qualified teaching personnel in formal, regularly scheduled classes, lectures, seminars, and tours. When this presentation is

made to students who are enrolled in schools, colleges, or universities, it complements and enriches the efforts of these institutions; when it is to laymen, it complements and enriches their individual informal pursuit of knowledge and helps to make for the well-informed citizenry that is essential to our national progress.

Although the scope and competence of instruction vary considerably with the size and nature of the institution, the important fact is that today more museums are presenting broader and more valuable programs of educational activities. According to Mr. Joseph A. Patterson, Director of the American Association of Museums, there were approximately 1600 museums in the United States and Canada in 1932. A sampling of one-fourth of these showed that fifteen per cent were offering formally organized educational programs. By 1960 there were more than 4000 museums, with 45 per cent of the sample offering such programs. Such a trend is impressive, and it has been most pronounced in the United States where these functions are designed for all age groups and provide opportunities for study on all levels, ranging from classes for children through courses on the college and university level, and including a rich variety of programs for the adult layman.

The natural history museum is the gateway to science for many individuals. Here, a child's interest in science is awakened and finds direction; curiosity is developed along lines that often lead to a fruitful career in science. Here, too, is found the basis for intelligent participation, by an informed citizenry, in national scientific policy.

Until now, I have been speaking in general terms. What are the specific contributions that are being made by the American Museum of Natural History? How does our own museum qualify as an educational institution?

This Museum was founded in 1869 with one of its basic aims that of education in natural history. In 1872 the first school groups visited the institution, then housed in the old Arsenal Building. Since that time the activities of the Museum have

expanded remarkably in many areas, but its commitment to teaching has never changed. On the contrary, the Trustees and staff, in cooperation with the City of New York and with other educational institutions, have continually explored new techniques and methods of education.

At the core of direct teaching activities in the Museum is the Department of Education which is responsible for the major share of formal instruction and extension services. The work of this department is complemented by that of the education division of the Planetarium, a unit of continually increasing activity and importance. But the educational function of the Museum takes many additional forms, among them the following: the specialized guidance and direction of individual undergraduate students and doctoral candidates by staff scientists; the direct participation of our scientific staff in the teaching programs of colleges and universities; the utilization of Museum collections in such programs; the support, maintenance, and continued enrichment of our Library, which represents one of the largest and finest collections on natural history in the world; and the sponsorship of an extensive publications program.

The scope and variety of programs offered are too broad to be described in detail, but I should like to discuss briefly some of the continuing projects that best exemplify the educational activities of the Museum.

The Department of Education, even with its limitations in staff and in budget, provides programs of quality and significance for as many segments of the community as possible, while maintaining a balance between activities for adults and those for children. The department is under the direction of Mr. John R. Saunders, Chairman.

A five-year summary of the adult education program—from fall, 1956, to spring, 1961—shows that 29 undergraduate, six graduate, and 30 non-credit courses have been given and that a total of 47,306 men and women benefited from this work.

Fourteen courses are now especially designed to give work-

ing teachers in greater New York and the adjacent New Jersey area learning experiences in the natural and social sciences not obtainable in the average college curriculum. In order to strengthen the background of high school biology teachers in particular, the Museum, with grants from the National Science Foundation, offers summer institutes in field biology in which plants and animals may be seen and studied in their natural environments. In 1960, the institute was held at the Southwestern Research Station of the Museum in Portal, Arizona. Aside from these courses, which enrich the knowledge of experienced teachers, the education department has also arranged for the training of student teachers in cooperation with the City College of New York, New York University, and Mills College.

The nurse education program in the anthropological and natural sciences has been part of the work of the department since 1931. Courses are especially designed to supplement current nursing school curricula and are developed and revised in cooperation with nearby teaching hospitals and schools of nursing. During the 1960 teaching season, 822 student nurses attended. The new Hall of the Biology of Man will be particularly valuable in the conducting of these classes.

The newest project in the course program for laymen is the Adult School, which this year offered seventeen eight-week courses. These evening classes included topics as varied as "Patterns of Japanese Life" and "The Earth's Crust." Student response has been gratifying, as has been the news that the National Science Foundation will provide a grant to cover the operating expenses of the program next year.

In addition to its classes, the Museum has for many years sponsored bi-weekly film programs for the general public and has offered special lectures and film showings for Museum Members and their children. These are classified according to the appropriate audience age. Free Gallery Talks, which were initiated this year, met with the same enthusiastic response accorded the other programs and were quickly oversubscribed.

In this project, detailed explanations of selected exhibition halls are given by department instructors. These informal lectures are followed by discussions.

Field trips for the layman, which during the past year alone were attended by more than 1700 people, add another dimension to the natural science studies offered by the Museum.

The largest children's program is "The World We Live In" which provides an all-day Museum experience for those in grades three to nine. This program for school classes from New York City is designed to accommodate approximately 2200 school classes during the year. The topics presented are closely correlated with the school syllabi in science and social studies. Conferences are held regularly with key administrative and supervisory personnel in the public, private, and parochial schools of New York to enable the department to provide programs best suited to the requirements of the school groups. The basic program is offered to standard school classes; special versions are developed to meet the needs of classes for the intellectually gifted, classes for the mentally retarded, and classes for the physically and emotionally handicapped.

In addition to the regularly scheduled classes many other groups visit the Museum. A five-week survey of these groups in 1960 shows that a total of 814 schools—1775 classes—had been given a full-day instructional tour of selected halls. Of this total approximately one-third of the classes were from New York City, one-third from upper New York, and one-third from New Jersey. Connecticut, Pennsylvania, Virginia, Delaware, Maryland, Massachusetts, and Ohio were also represented.

The High School Science Program serves 2000 students each year who come to the Museum for a two-hour laboratory visit and discussion session. Museum instructors, in cooperation with the scientific staff, explain the operation of a research laboratory, discuss some of the research problems currently being investigated by the scientists, and answer inquiries about science as a vocation.

An introductory course in mineralogy for high school students was initiated in 1957 because no such course was available in this area. Unfortunately, because of the limited staff and funds, the enrollment must be confined to 20 students.

The Natural Science Center provides informal instruction which introduces children to the plants and the animals of the metropolitan area. In many cases it offers boys and girls the most comprehensive exposure to biology that they will get before high school. Since the Center opened in 1954, more than 220,000 young people have visited it. Many of them have developed their own scientific projects and study collections at the Center. One, it was announced in March of this year, went on to receive a Westinghouse Science Scholarship in 1961.

By means of circulating exhibits the Department of Education was able to provide 464 schools, colleges, libraries, hospitals, youth organizations, church organizations, and children's museums with 6531 loans of exhibit material during the past year. These exhibits, delivered free in Museum trucks, were seen by a total viewing audience of over 8,000,000 individuals. These loans do not include the thousands of specimens that the scientific departments send to all parts of the world to further scientific research on a more scholarly level. The Museum also distributes natural history films, slides, filmstrips, and still photographs to museums, colleges, schools, and other organizations on a sales or rental basis.

The importance of astronomy and space science makes it imperative for the Department of Astronomy to offer programs that will enable both young people and adults to pursue these studies quickly and intensively. In some instances these programs determine future careers; in every instance they lead to better understanding of new advances in these highly complex fields. The American Museum-Hayden Planetarium is uniquely equipped to participate in this educational activity. An eminently qualified staff directs the effective use of facilities that include the new Zeiss projector, hundreds of devices for dem-

onstrating special astronomical effects, two large classrooms, and topical exhibits. An average of 40 lectures per week is presented at the Planetarium. Including those on the staff who contribute to the planning of the program, nine lecturers and three projectionists share in presenting the lectures. In any one presentation, as many as 150 auxiliary projectors, in addition to the Zeiss projection instrument, may be used for visual effects. Lectures are planned in accordance with sound educational theory and are adapted to audience age and background.

Sixteen courses were offered in 1960–1961; for 1961–1962, 20 are planned. The subjects range from “Astronomy for Young People” to “Advanced Celestial Navigation.” The department has taken care to provide a program of courses that encourages interested and capable people to start with the fundamental principles of science in general and to progress to more difficult investigations of a specific area. Young people may start their astronomy education at the age of eight.

The department is continuing its successful Astronomy and Space Science Summer Institute for selected high school students. Two hundred young people were accepted last summer—out of 532 applicants—to attend classes at the Planetarium which were supported by the National Science Foundation. These classes consider such topics as “Our Galaxy and Beyond,” “Rocket Engines,” “Interstellar and Intergalactic Space,” and “Opportunities in Space Engineering.”

A special program for elementary school teachers was originated in the fall of 1960 in order to give teachers a background in factual astronomy and space sciences, and to help them develop devices and procedures which they can use in the classroom. The National Science Foundation will continue to support the program next year.

Training in research methods, an important aspect of the educational program of the Museum, is conducted by members of the scientific staff on both the undergraduate and graduate levels. During the summer of 1960, sixteen students, sponsored

by the Undergraduate Research Participation Program of the National Science Foundation, were selected by Museum scientists to work with them on projects in animal behavior, astronomy, herpetology, invertebrate paleontology, mammalogy, ornithology, and vegetation studies. Some worked in the Museum, others at Museum field stations and at the Woods Hole Oceanographic Institution. Eight additional students worked part time after school on projects in animal behavior, anthropology, ornithology, and vegetation studies. Thus this year alone a total of 24 young men and women, working side by side with staff members of the Museum, had the opportunity of experiencing at first hand the meaning of research as performed by competent scientists. The continuance of this Undergraduate Research Participation Program in 1960–1961 and for the three-year period of 1961–1964 has been made possible by grants from the National Science Foundation.

On the graduate level, mention must be made of the participation by the scientists in university programs of graduate training. This is illustrated by the cooperation of the Departments of Vertebrate Paleontology and of Fossil Invertebrates in the program of graduate training of Columbia University: since 1891 the Museum has been a major center for the training of graduate paleontologists.

By sharing their extensive study collections, essential for graduate research and teaching, these departments have made available to doctoral candidates the very best facilities in the world. Proof of the worth of this program lies in the fact that former participants now occupy leading positions in their fields. Many are in charge of their own academic programs (at Harvard, Princeton, Brown, Wisconsin, Syracuse, Western Reserve, Kentucky, Wyoming, Colorado, Oregon, Rice, Louisiana, and Florida State). Others hold high administrative and research posts with government agencies and in industry. All or most of the expenses were met and needed facilities were made available as a public service by the Museum. Costs have been paid

from limited funds of the Museum, grants-in-aid, and gifts from various sources.

Through the Museum's own fellowships and grants, including those made available by the Frank M. Chapman Memorial Fund, the Leonard C. Sanford Fund, the Ellsworth Fund, the Ogden Mills Fellowships, and the Theodore Roosevelt Fund, the institution affords opportunities for students and scholars to pursue individual scientific studies. The Chapman Memorial Fund, one of the most important sources of research support in ornithology, enables the Museum to bring many of the world's leading ornithologists to the institution for temporary investigations. Also of significant assistance to ornithological research is the Leonard C. Sanford Fund. The Ellsworth Fund, set up by Mrs. Lincoln Ellsworth in memory of her distinguished husband, makes it possible for young people to accompany scientists on field expeditions. The Ogden Mills Fellowships, named for an early benefactor of the Department of Anthropology, were established in 1960 to give young anthropologists an opportunity to spend a year at the Museum using its collections, Library, and other facilities, and working in conjunction with members of the curatorial staff. The Theodore Roosevelt Fund, which was established during the past year, provides financial assistance to individuals conducting worthwhile research in any phase of wildlife conservation or related fields of North American natural history.

The Museum also offers its extensive facilities to educators from other countries. For a number of years virtually every department has been at the service of the State Department of the United States by assisting distinguished foreign visitors in studies of American museums and their educational systems. Conferences, examination of exhibits, and observation of educational programs in action have been arranged for the benefit of these visiting educators.

The educational work of the American Museum of Natural History is not limited, however, to activities in the Museum

proper and at its field stations. A number of Museum staff members take their special skills out into the community and indeed to all parts of the nation by teaching, by lecturing, and by serving as science curriculum advisers. The work of the Museum is further extended to the scientific and educational community by means of its excellent Library and publications. In addition to supplying both Museum and visiting scientists with reference material necessary to the success of their work, the Library with its collection of more than 175,000 volumes sends out items on loan to various college, university, special, and commercial libraries. Through its scientific publications, which represent the culmination of years of study, of collecting in the field, and of research in the laboratory, the Museum shares the results of its work with the scientific community of the world. In the past year alone a total of approximately 1500 pages of scientific material went to press. *Natural History*, *Junior Natural History*, and *Curator*, the three periodicals published by the Museum, are also read in all parts of the world. And the newest popular publications project, *The Natural History Library*, will make classics in the life and earth sciences available to a broad public.

To sum up in a few words the fruits of the vital educational role of the Museum: it makes better teachers, better students, and better citizens. This adds up to a very considerable contribution for *any* organization engaged in education. Yet the institution contributing these services receives little recognition as an educational force. This is not only astonishing but results in restrictions to progress.

These restrictions take several forms. Museums do not qualify as recipients of state aid to education. They do not qualify as recipients of surplus government property, as do colleges and universities. In addition, donors to museums are penalized because they are not allowed the same tax benefits received by donors to colleges and universities. The infliction of these penal-

ties reveals a failure to recognize the unique educational role played by museums today. What is needed is greater acknowledgment that museums are an integral part of our educational system and vital to our educational needs.

REVIEW OF THE YEAR 1960–1961

A fitting beginning for the brief review of the year 1960–1961 is a list of honors conferred on Museum personnel by other institutions. Dr. Norman D. Newell, Chairman and Curator of the Department of Fossil Invertebrates, received two significant honors. His alma mater, the University of Kansas, awarded him a citation for distinguished service to mankind, and the National Academy of Sciences gave him the Mary Clark Thompson Medal for his outstanding contributions in the field of paleontology and geology. Dr. Libbie H. Hyman, Research Associate in Invertebrates in the Department of Living Invertebrates, was elected to the National Academy of Sciences. An honorary Doctor of Science degree was awarded by Hobart College to Dr. Dean Amadon, Chairman of the Department of Ornithology and Lamont Curator of Birds. Keuka College conferred a Doctor of Letters on Miss Constance D. Sherman of the Department of Ornithology. Dr. Harry L. Shapiro, Chairman of the Department of Anthropology, was re-elected President of the American Eugenics Society. Dr. Margaret Mead, Associate Curator of Ethnology in the Department of Anthropology, received the Merrill-Palmer Award. Dr. Edwin H. Colbert, Chairman and Curator of the Department of Vertebrate Paleontology, was nominated as Vice President of the Paleontological Society, and Dr. William K. Emerson, Chairman and Associate Curator of the Department of Living Invertebrates, was elected Vice President and President-elect of the American Malacological Union.

Within the Museum itself, three appointments to the scientific staff were made during the year: Dr. Jerome G. Rozen, Jr., was appointed Chairman of the Department of Entomology and Associate Curator; Mr. Robert Mathewson was appointed Resident

Director of the Lerner Marine Laboratory of the Museum; and Dr. Donn E. Rosen was appointed Assistant Curator in the Department of Ichthyology. The following promotions of scientific staff members took effect on July 1, 1961: Dr. James A. Ford, Department of Anthropology, from Associate Curator to Curator of North American Archeology; Dr. William K. Emerson, Chairman of the Department of Living Invertebrates, from Assistant Curator to Associate Curator; Dr. Donald F. Squires, Department of Fossil Invertebrates, from Assistant Curator to Associate Curator; and Dr. Richard G. Van Gelder, Chairman of the Department of Mammalogy, from Assistant Curator to Associate Curator.

Two members of the staff of the Museum retired this year, and in noting their retirement I should like to express the appreciation of the Museum for their many years of exceptionally productive work: Miss Hazel Gay, Librarian, who retired after 45 years of service to the Museum and to science, and Mr. T. Donald Carter, Assistant Curator in the Department of Mammalogy, who served the department for 40 years and made 27 major expeditions for the Museum.

The major public event of the year was the opening in March of the Hall of the Biology of Man, conceived and directed by Dr. Harry L. Shapiro, Chairman of the Department of Anthropology, and executed by the Department of Exhibition. The 5400-square-foot, two-part exhibition begins by considering man's place in the process of evolution, his prehistoric ancestors, and the characteristics that relate him to and distinguish him from other forms of animal life. With this perspective, the visitor is then introduced to an examination, in vivid detail, of the functioning of his own body. The hall provides extraordi-

The world's first bi-lingual, three-channel, radio guide service was installed in ten halls of the Museum last year. A listener hears one of the talks that are broadcast in the Hall of Early Dinosaurs. Photograph: Lee Boltin.



nary insight not only for the layman but also for those students currently engaged in acquiring a scientific education in this important field of study.

Two innovations in which virtually all the departments were involved should be noted here. One was the installation, in ten halls of the Museum, of the world's first bi-lingual, three-channel, radio guide service. Visitors to these halls have their choice of three personally guided tours. Those with an advanced interest in the subject matter of an exhibition may tune their portable Soundtrek instrument to a detailed, 35-minute lecture by a Museum curator. Another channel presents a shorter, more generalized talk. The third, for the benefit of Spanish-speaking citizens, carries the brief, general talk in Spanish.

The second innovation was the result of a new arrangement with the Bureau of Audio-Visual Education of the City of New York. Copies of the master tapes of the Museum-WNBC weekly radio program, "Journey Into Nature," are being made available to schools in the five boroughs to supplement their science studies. The program features interviews with Museum scientists on topics of current interest.

For a review of the work in the individual departments, we call your attention to the reports that follow.

DEPARTMENT OF ANIMAL BEHAVIOR

Lester R. Aronson, Chairman

Progress has been made on the long-term projects concerned with such diverse and significant areas of investigation as the evolution of the function of the forebrain, the development of stress and tension patterns in mammals, bird migration, schooling in fishes, and the behavioral significance of underwater sounds produced by marine fishes.

In connection with Dr. Aronson's study of the little-understood function of the forebrain, fish of the species *Tilapia macrocephala* were trained to push a target to get food. The fore-

brain was excised from a few, and after a period of adjustment, they continued hitting the target but the responses were somewhat erratic. In another group the cerebellum was removed. The same behavior pattern was resumed fairly soon. When both the forebrain and the cerebellum were removed, however, the conditioned behavior pattern disappeared within a few weeks. Definite but erratic changes in the courtship and parental behavior resulted from experiments with forebrain removal in members of the species *Aquidens latifrons*. Both experiments suggest that neither the forebrain nor the cerebellum contributes to the organization of these behavior patterns, but that both function as facilitory or energizing mechanisms. Experiments have been initiated to test the role of the forebrain in visual discrimination.

For the past three years, Dr. T. C. Schneirla, working with Drs. Ethel Tobach and Leo Vroman, has been preparing methods and techniques for an intensive investigation of the development of patterns of adjustment made by animals to conditions of imposed stress. Wistar-strain rats were used as the experimental animals. A group of rat pups were subjected to a series of stresses in both environment and handling. Data on the resulting complex physiological reactions were gathered by means of a variety of techniques, many of which were developed in the Animal Behavior laboratory for this project. One such device is the Aronson keyboard which enables investigators to collect continuous data on as many as 20 behavioral traits simultaneously. Automatic switches have now been added, so that a total of 36 items of information can be recorded. A further improvement makes it possible not only to record the frequency, sequence, and duration of events on tapes, but also to feed this information into an IBM computer which can reduce it into a code system and analyze it statistically.

During the summer of 1960, Dr. William N. Tavolga added significant new knowledge concerning the process of sound production in fish. Experiments with marine catfishes, toadfishes,

and sea robins proved that, contrary to belief, the swim bladder in these fishes does not act as a resonator or amplifier of the sounds produced by the vibrating muscles. It is, in fact, an efficient distributor of the sound energy. Because the mechanisms in fishes are considerably more efficient as under-water loudspeakers than anything so far devised by man, the study of the physical principles involved may be of considerable practical importance.

Dr. Evelyn Shaw continued her study of the development of schooling behavior in fishes. This behavior is unique among the vertebrates. It occurs in the young without previous schooling experience with adults of the species. Experiments to determine the effect of association among fry of the same age on schooling behavior produced surprising results. Fry in one group were reared in individual chambers from an early embryonic stage to schooling age. In another group, fry lived in communities until five to seven days after hatching, when they were separated into individual chambers and reared alone until schooling age. When the first group of fry were brought together, they formed into schools within ten minutes. The second group did not form schools for at least an hour and a half to two and a half hours. This result suggests that the early experience of the second group inhibited their schooling development.

By training experimental birds to peck at different keys for rewards of food, Dr. Helmut A. Adler is obtaining quantitative data on four sensory factors considered significant in the process of bird navigation. These factors are spectral sensitivity (color vision), dark adaptation, visual acuity, and time judgment. A complete spectral sensitivity curve was obtained for one robin. Further studies of dark adaptation in robins indicate that vision plays a limited role for this bird during periods of dim light or darkness.

Under the direction of Dr. Evelyn Shaw, fourteen seminars

in animal behavior, led by prominent researchers in the field, were held at the Museum.

A final grant, the last of 26 yearly awards, was awarded to Dr. Aronson by the Committee for Research in Problems of Sex of the National Research Council. This committee is no longer offering direct research grants. Dr. Schneirla received two grants: one from the National Institutes of Mental Health for his stress and tension studies, and another from the National Science Foundation for his studies of the behavior and biology of army ants. Dr. Tavalga received a grant from the Office of Naval Research for his studies of fish sounds.

DEPARTMENT OF ANTHROPOLOGY

Harry L. Shapiro, Chairman

On March 20, 1961, the Hall of the Biology of Man was opened, culminating years of planning, research, design, and construction. The concept was created by Dr. Shapiro, who supervised its execution, as the first of a series of five halls intended to set forth general principles in anthropology. The enthusiastic response of record-breaking crowds of visitors has affirmed the need for and value of this exhibition, which is very possibly the most comprehensive of its kind in the world.

The department was active in other exhibition projects as well. In cooperation with the Department of Exhibition, Dr. Stanley A. Freed and Miss Bella Weitzner have been involved in the extensive task of renovating the Northwest Coast Indian Hall. In the process, the huge Haida Indian canoe with its numerous life-sized figures was restored and moved to the Seventy-seventh Street Foyer. Dr. Freed was also concerned with plans and preliminary research for a new Eastern Woodlands-Plains Indian Hall. In the early stages of preparation are a Hall of the Peoples of Africa, under the direction of Mr. Colin M. Turnbull; and a Hall of the Peoples of the Pacific, under Dr. Margaret Mead.

A temporary exhibit comprised of photographs by a native of Nigeria and Nigerian material from the departmental collec-

tion was presented, under Mr. Turnbull's supervision, to commemorate Nigerian independence. Later in the year Mr. Turnbull prepared another temporary exhibition of new African accessions, many of which were acquired by the department through the generosity of Mr. and Mrs. Sidney de la Rue, Mr. Douglas Foss, and Mr. and Mrs. Gaston T. DeHavenon.

Field work was varied and extensive. Dr. Robert L. Carneiro and his wife, Dr. Gertrude E. Dole, who is also an anthropologist, spent six months in the Montaña of Peru studying the Amahuaca, heretofore one of the least known and most remote of the Panoan-speaking peoples of western Amazonia. In addition to their ethnographic data, they brought back 250 specimens of Amahuacan material culture, the first collection of any consequence made among this tribe.

The Museum has long been a pioneer in anthropological research in the Montaña, an inaccessible and little-studied region. This research not only adds to the over-all literature of anthropology, but is significant because the Montaña still contains groups that have been influenced very little by European civilization.

The expedition by Dr. Carneiro and Dr. Dole was one of four conducted by the Museum in the Montaña area during the past year. The others were a study of the Conibo tribe by Mr. Michael J. Harner, of the Hushipairi by Miss Patricia J. Lyon, and of the Campa by Mr. Gerald Weiss.

Dr. James A. Ford excavated two burial mounds of the Hopewell Indian culture at Helena, Arkansas, before the destruction of the sites through commercial development. Six long-roofed tombs yielded 24 burials and quantities of pottery and shell,

Dramatic in their stage-like setting are the sculptured reconstructions of the heads of fourteen prehistoric human beings and forerunners of modern man. Executed especially for the new Hall of the Biology of Man, the heads illustrate the striking changes in cranial structure over the ages. Photograph: Lee Boltin.



head, and copper artifacts. He also completed his study of the archeological culture of the Quapaw, or Arkansas, Indians. Dr. Ford prepared a handbook on the archeological techniques of typology and stratigraphy and the preparation and use of quantitative chronological graphs. Originally used at a teaching conference on archeological methods arranged in Colombia for Latin American archeologists, it will be published by the Pan American Union in Spanish and English.

The research initiated last year by Dr. Junius B. Bird in connection with IBM computer processing of coded archeological and correlated textile data has been expanded under a grant from the National Science Foundation.

A new radiocarbon date, of considerable interest to persons concerned with the antiquity of man in the Americas, was obtained during the year. Thanks to the kind help of Mr. John Fell, an excavation that was made originally by the Museum in 1937 in a cave deposit on his property near the Strait of Magellan was reopened. Charcoal samples from the bottom strata were processed by Dr. Meyer Rubin in the United States Geological Survey Laboratory in Washington and yielded a date of 8760 ± 300 years. This date is the oldest thus far obtained from South America for human artifacts associated with extinct forms of the giant ground sloth and of the horse.

Dr. Gordon F. Ekholm has been directing a study of the archeology of the Isthmus of Tehuantepec region of Mexico, which is being carried on chiefly by Mr. Matthew Wallrath. This work is part of a large-scale project organized by the Institute of Andean Research and is being financed by the National Science Foundation.

Dr. Margaret Mead continued her work on the problems of mental health, family relationships, and culture dynamics in both primitive societies and our own. She worked on a career advisory book entitled "Anthropologists and What They Do" and on a new edition of "Cooperation and Competition Among Primitive People," first published in 1937.

Mr. Colin M. Turnbull has been engaged in a study of the distinctions between magic and religion in evaluating the relationship between the BaMbuti and BaBira peoples of the Congo.

Dr. Stanley A. Freed prepared for publication a report on his field studies in India, where he spent 21 months conducting research on the effects of a large urban center upon the inhabitants of a nearby village.

Dr. Walter A. Fairservis, Jr., concentrated on a study of the archeological collection made in 1925–1926 and 1928 in Mongolia and long delayed in its publication.

Dr. Paul Tolstoy, one of the Ogden Mills Fellows for 1960–1961, used Museum materials as references in his study of the distribution and technology of bark-cloth in tropical areas of the world. Mr. Philip L. Newman, also an Ogden Mills Fellow, was engaged in organizing ethnographic material collected in New Guinea in connection with his proposed doctoral dissertation on New Guinea religious systems. Dr. Joan Mencher was appointed to an Ogden Mills Fellowship for the period of 1961–1962. She will utilize the departmental collections in a study of the correlation between material culture and the social and economic organization of India.

Mr. David M. Hart continued his field studies in Morocco and sent back material gathered for the department.

Mr. Roger C. Green spent part of the year in excavating on Moorea in the Society Islands under Museum auspices and later in studying the collections excavated in preparation for a report on his findings.

In addition to the important accessions of African material through gifts and purchases, and a fine series of Haida Indian and Eskimo carvings graciously donated by Miss Amelia Elizabeth White, ethnographic material from areas not well represented in the Museum collections was acquired through arrangements with Mr. Borys Malkin in Brazil and with Dr. Louis B. Dupree in Afghanistan.

DEPARTMENT OF ASTRONOMY AND
THE AMERICAN MUSEUM-HAYDEN PLANETARIUM

Joseph Miles Chamberlain, Chairman

The Planetarium, by means of its programs and facilities, continued to provide an understanding of astronomy and related sciences that is unique and represents an important influence in the community.

The sky presentations, offered to the public every day of the year, attracted nearly 600,000 people. These presentations, developed under the supervision of Mr. Thomas D. Nicholson, emphasized both the accomplishments of the earlier astronomy and the dramatic developments of the modern science. The principal technical improvement in the sky theater was the modification of the horizon projection system to allow for greater illumination, greater facility in the changing of scenes, and a doubling of the number of scenes that can be used in any one presentation.

Dr. Franklyn M. Branley, in charge of the teaching program, reports that enrollment in the sixteen courses totaled 694, which indicates a steady and substantial growth. No school or other institution in the world can claim a greater number of voluntary students of astronomy, a fact that is especially impressive as no credit for a degree is given for these courses.

The programs in both astronomy and navigation continued to take students from beginning through advanced work. For the second successive year, the Planetarium, in cooperation with the National Science Foundation, offered a special summer training program in astronomy and space science for 200 high school students of exceptional ability. It was extremely successful and is to be repeated in the summer of 1961. Similarly, a course for elementary school teachers, also supported by the National Science Foundation, was well received and will be repeated during the coming school year.

For those of a mechanical turn, the Optical Division of the

Amateur Astronomers Association, in cooperation with the Planetarium, continued to provide instruction in the grinding and figuring of a telescope mirror.

Dr. Kenneth L. Franklin continued his research at the radio astronomy laboratory located at the Kalbfleisch Field Research Station of the Museum on Long Island. The receiver he is now using has recorded the presence in the antenna pattern of several radio sources, including certain stars, the sun, and various artificial satellites. A measurement of the receiver sensitivity indicates a capability of recording the strongest bursts of radiation from Jupiter, the prime target of the research, but none has been observed to date. The continued development of this investigation now requires funds for the purchase of additional equipment, including a spectrometer, as well as for the employment of an electronics technician.

In another area of investigation, Dr. Franklin began a study of the distribution of hydrogen in the Milky Way galaxy.

Improvements to the exhibits in the corridor of the Planetarium during the year included the extensive modernization of the exhibit by the Toledo Scale Company, "Your Weight on Other Worlds." New illumination panels were installed in the Ahnighito meteorite display, incorporating the luminous plastic lighting technique. This lighting medium, used for the first time in the Planetarium halls, has proved to be very attractive. A new exhibit, constructed by the North American Aviation Corporation and explaining advanced space flight concepts, was installed in June.

The Guest Relations Bureau, under the supervision of Mr. James S. Pickering, reports that attendance at the morning sky presentations reserved for school children was 111,475, a decrease of 3766 from the previous year. This loss was due to the unusually adverse weather in the winter months which, on a number of occasions, forced the cancellation of the travel arrangements of various schools. During most of the school year, the morning presentations were reserved to capacity, the only

limitation on attendance being the limited luncheon facilities available in the Museum for school groups.

Proceeds from the sale of astronomical materials at the Book Corner continued to show an increase. Sales per individual visitor for the past year were higher than for any of the past six.

DEPARTMENT OF ENTOMOLOGY

Jerome G. Rozen, Jr., Chairman

This has been a year of heightened activity on many fronts. All three curators are embarked on major research problems. Four separate field trips have originated from the department; the collection was enlarged; and there has been a considerable increase in exhibition work.

Dr. Jerome G. Rozen, Jr., formerly of Ohio State University, joined the department on August 1, 1960, as Chairman and Associate Curator of Hymenoptera. His main research interests are the evolution, taxonomy, and behavior of bees, and the taxonomy and phylogeny of immature beetles. During the year Dr. Rozen completed the first phase of his biosystematic study of the parasitic bee genus *Oreopasites* and began investigation of three first-instar larvae twenty million to thirty million years old that have been found in Chiapas amber.

Dr. Willis J. Gertsch made substantial progress in his studies of spider fauna. He also secured more than one hundred males of the relict spider *Hypochilus thorelli* on a short trip to the Great Smoky Mountain region of North Carolina, thus negating the myth of their rarity.

Dr. Frederick H. Rindge completed the taxonomic revision of the geometrid moths belonging to the New World tribe Nacophorini and started a revisionary study of the geometrid genus *Melanolophia*. His field trip to the Rocky Mountain states resulted in valuable additions to the Lepidoptera collection.

Three of the field trips taken during the year were confined to continental North America, while the fourth explored parts

of the West Indies. As a result of expeditions, gifts, and bequests, the number of specimens in the collection has increased by 134,433. From this collection, probably the second largest in the country, 123 loans were sent to investigators in North America, South America, and Europe.

Doctors N. S. Obraztsov, Herbert Ruckes, and A. B. Klots, resident Research Associates, studied at scientific institutions in nine European cities. The department was represented at the scientific meetings of six national and international societies.

The research productivity of the department is indicated by the seven scientific papers which were published and the fourteen others that are finished and are awaiting publication.

DEPARTMENT OF FOSSIL INVERTEBRATES

Norman D. Newell, Chairman

A major project in which the department participated during the year was the initiation of a cooperative program of deep-sea biological research between the American Museum and the Lamont Geological Observatory. Under the program, Museum scientists are taking part in the expeditions of the research vessel "Vema," which belongs to the Observatory, and various collections from these voyages, particularly invertebrate materials, are being deposited in the Museum for processing and study.

Dr. Newell reports that work is well advanced on a comprehensive revision of all the known genera of bivalve mollusks, living and fossil, for the "Treatise of Invertebrate Paleontology." In addition to organizing and directing this activity, which is being carried on by an international group of seventeen investigators, Dr. Newell is preparing a wholly new classification of the Bivalvia. He also devoted time to research on the origin and early history of the oysters and trigoniacean bivalves, two diverse groups that can be traced to the mid-Paleozoic.

One of the most intriguing problems in the history of life is the cause, or causes, of the mass extinctions of many groups

of animals in the shallow seas of the earth at the close of the Permian and Cretaceous periods. Supported by a National Science Foundation grant, Dr. Newell began an investigation of this mystery with field work in Greece and Turkey, the study of pertinent collections in various European museums, and an exchange of data at conferences on the subject in Scandinavia. While there appears to be no simple explanation of the mass extinctions, certain general principles have emerged which suggest further lines of fruitful study.

Continuing his ecological investigations of the Great Bahama Bank, Dr. Newell collaborated with Dr. John Imbrie, Research Associate, and Dr. Edward G. Purdy of Rice University in the publication of field studies. In June, 1961, the three scientists undertook a field study of the taxonomic composition and ecology of the burrowing animals of the Bimini area, using newly devised methods for quantitative sampling of these animals together with their burrows. In addition, a general survey was completed of the level of the sea in the Bahamas of some 3500 years ago. The opinion is general that the sea was recently five or six feet higher than it is at the present time, but new geologic and geochemical evidence from many of the islands in the Bahamas indicates that the present level is the highest that the sea has reached in the past 100,000 years.

Dr. Donald F. Squires has continued his studies of the coral faunas, both fossil and modern, of the Southern Hemisphere. He published a number of papers resulting from his recent work in New Zealand and is coordinating data on cool-water corals of the southern oceans. An investigation of the extant corals of the Patagonian region collected by the "Vema" led to his participation in a "Vema" cruise to obtain field data on the relationships between the faunas of the continental shelf and the continental slope. It is anticipated that these studies will throw new light on the extent of the northward movement of the fauna during the glacial stages of the Pleistocene.

Dr. Squires' geological study of Lord Howe Island, Australia,

is nearly completed and will provide a basis for an accurate picture of the history of the coral reefs of that island.

As part of the continuing series of papers on the collections of deep-sea corals obtained by the Lamont Geological Observatory, Dr. Squires completed a revision of the Indo-Pacific genus *Stephanophyllia*.

Over a ten-year period the department has been building an excellent collection of Permian marine invertebrates in collaboration with, and supplementing the collection of, the United States National Museum. Dr. Newell reports that, as a part of this project, the Museum published in the *Bulletin* "Late Paleozoic Sponge Faunas of the Texas Region, the Siliceous Sponges" by Dr. Robert M. Finks. Dr. Finks was a graduate student of Dr. Newell's, worked on the collections in the department, and his fine report represents his doctoral thesis. Publication of this *Bulletin* was partially supported by funds from the National Science Foundation.

Curatorial work was concerned largely with the sorting and disposition of a residue of material, much of which was turned over to other museums and teaching institutions. The valuable acquisition of a large and important collection of Tertiary fossil invertebrates from France was made possible through the generosity of Mr. Georges Pardo of the Gulf Oil Corporation.

DEPARTMENT OF HERPETOLOGY

Charles M. Bogert, Chairman

Research in the Department of Herpetology is concerned primarily with systematics, with the study of the regulation of body temperature in amphibians and reptiles, and with the behavioral significance of the sounds that frogs produce. The over-all objective is the extension of knowledge concerning every aspect of the biology of amphibians and reptiles. The study of the isolation mechanisms is of great importance in a decision as to which populations are to be grouped together as species. The mating

calls of frogs play an important part in preventing interbreeding between species and often aid the investigator in deciding which species are to be placed in one genus.

Studies of the American toad (*Bufo terrestris americanus*) and of two species of lizards revealed differences in the extent of the control of their body temperature. The analysis of the data that were obtained, both in the field and in the laboratory, shows that toads exercise a fair degree of control over their body temperatures, even though they are active at a wider range of environmental temperatures than most reptiles. Temperatures were obtained of Bahamian curl-tailed lizards (*Leiocephalus carinatus*) on Bimini Island during September and October, and a second series of temperatures from the same population during the colder month of January was obtained for comparative purposes. In addition, a number of these lizards were tested in the laboratory. Mr. Bogert obtained similar information for the greater earless lizard (*Holbrookia texana*). Both kinds of lizards are heliothermic, that is, they derive most of their heat directly from the sun. The lizards, however, showed a remarkable ability to regulate the intake of radiant heat by their movements. Through their behavior they maintain essentially the same mean body temperature regardless of fluctuations in the temperature of the air and substratum. Eventually, a comparative study of amphibians and reptiles living under a wide range of environmental conditions should reveal the nature and extent of temperature control in these animals and hence its significance in distribution and speciation.

The assemblage of a large number of tape recordings is essential before many problems can be solved by an analysis of the mating calls of frogs, or before their significance in reproductive behavior can be determined. Mating calls can be recorded only during the short breeding periods of certain frogs, some of which are found only in widely scattered populations. A report that summarizes much of the information gathered to date is contained in a volume published during the year by the

American Institute of Biological Sciences. Data obtained by the recording and analyzing of mating calls, combined with those on size, coloration, and distribution, demonstrate the existence of three distinct species of toads previously classified as races of a single species in Sonora, Mexico.

Dr. Richard G. Zweifel continued to study the systematics and distributions of the whiptail lizards (*Cnemidophorus*). In collaboration with Dr. William E. Duellman of the University of Kansas, he prepared a paper on the *sexlineatus* group of *Cnemidophorus* that establishes the existence of seventeen species, whereas the last revision in 1931 listed but two.

Dr. Zweifel also completed his field work at the Southwestern Research Station where he studied the effects of various temperature levels on the development of tadpoles of several kinds of frogs and toads. He is at the present time analyzing the extensive data obtained. As an incidental result of this work he raised and preserved developmental series of many species, of which the larval stages were previously either unknown or little known.

Two college students worked with Dr. Zweifel in the southwest through the Undergraduate Research Participation Program sponsored by the National Science Foundation. Mr. Charles Cole initiated a study of the distribution and relationships of two lizards of the area, and Mr. Harvey Pough surveyed the distribution of snakes in the area.

Dr. James A. Oliver and Mr. Bogert paid a brief visit to Costa Rica to observe the work being done by Dr. Archie F. Carr, Jr., and the Caribbean Conservation Corporation to rehabilitate the Caribbean population of the Atlantic green turtle.

Dr. John A. Moore and Mr. Bogert collected specimens of the leopard frog (*Rana pipiens*) in Mexico, and while in Colima and Nayarit studied the breeding habits of a number of frogs, the mating of which is restricted to the winter months.

Dr. Zweifel began a study of the population ecology of Fow-

ler's toad (*Bufo woodhousei fowleri*) at the Kalbfleisch Field Research Station on Long Island.

Specimens added during the year totaled 3642, of which 1426 were obtained by the Spalding-Hosmer Expedition to Australia. The Australian collection contained a number of rare species, including some not previously represented in any museum in the United States. Mr. William Hosmer, Field Associate in the department, will remain in this country for a year before returning to Australia to continue his field work. He is now at the Museum preparing a report covering the collections assembled since 1959, with well over two thousand specimens, including some now in transit, providing a sound basis for a major contribution to our knowledge of the amphibians and reptiles of Australia.

Staff members assisted in the preparation of sonagrams illustrating changes in the human voice during adolescence, for an exhibit in the new Hall of the Biology of Man.

The Department of Herpetology, together with the Departments of Mammalogy and Ornithology, is cooperating with the Philippine National Museum on a project to collect specimens in little-known parts of the islands.

DEPARTMENT OF ICHTHYOLOGY

Charles M. Breder, Jr., Chairman

Dr. Breder reports good progress in several long-term studies. In the project on the metabolism of marine fishes, extensive data were amassed from high-speed motion pictures on the swimming characteristics of various small fishes. On December 31, Dr. Vladimir Walters terminated his services on this project in order to take a teaching position at the University of California. He is continuing his analysis of the films, however, and will submit a manuscript which is expected to contain important contributions to our knowledge of this subject.

Some difficulties were encountered in the tuna-tracking proj-

ect, but it is anticipated that the tracking device presently being developed will soon be ready for field testing. Field Associate George A. Bass and Mr. Mark R. Rascovich were appointed special assistants on the project, and Mr. Rascovich was made a Research Fellow of the department.

Dr. Breder continued his field studies on the ecology and life histories of marine fishes on the Florida Gulf Coast, a project that was considerably modified this year by the effects of Hurricane Donna. Immediately after the hurricane, a striking change in the juvenile fish fauna of the area was observed. Some species that had been normally present were completely absent, while others that had not previously been recorded were present. By the first of March this situation had reversed itself entirely, and the fauna returned to its former composition. A short manuscript describing these changes is in preparation.

In an attempt to associate the sounds made by fishes with their activities, Dr. Breder broadened the techniques used in his Florida studies to include the tape recording of fish sounds and the playing back of these sounds to other fishes in order to determine their reactions, if any.

Miss Francesca R. LaMonte, continuing her studies on speared fishes, visited a number of institutions across the country to examine collections and was able to complete approximately half of her manuscript on this material for "The Fishes of the Western North Atlantic."

Dr. Donn E. Rosen, who was appointed to the department staff on February 1, 1961, brought with him a series of new and interesting studies in various stages of development. One, on the osteology and relationships of North American cave fishes and the fresh-water adrianichthyid fishes of the Celebes, clearly indicates that these fishes have been incorrectly classified and actually show striking affinities to fishes believed previously to have no close relationship to them. This work has considerable bearing on the department's long-term study of the evolution of cave fishes, to which Mrs. Lisa Walters devoted her

attention prior to her departure in December. Her manuscript is nearly ready for publication, and Dr. Rosen has assumed an active part in the continuation of the study.

Because the lack of adequate characterization of teleost orders has led to much confusion as to the limits of these larger groups, Dr. Rosen has undertaken an ambitious and painstaking reëvaluation which will limit osteological structures that define these orders.

Another major task in which Dr. Rosen is engaged is a much-needed systematic analysis of the killifishes of the western North Atlantic, a study that will provide the basis of his contribution on these fishes to "The Fishes of the Western North Atlantic." In connection with his continuing work on killifishes, Dr. Rosen recently began an experimental study of habitat preference in euryhaline species.

Dr. Breder reports satisfactory progress on his monograph on the reproductive habits of fishes. Partly to expedite the completion of this extensive work, and partly because of a community of interests, Dr. Rosen has joined Dr. Breder in its authorship. For similar reasons, Dr. Rosen is also serving as co-author for a new version of Dr. Breder's "Field Book of Marine Fishes of the Atlantic Coast." Published in 1929, this popular handbook is still in print but is in great need of revision.

Dr. Phyllis H. Cahn, a Research Fellow long associated with the department, has been concerned with the developmental and functional details of the lateral-line cupulae, structures that are poorly understood but are evidently of considerable importance to the normal functioning of fishes, especially young and permanently small forms. Dr. Cahn collaborated in part with Dr. Evelyn Shaw of the Department of Animal Behavior with reference to the possible significance of these structures in schooling behavior in fishes.

Material in the study collection was made available to an unusually large number of investigators from other institutions during the year, and there was considerable exchange of in-

formation with ichthyologists in this country and abroad. The only notable addition to the collection of preserved fishes was material from New Guinea collected by the Sixth Archbold Expedition. Exhibition activities were limited to the participation by staff members in plans for the redesign of the Hall of Ocean Life.

DEPARTMENT OF LIVING INVERTEBRATES

William K. Emerson, Chairman

Dr. Emerson continued his studies on the Scaphopoda of the eastern Pacific, and a manuscript proposing a new classification of this class of mollusks was completed. At the same time Dr. Emerson continued work on the revision of the eastern Pacific muricid gastropods and published one paper resulting from this study. He also made progress in his joint investigation with Mr. Edwin C. Allison of San Diego State College on the ecology of late Pleistocene invertebrate faunas of Turtle Bay, Baja California.

With the help of several research assistants, Dr. Dorothy E. Bliss made steady progress in her studies on the neuro-endocrine control of growth, water uptake, and locomotor activity in the land crab, *Gecarcinus lateralis*. She also continued work on the preparation of a manuscript dealing with the ecology and physiology of several Bahamian land crabs. In August, Mr. Morris D. Altman spent two weeks at the Lerner Marine Laboratory making field observations that will be incorporated in this manuscript. Work also proceeded on two manuscripts on which Dr. Bliss is collaborating with others: one on the morphology of the land crab, with Mrs. Mary Weitzman of the Albert Einstein College of Medicine; the other on oxidation in invertebrate tissues, with Dr. Dorothy M. Skinner of Yale University. All these studies were supported, in part, by a research grant from the National Science Foundation.

Dr. Meredith L. Jones, formerly with the Oceanographic In-

stitute of Florida State University, was appointed to the staff in July, 1960, and has been concerned largely with the organization of the deep-sea biological material collected by the research vessel "Vema" of the Lamont Geological Observatory. This cooperative research program is being coordinated by Dr. Jones, who joined the "Vema" on the coast of Chile in March in order to take bottom samples in an offshore trench and on the continental slope. Dr. Jones also devoted part of his time to the completion of a manuscript on a new family of the cephalocarid Crustacea and also conducted taxonomic studies of polychaetous annelids.

Dr. Libbie H. Hyman continued work on the Mollusca, volume 6 of her monumental treatise "The Invertebrates." She also continued taxonomic studies of free-living flatworms and published two papers.

Investigations by Dr. Horace W. Stunkard into the morphology, life cycles, and systematics of parasitic flatworms resulted in his completion of five papers, four of which were published this year. Progress was made by several investigators towards completion of the "Results of the Puritan-American Museum of Natural History Expedition to Western Mexico." Number 12 in this series, "Shell Middens of San José Island," by Dr. Emerson, was published as *American Museum Novitates* No. 2013. Dr. H. E. Coomans advanced his studies on the marine mollusks of the Netherlands West Indies.

Curatorial activities included the cataloguing of more than 100,000 invertebrate specimens. Nearly all the biological bottom samples collected by the "Vema" are now deposited in the Museum, and processing of these large and valuable collections is under way. In addition, the department initiated a program of selective exchanges which resulted in the acquisition of much valuable new material for the mollusk collections. The reorganization of the mollusk reference collection, according to modern classification, was continued with support from the National Science Foundation. To enable the department to pur-

chase specimens of species not represented in this collection, the Beatrice S. Proctor Fund was established through the interest and generosity of Mrs. Rodney Proctor.

A popular handbook on the shelled mollusks of the New York City area, on which Dr. Emerson collaborated with Mr. Morris K. Jacobson, was accepted for publication. Dr. Bliss' manuscript, "Shrimps, Lobsters, and Crabs," reached its final stages of preparation.

In cooperation with the Department of Entomology, members of this department have been working on the script for the new Hall of the Biology of Invertebrates. Staff members also took part in preliminary discussions concerning the redesign of the Hall of Ocean Life.

The department lost a valued friend and patron in the death of Mr. Harry J. Bauer on September 15, 1960. Mr. Bauer sponsored the Puritan-American Museum of Natural History Expedition to Western Mexico in 1957 and, at his invitation, Dr. Emerson joined the cruises of the "Puritan" to western Mexico in 1959 and 1960.

DEPARTMENT OF MAMMALOGY

Richard G. Van Gelder, Chairman

Faunal studies on a world-wide basis continued to be the primary emphasis in the Department of Mammalogy. Tropical and subtropical America received particular attention, and southeast Asia and the western Pacific also attracted study by staff members.

Mr. George G. Goodwin completed studies of the flying squirrels of Middle America and of the murine opossums of the West Indies. His continuing research on the mammals of Oaxaca was aided materially by a collection of more than 600 specimens gathered in that Mexican state under a commission from the department. The major study on the bats of Trinidad and Tobago, which Mr. Goodwin and Research Associate Arthur

M. Greenhall completed last year, was published in June. This study is the most comprehensive of its kind ever prepared. It deals not only with the classification of the bats of these islands, but also with their growth, reproduction, foods, and habits, as well as the incidence of rabies and other diseases.

Dr. Van Gelder, continuing his major study of the skunks of the world, devoted most of his research time to a long-range project on the classification of the striped and hog-nosed skunks, under the sponsorship of the National Science Foundation. He examined specimens at 26 institutions in the United States and Canada, did field work at the Southwestern Research Station, and procured voluminous data as well as additional specimens that were needed for the study. Dr. Van Gelder anticipates that the collection of data for this project will take approximately two more years.

Working in conjunction with Mr. David Wingate, Dr. Van Gelder completed and published a study on the bats of Bermuda, with a discussion of how these animals reach the islands.

Dr. Van Gelder also continued his studies of the small mammal populations of the Kalbfleisch Field Research Station of the Museum on Long Island, and of the mammals collected on the Puritan-American Museum of Natural History Expedition to Western Mexico in 1957.

Dr. Sydney Anderson, formerly of the University of Kansas, was appointed to the staff in July, 1960. His major research project, which is supported by the National Science Foundation, concerns the taxonomy, origins, and relationships of the mammals of the Chihuahua region of Mexico. When completed, it will be the most comprehensive work on this area ever prepared. This year, Dr. Anderson, in collaboration with others, completed studies on the white-sided jack rabbits of Mexico and on small mammals found in barn owl pellets in Chihuahua. Other subjects to which he devoted attention were the squirrels of western Mexico, a relict population of meadow mice in New Mexico, and a new method of preparing rabbit skins for study. He also

completed a study of the mammals of Mesa Verde National Park, Colorado, and continued work on the systematics of a genus of leaf-nosed bats, *Macrotis*.

Mr. Hobart M. Van Deusen pursued his investigations of the Australian and New Guinea fauna based on the Archbold Collections and completed papers on the source of color in the fur of the ring-tailed possum and on the first record for New Guinea of the tube-nosed insectivorous bat, *Murina*. He also completed a paper on the use of mist nets to collect bats.

Mr. Leonard J. Brass continued to record and collate materials for his report on the Sixth Archbold Expedition to New Guinea from which he and Mr. Van Deusen returned last year. Other activities in which Mr. Brass was engaged are described in the report on the Archbold Biological Station.

Dr. Joseph Curtis Moore continued his research on the squirrels of southeast Asia and completed papers on their geography, relationships, reproductive characteristics, and distribution, including one on the spread of squirrels across the Bering and Panamanian land bridges.

Outstanding among the acquisitions during the year were specimens of two rare rats from New Britain obtained by Dr. and Mrs. E. Thomas Gilliard. The shipment of some 600 specimens of small mammals from Kenya, collected for the department by Mr. Ronald H. Pine on the Model-Blagden Expedition to Africa, has been delayed by the political turmoil in Africa. The department continued to receive mammal specimens from Formosa through the efforts of Field Associate Robert Bruce White who accompanied field parties of Naval Medical Research Unit No. 2 under Commander Robert E. Kuntz. In the field at the present is an expedition sponsored in conjunction with the Philippine National Museum to obtain mammals from the Philippine Islands.

Staff members, in cooperation with the Exhibition Department, provided data for, or assisted in the planning of, the Hall of the Biology of Man, the Hall of Primates, the Hall of Ocean

Life, and the Corridor of Small North American Mammals.

Under the direction of Dr. Anderson, the general curatorial procedures were reëvaluated, and a manual is being prepared for the use of the staff and those visitors who are working with the collections. A plan to speed up the processing of new material has been implemented, and several hundred specimens were identified for installation in the collections.

DEPARTMENT OF MICROPALAEONTOLOGY

Brooks F. Ellis, Chairman

A number of important developments occurred in the work of the Department of Micropaleontology during the year, all but one of which represented growth and progress.

The quarterly *Micropaleontology* continued to grow and improve, and the demand increased for copies of the microfilmed edition of the "Catalogue of Foraminifera." A 711-page supplement to the catalogue and two new volumes of the "Catalogue of Ostracoda" were issued during the year.

An interesting development was a promise of much closer cooperation between micropaleontologists in the Soviet Union and the Western countries—the result of a visit made to the Soviet Union by Miss Angelina R. Messina, Associate Curator, in the fall of 1960.

In the newly established biology laboratory of the department rapid progress was made on the study of the basic biology of the Foraminifera. Recognition of this work has come in the form of a grant from the Society of Protozoologists to Dr. J. J. Lee, who supervised this research. He will go to Prague this summer to report his findings to the International Congress of the Society and related groups. A contract was signed with the Arabian American Oil Company to make a survey of the geological literature relating to the Arabian peninsula and adjacent lands.

The one unfortunate note was struck by the continued reces-

sion in exploration for oil, reflected in a further curtailment of laboratory service work.

DEPARTMENT OF MINERALOGY

Brian H. Mason, Chairman

Dr. Mason reported continued progress on his investigation of the mineralogical and chemical composition of stony meteorites. Nine meteorites were analyzed, and detailed descriptions of four of these were prepared for publication. A grant from the National Science Foundation for the period 1960–1963 made possible the purchase of needed equipment and assured the continuance of this research.

A seven-year study of the mineralogy and petrology of the Southern Alps of New Zealand was completed and prepared for publication. This project included the geological mapping of 2000 square miles of rugged terrain and the laboratory study of the rocks and minerals of the area.

Dr. Arthur Montgomery completed a geological mapping of the Sangre de Cristo Range of New Mexico, and Mr. David M. Seaman completed a species catalogue for the silica and silicate minerals in the collection of the Museum.

Dr. Mason attended the International Geological Congress in Copenhagen in August, 1960, and collected minerals in Norway, Sweden, and Finland. In April, 1961, he went to Japan to collect and to lecture at the University of Tokyo.

The “Uncle Sam” diamond, the largest ever found in North America, was lent to the Museum by the Peikin Jewelers of New York City for temporary display in the Morgan Hall. A 2800-carat emerald crystal, a gift of Mr. A. B. Martin, was put on display following the exhibit of the “Uncle Sam” diamond. The exhibits in the Hall of Economic Geology and Petrology were dismantled, and the materials temporarily stored.

Six hundred new specimens were added to the collection.

DEPARTMENT OF ORNITHOLOGY

Dean Amadon, Chairman

The publication of "Hummingbirds" by Crawford H. Greenewalt, Museum Trustee and Research Associate in the department, and the subsequent exhibition based on it were major events of the year. Mr. Greenewalt's work was the result of six years of study and 100,000 miles of travel through South America, the Caribbean, and the western United States during which he made important discoveries concerning the physics of structural color and the dynamics of flight.

As a result of a substantial bequest from the estate of Mrs. Walter M. Naumburg, the Frank M. Chapman Memorial Fund now provides capital assets of such size as to make it one of the most important sources of research support in ornithology. Not only will grants be made available for specific research projects, but the fund will enable the Museum to bring many of the world's leading ornithologists to the institution for temporary investigations. Much of the fund will still be concentrated upon graduate students and recent doctoral recipients.

The research and field work this year has been diverse and extensive. Dr. Amadon, in the course of his trip to Japan and Alaska, attended a meeting of the International Council for Bird Preservation, arranged for the exchange of specimens with the Yamashina Institute, and made plans for a habitat group of Alaskan bald eagles. In addition he was in the field much of the time and made observations on various birds of prey which will be incorporated in his forthcoming monograph on the birds of prey of the world.

His Imperial Highness, the Crown Prince of Japan, was present at the opening of the new Japanese group which completed the Birds of the World Hall. The group was the gift of Mr. and Mrs. Robert D. Sterling.

Dr. E. Thomas Gilliard has completed a major paper on New Guinea birds. His expedition to British Guiana on behalf of

the Museum and the National Geographic Society to study and photograph the cock-of-the-rock was very successful; that material is now being processed.

Funds from the National Science Foundation enabled Dr. Robert Cushman Murphy, Lamont Curator Emeritus, to continue his work on petrels; Dr. Wesley E. Lanyon, Assistant Curator, to prepare data on the genera *Myiarchus* and *Sturnella* which had been collected during the previous two years; Dr. Paul Slud, Research Fellow, to work on a book concerning the birds of Costa Rica and their ecology. The National Science Foundation also supports the Undergraduate Research Program which sponsors a college student to assist Dr. Lanyon in his long-term studies of bird populations at the Kalbfleisch Field Research Station; during the year they banded more than 1500 individuals of more than 80 species.

During the year Dr. Robert K. Selander, Research Fellow, studied at the Archbold Biological Laboratory and in Nicaragua; Mr. Eugene Eisenmann, Research Associate, worked in Japan, Midway, Hawaii, and Panama; Dr. Charles Vaurie, Assistant Curator, made some avifaunal observations on the birds of the Lesser Antilles, and is also involved in the preparation of the second volume of his work on the Palearctic birds of the world; Dr. James P. Chapin completed his studies of certain African honeyguides.

As heretofore, a particular effort has been made to secure species that are lacking in our own collection. Several exchanges and purchases were made; Dr. Selander presented the department with more than 1500 specimens, chiefly from Mexico.

Mr. Joshua Wollman, who studied part of the extensive bird collections in the Museum in connection with his special ornithological project, was awarded a national Westinghouse Science Scholarship.

DEPARTMENT OF VERTEBRATE PALEONTOLOGY

Edwin H. Colbert, Chairman

Three major events reported by Dr. Colbert were of particular significance to the advancement of the frontiers of paleontological knowledge and are expected to produce a considerable body of important research.

A completely new type of gliding reptile, older than any previously known, was discovered in the Triassic sediments of the Granton Quarry in West New York, New Jersey. The discovery was made by three high school students, Messrs. Alfred Siefker, Michael Bandrowski, and Joseph Geiler, who had been pursuing their fossil-hunting hobby under the aegis of Dr. Colbert. Recognizing that their find might be an important one, they brought it to the Museum, where Dr. Colbert estimated it to be 175 million years old and probably the first vertebrate ever to take to the air. The delicate job of cleaning the fossil and extracting it from its shale matrix in the departmental laboratory took about three months. Because of its importance and the interesting circumstances of its discovery, the specimen was placed on exhibit for a week during the Easter holidays, after which Dr. Colbert began an intensive study of it. The three young men worked in the departmental laboratory during the winter, learning to clean and prepare fossils, and are continuing their paleontological interest under the guidance and sponsorship of the department.

A second major achievement was the discovery of important specimens of Triassic fishes from the Chinle formation of Utah and Colorado by Dr. Bobb Schaeffer and Mr. Walter Sorenson.

One of the most important fossil discoveries of recent years was made by three teen-age boys working under the aegis of the Department of Vertebrate Paleontology. Alfred Siefker (foreground), Michael Bandrowski (left), and Joseph Geiler (right) uncovered the fossil skeleton of a gliding reptile 175 million years old. Photograph: Time by Ben Martin.



The collection contains a number of new types of fishes which will extend the scope of Dr. Schaeffer's comprehensive study of the fishes from the Triassic beds of the western United States.

Dr. Colbert cited, third, the work of Dr. Malcolm C. McKenna in the Lance Cretaceous sediments of Wyoming. There, through the use of a screening and washing technique, 130 tons of rock were broken down, and in the process the largest and most useful collection in existence of Cretaceous mammals and other small Cretaceous vertebrates was obtained.

Dr. Colbert collaborated with the Department of Exhibition in the development of a temporary exhibition honoring the fifty-year career of Charles R. Knight, the artist whose reconstructions of prehistoric life grace so many areas of the Museum. Entitled "The Career of Charles R. Knight," the exhibition remained on view in the Corner Gallery for four and a half months and was received with great interest.

The Osborn Library was reorganized during the year, to serve henceforth exclusively as a research library for Museum staff members, visiting scientists, and qualified graduate students. The general public will have access to its books through the main Library of the Museum. The change will provide greater space for the collection and will result in better services for advanced research students.

Consistent with a tradition dating from the establishment of a Department of Vertebrate Paleontology in 1891, the Museum continued to serve as a major center for the training of vertebrate paleontologists. Drs. Colbert, Schaeffer, and McKenna are all members of the graduate faculty of Columbia University, and at present there are five graduate students working at the Museum towards their doctoral degrees. A former graduate student, who completed his training in paleontology in the department, Dr. John H. Ostrom, has quite recently published in the *Bulletin* a detailed report on the cranial morphology of the hadrosaurian, or crested, dinosaurs.

Dr. Colbert noted with regret the retirement of Mr. Carl

Sorenson, who has served in the laboratory of the department with loyalty and excellence since 1916.

SPECIAL ACTIVITIES

ARCHBOLD BIOLOGICAL STATION

Richard Archbold, Resident Director

One of the most interesting studies at the station this year was the comprehensive investigation of arthropod-borne viruses undertaken by Dr. Richard Moreland Taylor of the Yale University School of Medicine. The two common strains of encephalitis that are found in the United States occur in Florida, and both are endemic to the rain forest of northeastern South America. More than a dozen other mosquito-borne viruses have been discovered in the South American rain forest in recent years, and there is a constant danger that these "new" viruses may be transplanted to North America by migrating birds, especially to Florida which is on a major migratory flyway.

Dr. Taylor's field and laboratory work incorporated searches for humoral antibodies for the known viruses in vertebrates and arthropods. A notable result was the discovery of an Andean virus which had occurred in Panama but not in the United States. An investigation of this virus is being continued by the Rockefeller Institute.

Dr. Jane Van Zandt Brower of Mt. Holyoke College and Dr. Lincoln P. Brower of Amherst College continued their work in the field of experimental mimicry, with a number of interesting results. They also started to develop a hypothesis on the origin of migration which involved an analysis of the population dynamics of the monarch and queen butterflies.

Other activities included continued parasitological investigation by Dr. Lawrence R. Penner of the University of Connecticut; an inquiry into the mechanisms of evolution, with the use of certain extremely variable moths, by Mr. Roger Waterman Pease of Yale University; continued research on a collection of

insects with light traps by Dr. Stuart W. Frost, Pennsylvania State University; and life history studies of grackles by Dr. Robert K. Selander of the University of Texas who is a Research Fellow in the Department of Ornithology.

Mr. Leonard J. Brass continued to collaborate with the Gray Herbarium of Harvard University and with the University of Florida on the "Oligocene Hills" research program. He advised on the organization of the Peabody Museum of Archeology and Ethnology (Harvard University) Expedition to the Balim Valley, Netherlands New Guinea, and also served as an adviser to Dr. L. M. Perry of the Arnold Arboretum on a three-year study of the medicinal plants of the western Pacific, a project that is being financed by the National Institutes of Health.

KALBFLEISCH FIELD RESEARCH STATION

Wesley E. Lanyon, Resident Director

Continued progress on projects in astronomy, herpetology, mammalogy, ornithology, and vegetation studies are being conducted at the Kalbfleisch Field Research Station of the Museum, a 94-acre estate near Huntington, Long Island. Five college students were in residence during the summer of 1960, and arrangements were made for seven resident students for the summer of 1961. Their work with the staff scientists on projects at the station is made possible by the Undergraduate Research Participation Program of the National Science Foundation. In addition, a number of high school student volunteers provide assistance to the staff during the summer. Through their apprenticeship, these young men and women gain invaluable insight into the techniques, methods, and theories of research.

The bird-banding laboratory has become one of the best equipped and most productive in the country. During the year, more than 1500 individuals, representing more than 80 species, were banded under Dr. Lanyon's supervision. Data are being gathered on the distribution and number of breeding birds, and

efforts are under way to increase the variety of birds breeding at the station by providing suitable nest sites for native species not currently represented.

Dr. Jack McCormick continued his studies of the natural succession of vegetation at the station. More than 500 permanent quadrats were established. They are being watched to learn what changes occur from year to year. A long-term program of vegetation management was initiated. Through the use of chemical herbicides, cultivation, and annual burning, habitats will be manipulated in order that the response of different animal populations to successional and experimental changes in vegetation can be studied.

Dr. Richard G. Van Gelder completed the basic inventory of mammals at the station and continued his study of the population dynamics of small mammals.

Dr. Richard G. Zweifel continued his survey of the distribution and movements of the amphibians and reptiles. Efforts were begun to establish populations native to the area but not found at the station at the present time.

Improvements and modifications were made in the equipment being used by Dr. Kenneth L. Franklin in his investigation of radiation from the planet Jupiter.

Mr. Irwin Brodo, a graduate student at Michigan State University, began a reference collection of the lichens at the station as part of his doctoral research on the lichens of Long Island.

LERNER MARINE LABORATORY

Robert F. Mathewson, Resident Director

In February, Mr. Mathewson was appointed Resident Director of the Lerner Marine Laboratory at Bimini, Bahamas, which is now in its fourteenth year of operation. Mr. Mathewson was formerly Science Curator of the Staten Island Institute of Arts and Sciences.

Two scientific conferences of unusual interest and the initia-

tion of an important conservation project were among the developments of an active year at the laboratory. In March, members of the Shark Research Panel of the American Institute of Biological Sciences held a four-day conference at the laboratory to exchange and coordinate their findings regarding shark repellents and other techniques designed to prevent shark attacks on people. During the conference, which was sponsored by the Office of Naval Research, Dr. Perry W. Gilbert of Cornell University, who is chairman of the panel, conducted a series of experiments to test the so-called "bubble curtain" which has been widely publicized at beach resorts as an impenetrable fence against sharks. Dr. Gilbert found that, under controlled conditions in the laboratory's shark pen, a curtain of rising air bubbles proved ineffective as a barrier to one of the most common and dangerous species, the tiger shark.

The laboratory also served as the base for a conference, sponsored jointly by the Biology Branch of the Office of Naval Research, the Lerner Marine Laboratory, and the Marine Laboratory of the University of Miami, on marine animal sounds. The purpose of this gathering was to acquaint interested scientists with the progress of a recently initiated study on the feasibility of obtaining information on marine animals in their natural environment through the use of a hydrophone system installed at the Lerner Marine Laboratory. The study is directed by Dr. John C. Steinberg of the Marine Laboratory, Institute of Marine Science, University of Miami. By means of two hydrophones located in the Gulf Stream and connected by cable to recording and analyzing equipment in the laboratory, conference participants listened to a profusion of marine animal sounds—including roars, honks, knocks, and squeals—and considered the effects of various physical oceanographic factors on under-water sound propagation and ambient noise. It was evident that sound-producing animals frequent the waters of the Bimini area in sufficient numbers to make the location of interest in the study of

marine bio-acoustics, and expansion of research in this field of study is anticipated.

As part of a broad program to preserve the green turtle from possible extinction, approximately 1000 newly hatched turtles were transported from Costa Rica to study pens at Bimini where they were protected from predators during their early growth, after which they were measured, marked, and released. It is hoped that the plan will help to rehabilitate this species, which has become dangerously few in numbers in recent years, and will provide additional information on this interesting reptile. This long-range program is sponsored by the Caribbean Conservation Corporation, with which the Museum is cooperating.

Throughout the year, the laboratory continued to serve the needs of visiting investigators in diverse fields of marine research. Facilities for field and laboratory studies were made available to some 50 scientists from institutions in this country and abroad, including universities, hospitals, and medical schools. The Biology Branch of the Office of Naval Research aided considerably in the support of these investigations.

SOUTHWESTERN RESEARCH STATION

Mont A. Cazier, Resident Director

Extensive use of the facilities of the Southwestern Research Station in Portal, Arizona, continued during its sixth year of operation, and the list of publications resulting from work that has been conducted there is steadily increasing. Dr. Cazier reports that 78 projects were initiated, and many of them were completed, during the past year. These studies included 59 investigations in entomology, four spider projects, one bird study, and fourteen general projects that involved a number of different insect groups.

In connection with these projects, several thousand specimens were mounted, labeled, and documented. The main additions to the collections were insects. All but one or two specimens of

each species will be sent to the Museum. The station also began to build up the identified wasp collection.

During the year the station was host to 72 scientists and specialists who were working on 60 additional projects in fifteen different fields of biology. Six classes of college students and high school biology teachers, 92 persons in all, also utilized the station's facilities. The total number of residents in the course of the year was 237.

With the completion of the major building and remodeling program, the Resident Director has been freed to devote considerable time to research activities. During the year Dr. Cazier completed four papers and has four additional manuscripts almost finished. Visiting scientists published twelve papers, all based on work done at the station.

VEGETATION STUDIES

Jack McCormick, In Charge

Dr. McCormick advanced nearly to completion his extensive survey of the vegetation of the Chiricahua Mountains in southeastern Arizona. This three-year project, which is supported by a grant from the National Science Foundation, is being concluded in the summer of 1961 with the study of air photographs to construct maps of the vegetation of the area.

Continuing his studies of the vegetation at the Kalbfleisch Field Research Station on Long Island, Dr. McCormick obtained data on the structure of various vegetation types.

The close of this fiscal year marked the termination of the Museum's full-time staff program in vegetation studies. In the fall of 1961, Dr. McCormick joins the Department of Botany and Plant Pathology at Ohio State University, where he will also, for six months each year, be attached to the staff of the Institute of Polar Studies. Fortunately, he will retain an active association with the Museum as Consultant in Ecology for the Kalbfleisch Field Research Station.

DEPARTMENT OF EDUCATION

John R. Saunders, Chairman

To help bring the vast scientific resources of the Museum to the community, the Department of Education provides both formal educational programs correlated with school curricula and informal activities designed for children and adults. Mr. Saunders reports that many of these areas of activity were strengthened during the year.

“The World We Live In” program, which provides an all-day museum experience for classes from grades three to nine, is the department’s largest single teaching program. All told, 53,850 children from 1500 classes representing more than 400 different New York City schools received instruction during the year. When a full complement of trained museum instructors is available the program can accommodate 2200 classes a year.

More than 2000 students from 49 high schools in New York City participated in the two programs offered for selected high school biology students. In each program there was a combination of classroom period, exhibition study, and laboratory work.

Programs designed to fit the specific educational needs of special groups comprise one of the most interesting aspects of the department’s activity. A rewarding experience for a small corps of specially trained teachers, as well as for the pupils they serve, is work with the special classes conducted in the Museum as a part of “The World We Live In” program. The approach and content are altered to fit the diverse needs of classes for the blind, the orthopedically handicapped, the mentally retarded, the emotionally disturbed, as well as the intellectually gifted.

During the spring months, teams of instructors leave the Museum grounds to conduct classes in some eighteen hospitals and special institutions in the metropolitan area. More than 2000 children have received this form of extension instruction during the past year.

The adult school concluded its second year of successful op-

eration. Seventeen courses were presented to a total of 1545 adult students, with lecturers drawn from the scientific and educational staffs of the Museum and from specialized outside organizations. The student response was excellent, and the program is meeting a real need for adult education in the natural sciences.

The Museum has offered "in-service" courses to science teachers since 1929. In addition the second summer institute for high school teachers of biology and earth sciences was held at the Southwestern Research Station at Portal, Arizona, in 1960. The institute was supported by the National Science Foundation, which has approved plans for a third such institute to be conducted at the Museum during the summer of 1961. Both programs carry undergraduate and graduate academic credit from the City College of New York.

The department also has a teacher training program which it operates in cooperation with the City College of New York, New York University School of Education, and Mills College. After a training and orientation period, the students assist in the Science Center or complete a specific work assignment in the Circulating Exhibits Division.

The work of the Peter Van Gerbig Natural Science Center for Young People is among the informal activities of the department. Its attendance rose to 28,037, which is an increase of 5342 over that of last year. The staff of the center was delighted to learn that one of their "regulars," Joshua Wollman, who began visiting the center when he was eleven years old, won first place in the Westinghouse Science Scholarship competition.

The response to the gallery talks for adults was so enthusiastic that they will be continued next year. During this series of informal afternoon meetings instructors explained and dis-

For many children the Museum is the gateway to science. Here a young visitor to the Natural Science Center looks with interest at a pilot black snake. Photograph: Lee Boltin.



cussed eight of the most popular exhibit halls of the Museum.

Other programs for laymen include Miss Farida A. Wiley's popular series of natural history field trips, and the classes given in cooperation with the Adult Students Council which is arranged for working adults, many of whom are newly arrived in this country.

Nature trails were again set up at three New Jersey institutions: the State Hospital at Marlboro, the Women's Reformatory at Clinton Farms, and the Child Treatment Center at Allaire. The funds for these programs were the gift of Mrs. Lewis S. Thompson of Red Bank, New Jersey.

By upgrading the classifications of departmental instructors, the City of New York has placed the Museum in a more favorable position for attracting and securing properly qualified personnel to fill vacancies in the teaching staff. Although the salary schedules were somewhat improved by the change, the financial need of the department remains basically the same as in previous years. Educational literature to assist teachers in the proper use of the resources of the Museum is badly needed, as is a fully equipped laboratory-classroom for all the natural science courses that require the use of laboratory facilities. No funds are available for either of these projects.

The department has completed an analysis of the Visiting Group Survey made in May, 1960. This five-week survey of all school groups visiting the Museum gave pertinent information concerning the purpose and length of the visits and the services that the groups needed. The analysis of the material will help the department to meet the needs of both out-of-town schools and local schools with the greatest possible effectiveness.

By means of all services and programs, a total of 15,892,000 educational contacts were made. Of these 408,531 were made by teaching and lecturing at the Museum. The Department of Education alone accounted for 9,338,000 of this number through its programs and services at the Museum and its extension work.

DEPARTMENT OF EXHIBITION AND GRAPHIC ARTS

Gordon R. Reekie, Chairman

Activities of the Exhibition Division were channeled along four major lines: the completion of new, permanent exhibition areas; the renovation of selected existing halls; the design and planning of the first group of halls in the exhibition expansion program; and the design, preparation, and installation of temporary exhibitions.

Permanent exhibition work completed during the year included the first two sections of the Hall of the Biology of Man, which were opened to the public in March; ten habitat groups for the Hall of North American Birds; and seven habitat groups for the new exhibit of small North American mammals. Work also neared completion on the exhibit of courtship in birds, which is the final alcove in the Hall of the Biology of Birds.

Renovation of the Northwest Coast Indian Hall has been virtually completed, and the Haida Indian canoe, which was removed to the Seventy-seventh Street Foyer last year, has been extensively restored.

Design and planning for the exhibition expansion program included work on the halls of the Biology of Primates, the Biology of Invertebrates, Peoples of the Pacific, Peoples of Africa, and Eastern Woodlands-Plains Indians. Work is also proceeding on three groups in the Hall of Ocean Life.

Six temporary exhibitions were installed during the year, ranging in subject matter from fish to man, and in time from the prehistoric to the present. These exhibits included "Fish, Fowl, and Fantasy," "The Career of Charles R. Knight," "Nigeria Comes of Age," "Hummingbirds," "Recent Accessions from Africa," and "Preview: Man in Space." The last-mentioned was designed as the first phase of a much larger and more comprehensive special exhibit to be opened in October, 1961.

In the Division of Graphic Arts, activities included the design and production of a new Planetarium guide, the first such pub-

lication since 1936; completion of several hundred drawings and maps for the scientific publications; and an ever-increasing number of original illustrations for *Natural History*.

LIBRARY

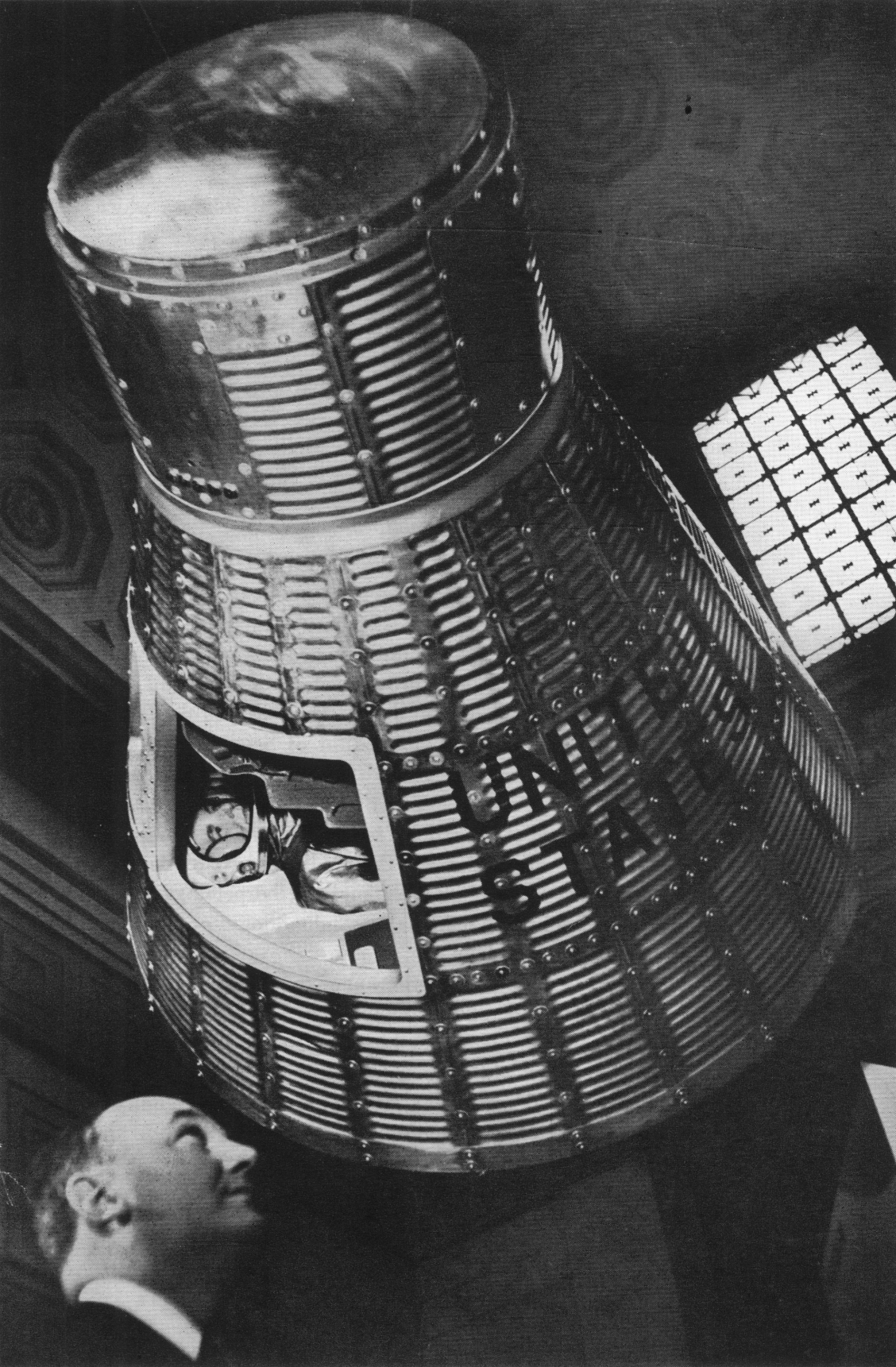
George H. Goodwin, Jr., Librarian

One of the most important events of the year was the long-awaited move of the Library—with its collection of more than 175,000 volumes—from outmoded, overcrowded quarters on the fifth floor to modern, spacious quarters on the floor below. The official reopening was celebrated on June 22, 1961, when the Trustees and staff paid tribute to Miss Hazel Gay, Librarian, on the occasion of her retirement. In commemoration of her work and to mark the official reopening, some of the rare treasures of the Library were exhibited.

The new quarters allow the staff to fulfill more effectively the primary function of the Library, which is to supply Museum scientists with the references necessary to their work. One measure of the strength and scope of a research library is the extent to which its collections are used to satisfy inter-library loan requests. During the past twelve months the Library lent 574 items to various college, university, special, and commercial libraries. During this same period the Library borrowed for use by Museum scientists a total of only 46 volumes.

Mr. Goodwin points out that in order to maintain this position of leadership, a program of systematic acquisition is necessary. Towards this end the Library acquired 1566 books and pamphlets, 14,330 periodicals, and 250 new serial titles (the majority being secured in exchange for our own publications)

A full-scale model of the Mercury Space Capsule is suspended from the dome of the Roosevelt Memorial building in the first phase of the Man In Space exhibition. Here, Dr. James A. Oliver, Director of the Museum, looks through the cutaway panel at the manikin astronaut. Photograph: New York Herald Tribune by Morris Warman.



this year. Among the new acquisitions were 60 sorely needed out-of-print books and serials.

Funds are needed to bind or rebind 25,000 volumes which represent approximately one-seventh of the total book collection of the Library.

The staff notes with deep regret the death of three of its former members: Miss Helen M. Gunz, who retired from her position as Assistant Librarian in February, 1961, after 42 years with the Museum; Miss Ida Richardson Hood, former Head Librarian; and Mrs. Jacqueline Van Til Miller, former cataloguer of the collection.

PUBLICATIONS

John F. Purcell, Manager

The scientific publications of the Museum are basic to the reputation of this institution. Upon these publications the scientific authority of the Museum rests. Through them the Museum not only makes the results of its research available to the world's scientific community but also provides its curatorial staff with an essential means of communication. This year, in the fulfillment of this dual obligation, the Editor of Scientific Publications, Miss Ruth Tyler, put through the press a total of 1474 printed pages, which represent 26 titles in the *American Museum Novitates* series and seven articles for the *Bulletin of the American Museum of Natural History*. The fields of study represented in these publications included entomology, herpetology, fossil and living invertebrates, mammalogy, mineralogy, ornithology, and vertebrate paleontology.

In the popular publication program of the Museum this year, the major event was the publication of Crawford E. Greenewalt's remarkable volume, "Hummingbirds." Doubleday and Company published the work for the Museum both in a limited edition and in a trade edition of 8000 copies. Both were quickly sold out. A second printing of the trade edition, later in the year, has now also been exhausted, and a third is in press.

A panel of scientific staff members engaged this year in another project in popular publications in cooperation with Doubleday and Company. The venture is aimed at making classics in the field of natural history available in the form of inexpensive, attractive, paperback books. Under the serial title of *The Natural History Library*, the first thirteen books are to appear in the fall of 1961, many with forewords especially prepared by members of the staff.

The Publications Committee has prepared a plan for the future production of a series of books for the general reader in the various fields of science with which the Museum is concerned. The series, which is to be written largely by members of the scientific staff, will eventually include as many as 60 titles.

Our three periodicals — *Curator*, *Natural History*, and *Junior Natural History* — have continued to meet high standards. The reputation that *Curator* has earned in its more than three years as a journal of museology reflects great credit to the Museum. After a year of merger with *Nature Magazine*, the popular journal *Natural History* has raised its paid circulation to a new high, substantially in excess of 100,000. *Junior Natural History*, the science magazine for children, celebrated its twenty-fifth anniversary of publication in March. In view of the recognized need for improved science education in the schools, the Publications Committee is exploring the possibility of substantially expanding the readership of this periodical.

PLANT OPERATION AND MAINTENANCE

Paul H. Grouleff, Plant Manager

This fiscal year saw the completion of five major construction projects supported by funds from the City. These included the Hall of the Biology of Man and the new Library, both of which required extensive construction within the framework of existing buildings. In addition, the elevators in the Seventy-seventh Street building were completely overhauled, and roofs

and masonry of various exteriors of the Museum were rehabilitated. For the first time, electric pigeon-repellent devices were installed on the facade of the Roosevelt Memorial building. The cost of the foregoing capital projects, together with various other projects, amounted to approximately \$380,000.

During the same period, the Board of Trustees made available approximately \$130,000 to complete other capital improvements. Among these were the reconstruction of the North American Bird Hall; major rehabilitation of the Northwest Coast Indians Hall and the relocation of the 64-foot Haida war canoe in the Seventy-seventh Street Foyer; conversion of group lighting from direct to alternating current in four large exhibition halls and several smaller ones; and structural work required for various exhibits and necessary alterations in offices.

ATTENDANCE

During the fiscal year here reported on, 2,041,035 people visited the Museum, and 563,460 visited the Planetarium, making a combined total of 2,604,495. This figure represents an increase of 255,672 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, 1961 AND 1960

THE AMERICAN MUSEUM OF
BALANCE SHEETS, JUNE

ASSETS:	1961	1960
Current funds:		
General funds:		
Cash	\$ 46,221	\$ 57,975
Accounts receivable	280,995	246,261
Inventories, principally publications	58,605	85,211
Prepaid expenses	119,538	118,502
	<u>\$ 505,359</u>	<u>\$ 507,949</u>
Special funds:		
Cash	\$ 540,698	\$ 727,143
Investments (market June 30, 1961, \$885,000) (Note 1):		
U. S. Government bonds	900,000	898,626
Preferred stock	2,387	2,387
Accounts receivable	26,462	11,270
	<u>\$ 1,469,547</u>	<u>\$ 1,639,426</u>
	<u>\$ 1,974,906</u>	<u>\$ 2,147,375</u>
Endowment funds:		
Cash	\$ 11,706	\$ 41,701
Investments (market June 30, 1961, \$37,802,000) (Note 1):		
Bonds	16,249,117	16,763,070
Preferred stocks	1,557,104	1,567,138
Common stocks	12,008,923	10,448,825
Other	3,775	3,884
	<u>\$29,830,625</u>	<u>\$28,824,618</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	\$ 59,861	\$ 92,830
Investments, at cost (market June 30, 1961, \$7,850,000):		
Bonds	5,331,175	5,115,032
Preferred stocks	529,645	595,270
Common stocks	1,242,401	1,012,906
	<u>\$ 7,163,082</u>	<u>\$ 6,816,038</u>
	<u>\$39,393,613</u>	<u>\$38,213,031</u>

The accompanying notes are an integral part of these statements.

NATURAL HISTORY

30, 1961 AND 1960

FUNDS AND LIABILITIES:	1961	1960
Current funds:		
General funds:		
Accounts payable and payroll taxes withheld	\$ 92,677	\$ 104,061
Deferred income, principally unearned subscriptions	509,371	448,007
Appropriations for outstanding budgetary commitments (Note 6)	—	53,330
	<u>602,048</u>	<u>605,398</u>
Deficit	<u>96,689</u>	<u>97,449</u>
	<u>\$ 505,359</u>	<u>\$ 507,949</u>
 Special funds:		
Balances of funds received or appropriated for specific purposes	<u>\$ 1,469,547</u>	<u>\$ 1,639,426</u>
	<u>\$ 1,974,906</u>	<u>\$ 2,147,375</u>
 Endowment funds:		
Endowment funds, income available for:		
Restricted purposes	\$12,758,792	\$12,473,093
Unrestricted purposes	7,231,538	7,073,499
Funds functioning as endowment, principal and income available for:		
Restricted purposes	2,351,364	2,083,128
Unrestricted purposes (Notes 2 and 5)	7,488,931	7,194,898
	<u>\$29,830,625</u>	<u>\$28,824,618</u>
 Funds invested in bonds of The American Museum of Natural History Planetarium Authority	<u>\$ 425,000</u>	<u>\$ 425,000</u>
 Pension funds:		
Pension fund balance	\$ 7,160,955	\$ 6,813,911
Welfare fund balance	2,127	2,127
	<u>\$ 7,163,082</u>	<u>\$ 6,816,038</u>
	<u>\$39,393,613</u>	<u>\$38,213,031</u>

The accompanying notes are an integral part of these statements.

GENERAL FUNDS
SUMMARY STATEMENTS OF CHANGES
for the years ended June 30, 1961 and 1960

	<i>1961</i>	<i>1960</i>
Deficit, beginning of year	\$ 97,449	\$ 24,629
Less, Transfer from unrestricted funds functioning as endowment	<u>97,449</u>	<u>24,629</u>
	<u>—</u>	<u>—</u>
Income:		
Appropriation from the City of New York	\$1,504,855	\$1,370,586
Endowment funds	1,150,142	1,073,238
Outside trusts and foundations	63,150	55,880
Gifts and grants	231,538	208,303
Other (Notes 2, 3 and 4)	<u>345,182</u>	<u>378,855</u>
	<u>\$3,294,867</u>	<u>\$3,086,862</u>
Expenses and appropriations:		
General administration	\$ 671,723	\$ 589,048
Educational activities	1,312,653	1,243,215
Pension and other social benefits	290,685	256,550
Operation and maintenance of physical plant	1,169,825	1,073,045
Appropriation for outstanding budgetary commitments at end of year (Note 6)	<u>—</u>	<u>53,330</u>
	3,444,886	3,215,188
Less, Appropriation for outstanding budgetary commitments at beginning of year	<u>53,330</u>	<u>30,877</u>
	<u>\$3,391,556</u>	<u>\$3,184,311</u>
Deficit, end of year	<u>\$ 96,689</u>	<u>\$ 97,449</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, 1961 and 1960

	<i>1961</i>	<i>1960</i>
Balance, beginning of year	<u>\$1,639,426</u>	<u>\$1,575,482</u>
Income:		
Endowment funds	\$ 206,108	\$ 147,394
Gifts and grants	726,458	855,777
Other	248,555	192,684
	<u>\$1,181,121</u>	<u>\$1,195,855</u>
Expenditures for the special purposes and objects for which the funds were established	\$1,346,000	\$1,067,024
Transfer to endowment funds	5,000	64,887
	<u>\$1,351,000</u>	<u>\$1,131,911</u>
Balance, end of year	<u>\$1,469,547</u>	<u>\$1,639,426</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, 1961 and 1960

	<i>1961</i>	<i>1960</i>
Balance, beginning of year	<u>\$28,824,618</u>	<u>\$25,838,500</u>
Additions:		
Gifts, bequests, etc. (Note 2)	\$ 548,255	\$ 1,346,638
Net profit on sales of investments	585,175	1,863,364
Transfer from special funds	5,000	64,887
	<u>\$ 1,138,430</u>	<u>\$ 3,274,889</u>
Deductions:		
Expenditures for:		
Custodian fee	\$ 5,000	\$ 5,000
Auditorium rehabilitation	—	85,000
Electrical and heating systems alterations	—	110,000
Transfers to general funds:		
For payment of certain expenses	29,974	62,800
To dispose of operating deficit of preceding year	97,449	24,629
Transfer to pension funds	—	1,342
	<u>\$ 132,423</u>	<u>\$ 288,771</u>
Net additions	<u>\$ 1,006,007</u>	<u>\$ 2,986,118</u>
Balance, end of year	<u>\$29,830,625</u>	<u>\$28,824,618</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, 1961 and 1960

	<i>1961</i>	<i>1960</i>
Balance, beginning of year	<u>\$6,816,038</u>	<u>\$6,379,099</u>
Additions:		
Contributions of members	\$ 154,620	\$ 143,264
Contributions of Museum	184,322	171,330
Income from investments	290,397	266,589
Net profit on sales of investments	12,677	108,899
	<u>\$ 642,016</u>	<u>\$ 690,082</u>
Deductions:		
Payments to members and beneficiaries	\$ 289,969	\$ 248,440
Expenses	5,003	4,703
	<u>\$ 294,972</u>	<u>\$ 253,143</u>
Net additions	<u>\$ 347,044</u>	<u>\$ 436,939</u>
Balance, end of year	<u>\$7,163,082</u>	<u>\$6,816,038</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 1961 and 1960 royalties received, net of expenses, amounted to \$91,763 and \$58,380, respectively, of which \$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 1961 and 1960. These amounts are included in other income of the general funds.
4. Other income of the general funds includes (a) net income from magazine and book shop operations of \$16,357, for the year ended in 1961 and net loss of \$15,999 from these operations for the year ended in 1960, and (b) transfers from unrestricted funds functioning as endowment of \$29,974 and \$62,800 for the respective years. Gross income from magazine and book shop operations amounted to \$1,005,819 and \$849,321 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.
6. Effective as of June 30, 1961 the Museum discontinued the practice of making appropriations for outstanding budgetary commitments. The effect of the change reduced the deficit for the year by approximately \$48,000.

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, 1961 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, 1960.

In our opinion, the accompanying balance sheets and related statements of funds present fairly the financial position of the Museum at June 30, 1961 and 1960 and the results of its operations for the years then ended, on a consistent basis, except for the change described in Note 6 relating to appropriations for outstanding budgetary commitments, with which change we concur.

Lybrand, Ross Bros. & Montgomery

New York, August 15, 1961.

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

FINANCIAL STATEMENTS

FOR THE YEARS ENDED JUNE 30, 1961 AND 1960

**THE AMERICAN MUSEUM
PLANETARIUM
BALANCE SHEETS,**

ASSETS:	<i>1961</i>	<i>1960</i>
Cash	\$ 29,157	\$ 18,365
Accounts receivable	937	1,593
Inventory, principally publications	<u>24,825</u>	<u>16,210</u>
	<u>\$ 54,919</u>	<u>\$ 36,168</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>
	<u>274,586</u>	<u>274,586</u>
Less, Allowances for depreciation	<u>149,652</u>	<u>139,747</u>
	<u>124,934</u>	<u>134,839</u>
Building, at cost (Note 1)	569,209	569,209
Land (donated by the City of New York)	<u>—</u>	<u>—</u>
	<u>\$694,143</u>	<u>\$704,048</u>
Prepaid insurance	<u>\$ 5,263</u>	<u>\$ 1,660</u>
	<u>\$754,325</u>	<u>\$741,876</u>

The accompanying notes are an integral part of these statements.

OF NATURAL HISTORY
AUTHORITY
JUNE 30, 1961 AND 1960

	1961	1960
LIABILITIES:		
Accounts payable	<u>\$ 836</u>	<u>\$ 463</u>
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	<u>295,920</u>	<u>270,270</u>
	555,750	530,100
Less, Payments on account, including \$25,650 in each of the respective years	<u>240,300</u>	<u>214,650</u>
	<u>\$315,450</u>	<u>\$315,450</u>
Principal, past due	<u>\$570,000</u>	<u>\$570,000</u>
	<u>\$886,286</u>	<u>\$885,913</u>

CONTRIBUTED CAPITAL AND DEFICIT:

Contributed capital:		
Charles Hayden	\$156,869	\$156,869
Charles Hayden Foundation	<u>250,925</u>	<u>250,925</u>
	407,794	407,794
Deficit, as annexed	<u>539,755</u>	<u>551,831</u>
	<u>\$131,961*</u>	<u>\$144,037*</u>
	<u>\$754,325</u>	<u>\$741,876</u>

*Denotes deduction.

The accompanying notes are an integral part of these statements.

STATEMENTS OF INCOME, EXPENSES AND DEFICIT

for the years ended June 30, 1961 and 1960

Income:	1961	1960
Admission fees less allowances and commissions	\$350,337	\$302,906
Special lectures and courses	15,509	13,647
Miscellaneous	7,981	1,875
	<u>\$373,827</u>	<u>\$318,428</u>
Auxiliary activity, sales booth	\$ 75,387	\$ 77,413
Total	<u>\$449,214</u>	<u>\$395,841</u>
Expenses:		
Preparation, presentation and promotional:		
Salaries	\$148,728	\$137,632
Supplies and expenses	32,822	32,698
	<u>\$181,550</u>	<u>\$170,330</u>
Operation and maintenance:		
Salaries	\$ 94,496	\$ 78,805
Supplies and expenses	33,064	37,903
Special improvements, renovations, etc.	—	45,568
	<u>\$127,560</u>	<u>\$162,276</u>
Administrative and general:		
Salaries	\$ 7,500	\$ 7,500
Pension fund, social security and other employee benefits	22,583	20,315
Miscellaneous	8,446	8,821
	<u>\$ 38,529</u>	<u>\$ 36,636</u>
Auxiliary activity, sales booth	\$ 53,944	\$ 56,531
Total	<u>\$401,583</u>	<u>\$425,773</u>
Income (loss) before interest and depreciation	<u>\$ 47,631</u>	<u>(\$ 29,932)</u>
Interest on past-due 4½% Refunding Serial Revenue bonds	\$ 25,650	\$ 25,650
Provision for depreciation (Note 1)	9,905	6,530
Total interest and depreciation	<u>\$ 35,555</u>	<u>\$ 32,180</u>
Net income (loss) for year	<u>\$ 12,076</u>	<u>(\$ 62,112)</u>
Deficit, beginning of year	551,831	489,719
Deficit, end of year	<u>\$539,755</u>	<u>\$551,831</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.

During the year ended June 30, 1960, the Authority amended its former general policy and provided for the capitalization of major additions to or replacements of plant and equipment. In that year, the cost of the planetarium instrument was capitalized which reduced the deficit for the year by \$131,683 after provision for depreciation.

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, 1961 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, 1960.

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, 1961 and 1960 and the results of its operations for the years then ended, on a consistent basis.

Lybrand, Ross Bros. & Montgomery

New York, August 15, 1961.

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