



NINETY-FIRST ANNUAL REPORT

**THE AMERICAN MUSEUM
OF NATURAL HISTORY**

JULY, 1959, THROUGH JUNE, 1960



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THE CITY OF NEW YORK
1960

NINETY-FIRST 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*

The past year has been a good one for the Museum. By fine cooperation between Dr. Albert E. Parr, retiring from the directorship after seventeen years, and Dr. James A. Oliver, assuming the directorship, a transition in professional leadership has been effected which augurs well for our future. Whenever a command changes, the incoming administration is charged with the responsibility of taking stock of the organization and plotting a course for the future. As our present fiscal year closes, we on the Board of Trustees join those on the Museum staff in looking forward eagerly to the work that must be done in the period leading to our centennial in 1969.

We are particularly fortunate in acquiring the full-time services in the fall of this year of our Vice President, Mr. C. DeWolf Gibson, who has recently retired after many years as one of the senior officers of the Air Reduction Company. He will direct his attention both to administrative matters in the Museum and our activities in the fields of fund raising and public relations.

I shall touch briefly here on the high lights of the events since my last annual report:

1. Significant progress has been made in our construction and rehabilitation program. The new auditorium was completed in the fall of 1959 and the new library in the early summer of 1960. On the first floor of the Seventy-seventh Street side of the building, construction on the new Hall of the Biology of Man

has been about completed and the hall is now ready for the installation of the exhibits which have been in preparation for the past three years. The Hall of the Indians of the Northwest Coast on the same floor is in an advanced state of renovation. The Hall of North American Birds on the third floor of the same wing has been completely reconstructed and is now ready for the installation of exhibits.

2. Our magazine *Natural History* has been strengthened by the incorporation, through the generous gift of the Pack Foundation, of *Nature Magazine* and continues to improve in the quality of its editorial and pictorial content, thus furthering its essential objective—that of being a meeting place for the professional scientist and the interested layman. A measure of the success achieved in working towards this goal may be read from the fact that two of the three honorable mentions awarded to American periodicals for distinguished science journalism in 1959 by the American Association for the Advancement of Science-Westinghouse Science Writing Award Committee were received by *Natural History*. The present circulation of the magazine is 124,917, and prospects are good for increased revenues, not only from subscriptions but from advertising.

Another significant award made to the Museum was the medal and citation given by the Theodore Roosevelt Association “for distinguished service in science.” This is the first time the award has been made to an institution.

3. In the spring of 1960 we embarked on a weekly radio series, in cooperation with the National Broadcasting Company. The program, entitled “Journey into Nature,” is carried over WNBC on Sundays from 2:05 P.M. to 2:30 P.M. The host of the program is the well-known commentator, Mr. Kenneth Banghart, and the guests are Museum staff members who discuss high points of their activities in research and exploration. The program has been very well received, and station WNBC is to be commended for the intelligent and sensitive manner in which the broadcasts have been handled.

4. Active consideration is being given to the possibility of expanding our natural history publications, with a view to increasing our educational efforts through the current public interest in scientific paper-backed books. This activity would undoubtedly be a revenue-producing operation.

5. The Planetarium was greatly improved last January by the installation of our new Zeiss instrument which was a gift of the Charles Hayden Foundation. Attendance has been running at high levels, and there has been active public interest in our special exhibits.

6. The officers and Director Oliver have given careful attention to the operations of the Museum's several field stations, with the result that a better liaison and also a better budgetary control have been established.

7. Salary increases were made early in 1960, putting our scale on a basis fully competitive with any similar institution in the country. A deserved increase was also made in our retirement pay schedule, an increase made possible by the healthy condition of our Pension Fund.

8. Our Men's and Women's Committees again performed notably under the chairmanships of Trustee Robert G. Goelet and Mrs. Alexander P. Morgan, respectively. A record total of \$208,302 came in through the Contributors Program which cut our operating deficit to \$97,449 in the period here reviewed. Unfortunately our estimates show that we must face a substantially higher red-ink figure in the coming year. Obviously some way must be found to increase our sources of income, if the house is to be kept in order. On June 30 the Endowment Fund stood at \$34,380,355 and the Pension Fund at \$7,165,638. It is our hope that by our centennial in 1969 we can raise our Endowment Fund by 50 per cent or to approximately \$50,000,000. It is essential that we strive to reach this goal through increased contributions and bequests.

When Americans travel to Europe, as they do in increasing numbers, they are exposed to the great and varied cultural insti-

tutions of the Old World. Surely such exposure should make them increasingly aware of the quality of some of our own riches, and in quality our Museum of Natural History here in New York would be in the first rank. Is it not a national trait that we continue to take for granted many of our most valuable assets? Consider the contribution made over the years by this institution, both in promoting scientific knowledge and in teaching young and old alike to understand the world in which we live.

In May of this year I had an opportunity to make a brief visit to the Far East where natural resources are rich but where few countries have natural history museums. In Thailand it was my privilege to meet a doctor who was spending all the time he could spare from his profession, and using his own funds, in working to get his government to pass a proper conservation law and to appropriate funds for the construction of a museum. He wanted the Thai people to see what their country had and to appreciate the importance of preserving its natural assets. After listening to this doctor, I could not help but hope that more Americans, who profess to be lovers of nature, would work as diligently for the cause in which they believe.

During the year the following Trustees were elected to the Board: Messrs. August Belmont, Robert E. Blum, Duncan S. Ellsworth, C. DeWolf Gibson, Hughston M. McBain, and James S. Rockefeller, and Dr. H. Clay Frick.

In the pages following, Director Oliver will tell you of his plans for the future and review the accomplishments of the Scientific Staff during the past year. It is our hope that, as you read of the Museum's record, you will share our belief that support of this institution represents a sound investment in the culture not only of our country but of the world.

Alexander M. White

REPORT OF THE DIRECTOR

Probably at no period in human history has there been so great an urgency for an increase in our knowledge of the natural world. We have attained an awesome technological skill enabling us to alter our surroundings with alarming speed and thoroughness. Fortunately these activities are usually directed towards an improvement—real or imagined—in our welfare. But all too often the efforts are accompanied by the destruction, sometimes complete, of important elements in our surroundings, even of man himself. Sometimes the woeful destruction accompanying the advance of civilization is unavoidable, but in most instances appropriate knowledge and careful study make it unnecessary.

The safeguarding of the world's natural heritage is a proper concern of the natural history museums. The priceless collections of this Museum contain thousands of forms of life that can no longer be found in nature and hundreds of artifacts that represent the material remains of peoples who have passed along the road to oblivion within the brief span of human history. Here our scientists and those from institutions throughout the world can delve into the realm of the long ago, the recent past, and the present. Their studies tell us much of things no longer extant and can help to guide our actions in the present and the future. For example, the conservation of threatened wildlife and endangered areas today requires the application of lessons we have learned from a study of the past. But preservation and conservation are only two of the aspects of the much broader problem we face today: the problem centered around an exploding human population that is rapidly engulfing the habitable areas of the world. This problem will tax all man's ingenuity and all his scientific

knowledge, if a complete debacle is to be avoided. And time is running out! It is now a matter of guiding mankind in the management of his affairs and the control of the world in which he lives. This task can be accomplished only through an increase in and an application of knowledge of all elements of the physical world and their interrelationships, as well as of the biological nature of man himself.

From the date of its founding in 1869 the American Museum of Natural History has been engaged in four activities basic to the increase and dissemination of knowledge of the physical world: research, exploration, exhibition, and education. It has been a fundamental creed of this Museum that all these activities are essential to the functions of a great natural history institution. Time has given ample proof not only of the wisdom of this philosophy, but also of the fact that these activities are interrelated and, to a large degree, interdependent. During the past year, faced with the challenge that confronts all of us, we have spent considerable time in studying all our interrelated activities and in determining ways in which we can increase our efforts to develop a better understanding of the world.

One major area of activity is the research program of our scientists. It is sometimes maintained that research is not appropriate to a museum such as ours; that only exhibition and education are requisite to the fulfillment of our obligations. The fundamental error of this thinking is manifest in far too many institutions that are handicapped by the fact that they cannot afford to do research, and its accompanying field work, and must depend on secondary sources for their information. Unfortunately, the errors and rapid outdateding of their exhibits often vitiate their educational efforts. The vast collections of a museum such as this are of little value unless we use them to reveal the lessons that our scientists can teach us of the past and of the present.

The numerous and varied investigations conducted by the scientists of our staff are predominantly of the type referred to currently by the generally accepted but somewhat inapt desig-

nation "basic research." This is uncommitted research, directed to obtaining facts or developing workable hypotheses about a particular subject for the sole purpose of exploring the unknown; of increasing our knowledge to the extent that we learn the answer to a given question now. This type of work is generally contrasted with what is called "applied research," which is directed towards gaining knowledge required for some specific practical purpose. Actually the comparisons given above are oversimplified, but are sufficient to indicate the accepted differences. In many instances it is virtually impossible to classify an investigation in one category or the other, but for most of the studies we pursue here, the term "basic research" is a proper designation.

To date, the total of man's knowledge includes only a partial inventory of the living organisms of the earth and a scant knowledge of the characteristics of even the better-known forms. Of what importance is this, one might ask, when nations are threatened with annihilation, and when we are faced with a prodigious struggle for survival? The answer is quite clear. Within the complex network of relationships in our world, it is not enough simply to be master in one area of human endeavor, be it the use of nuclear power, survival in space, development of antibiotics, control of global weather, or any of several other high-priority national concerns. If, in the struggle, we are forced to seek out each new fact as it is needed, we will be left wringing our hands in hopelessness. But if we encourage the inquiring minds of our scientists to probe every new lead uncovered in their search for new information, we shall have such a storehouse of facts and well-developed understanding of basic principles that we can readily apply our knowledge as it is needed.

Without this storehouse of readily available basic information, applied science is seriously handicapped. The ever-present question of the practical-minded person is "What good is it?" But who is to say when a discovery is first made what the ultimate value will be? As Benjamin Franklin remarked when challenged

with a similar inquiry, "Of what value is a baby?" We cannot say today what the value of a new slice of knowledge may be in the world of tomorrow. In a recent article in *Science*, G. B. Kistiakowsky, Special Assistant to the President for Science and Technology, noted, "Of course, it is the technology which is the carrier of change, but it is basic science, *the acquisition of knowledge*, that constitutes the seed from which man makes technology grow." (Italics ours.)

Only the shortsighted still strive to put a price tag on the results of research, now that we are engaged in a desperate struggle for permanent peace in the world. We are doomed to failure if we let ourselves be persuaded by such spurious arguments and concentrate only on our needs of the day.

Examples of the year's research by the Scientific Staff of this Museum are described in the reports of the individual departments. We are pleased to note that action taken by our Board of Trustees will enable us further to enlarge our research efforts in the future, with the addition of several new positions to the Scientific Staff. We also find a continuing cause of gratification and encouragement in the sizable support from Federal agencies that we receive for our scientific investigations. The National Science Foundation, the Office of Naval Research, and the National Institutes of Health have provided, and are continuing to provide, significant grants to our scientists. These appropriations, added to the funds provided by our Trustees and by a number of private foundations, enable us to carry out varied and extensive research projects. The grants are not only for the support of actual research but also to provide special facilities with which to work. For example, as the fiscal year was drawing to a close word was received that the National Science Foundation had awarded a substantial grant for much-needed expansion of and improvements to the laboratories of the Department of Animal Behavior.

Along with the responsibility of the Museum to search for new knowledge goes its obligation to interpret the principles of na-

ture for the general public. In this connection a thorough study was made during the past year of our existing exhibits and the current exhibition program. The study clearly demonstrated the need for an accelerated program of exhibition, requiring an increase in personnel for the Exhibition Department. A ten-year program was drawn up to bring our exhibitions to the standard and quality that are required by this Museum in the fulfillment of its objectives. The estimated cost of implementing the program will be \$2,000,000. This amount has been approved by the Board of Trustees to be paid from the private funds of the Museum, and is exclusive of any major construction costs, which are customarily paid by the City of New York.

The ten-year exhibition program will permit the needed refurbishing of eight halls, the extensive renovation of four halls, and complete new installation in eighteen halls, plus the completion of two new halls now in progress. Among the new exhibits to be completed under this program are a series of halls devoted to anthropology, the first of which is the Hall of the Biology of Man, to be opened early in 1961. Another is the Hall of Human Behavior, which will demonstrate the complex nature of man's ways and the biological basis for our acts. Still another will show the development of civilization, denoting man's cultural development from a crude shaper of stones to the creator of art and music. This program will also enable us to complete new halls devoted to the culture and attributes of the peoples of particular geographic areas, such as South America, Oceania, and Asia.

The new hall of living reptiles will show not only the structural diversity of this group, but the many ways in which it has adapted itself to life under various environmental conditions. Another of the new halls will tell the story of the biology of modern mammals, from the egg-laying duckbilled platypus to some of the social primates. The new Hall of Ocean Life will show a wide array of life from microscopic invertebrates to giant

whales. It will also tell the story of man's present efforts to exploit the resources of the sea.

Performance of this work during the next ten years will provide us with many exciting, new exhibits to augment the world-famous habitat groups and reconstructions of fossil animals.

This program not only will be an important step forward in meeting our challenge, but will give us a fitting appearance for our one-hundredth birthday.

Other programs under study involve an analysis of our popular publications. It is felt that we have a great opportunity, and educational responsibility, to overhaul our program completely and to produce a new, modern series of handbooks on the subjects covered by our exhibits. Such a program has been discussed with several publishers. Other types of popular publications are also under review, and we hope to get a vigorous program under way in the very near future. It is clear that we should embark on this venture only with competent professional supervision.

As noted in President White's report, the merger of *Natural History* and *Nature Magazine* has been accomplished smoothly under the skilled guidance of Editor John Purcell. *Curator*, our journal for the profession of museology, entered its third year of publication and is now reaching subscribers in 50 states and 43 countries.

The publication output of the Scientific Staff continues at a high level and keeps our *Bulletin*, *Novitates*, *Anthropological Papers*, and *Contributions of the American Museum-Hayden Planetarium* filled with important new scientific findings. Detailed lists of these publications can be obtained from the Secretary of the Council of the Scientific Staff, Dr. Richard G. Van Gelder.

The substantial growth of the American Museum-Hayden Planetarium under Mr. Joseph Miles Chamberlain, Chairman, and its closer association with the research and educational functions of the Museum as the Department of Astronomy have

been most satisfactory and productive. The two main public auditoriums were extensively modernized, and a new Zeiss projector was installed. As noted by President White, the projector was the generous gift of the Charles Hayden Foundation. The instrument represents an impressive new advance in the techniques of planetarium projection and is the only one of its kind in this country. Attending the ceremonies at the installation were President Alexander M. White, Mayor Robert F. Wagner, Park Commissioner Robert Moses, and Mr. Floyd G. Blair, Vice President of the Charles Hayden Foundation. By the addition of these new facilities, the educational functions of the Planetarium have been greatly enhanced.

There were a number of changes during the year in the staff of the scientific, educational, and administrative departments. Dr. Richard G. Van Gelder, Acting Chairman of the Department of Mammals, was appointed Chairman. Dr. Mont A. Cazier, Chairman and Curator in the Department of Insects and Spiders, resigned these positions in order to devote his full time to the operation of the Southwestern Research Station in Arizona. Dr. Willis J. Gertsch temporarily assumed the position of Acting Chairman of the Department of Insects and Spiders. Dr. C. Howard Curran, Curator in the Department of Insects and Spiders, retired after 32 years in the Museum. Mr. Colin M. Turnbull assumed the post of Assistant Curator of African Ethnology, and Dr. Stanley Freed was appointed Assistant Curator in the Department of Anthropology to work in North American ethnology. Mrs. Rachel Husband Nichols, Scientific Assistant in charge of the Osborn Library of Vertebrate Paleontology, retired after 35 years with the Museum. Miss Helen Gunz, Assistant Librarian in the general Library, retired after 42 years of service.

Mr. George H. Goodwin, Jr., was appointed Librarian to assist Miss Hazel Gay, Head Librarian, in the task of moving the Library, and he will succeed Miss Gay upon her retirement in a few years. Mr. Goodwin comes to us after several years in the libraries of the United States National Museum in Washing-

ton, D. C., and the New York State College of Education, New Paltz, New York.

Several additional changes in the Scientific Staff are scheduled to take effect on July 1, 1960. The appended staff list reflects these changes, which involve reorganization in two departments in order to give proper emphasis to certain fields. The present Department of Geology and Paleontology will be divided into three departments: Fossil Invertebrates, with Dr. Norman D. Newell as Chairman; Mineralogy, with Dr. Brian H. Mason as Chairman; and Vertebrate Paleontology, with Dr. Edwin H. Colbert as Chairman. The Department of Fishes and Aquatic Biology will be divided into a Department of Ichthyology, with Dr. Charles M. Breder, Jr., as Chairman, and a Department of Living Invertebrates, with Dr. William K. Emerson as Chairman. We shall also return, in such cases as are possible, to the standard scientific designations for the departments.

Other important organizational and personnel changes were made in the Office of Exhibition and Construction. The operations assigned to this department are so varied and complex that it was considered desirable to divide it into its two basic components. Mr. Gordon R. Reekie, the skilled and artistic General Manager of the department, was the logical selection for the Chairmanship of the new Department of Exhibition and Graphic Arts. Miss Katharine Beneker was designated Assistant to the Chairman and Keeper of Memorabilia. Mr. Luther A. Williams was appointed Chief of the Exhibition Division, and Mr. Joseph M. Sedacca continues as Chief of the Graphic Arts Division. The new Department of Plant Operation and Maintenance was established under the supervision of Mr. Paul Henry Grouleff, as Plant Manager. Mr. Grouleff joined our staff in January of 1960 upon his retirement from active duty as a Captain in the United States Navy. His training as an engineering officer, as well as his long experience in the Navy, makes him eminently qualified for his important responsibilities with the Museum. In the divisions under the Plant Manager, Mr. Walter F. Koenig was ap-

pointed Staff Architect in charge of the division of Architectural Planning; Mr. Philip C. Miller, Custodian, is in charge of the division of Building Services; and Mr. Emil W. Kremer remains in charge of Construction and Maintenance.

ACTIVITIES IN THE SCIENTIFIC AND EDUCATIONAL DEPARTMENTS

DEPARTMENT OF ANTHROPOLOGY

The establishment of two annual research fellowships, the first of their kind to be offered by the Museum, was a major development in the Department of Anthropology during this past year, reported Dr. Harry L. Shapiro, Chairman. The fellowships have been named for Ogden Mills, an early benefactor of the department, whose generosity made the awards possible. Notice of the awards was published during the winter, and the response was very encouraging. From the list of well-qualified applicants, Dr. Paul Tolstoy and Mr. Philip L. Newman were selected as the first recipients. Both these promising young scientists will spend the year 1960–1961 working with the vast resources and the outstanding professional staff of the department.

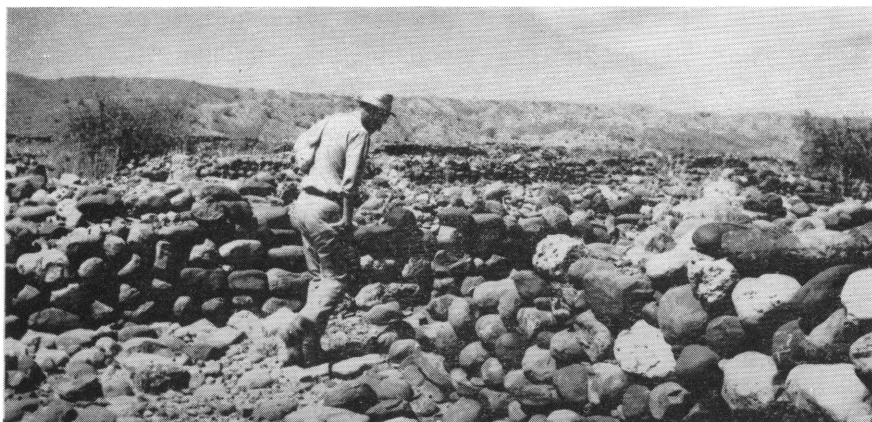
Work in the field, directed towards finding out more about man from his prehistory to the present, spanned the globe. Archeological excavations were conducted in the southern United States, in Morocco by Mr. David M. Hart, in New Guinea by Mrs. Susan Hirsh Bulmer, on the islands of Mangareva and Moorea in the Pacific, in Mexico by Dr. Gordon F. Ekholm and Mr. Matthew Wallrath, in Peru by Dr. James A. Ford, and in Pakistan and surrounding areas by Dr. Walter A. Fairservis, Jr. All were successful in obtaining materials of importance for our collections and information on human history in the areas. Dr. Ford's activities in Peru were particularly extensive, permitting him to survey and map some 70 large sites, to classify about 150,000 potsherds, and to bring back fifteen boxes of collected

materials. The last-named required a "Supreme Decree" permit from the President of Peru.

Dr. Fairservis, during his work in Pakistan, discovered a vast prehistoric ceremonial center comprised of a complex of sites extending for more than eight miles. He reports that it is one of the best represented and most extensive ruins of its kind in the Middle East. Evidence indicates that the ruins are made up of two distinct settlements dating from the second millenium B.C. Further excavation will be required to reveal the exact significance and details of this discovery. However, it is believed that this work will throw light on such problems as the extent of the Harappan empire, the character of prehistoric civilization in the area, and the probable identity of the peoples who brought about the collapse of the ancient cultures of Baluchistan and the Indus Valley.

At the Museum Dr. Shapiro has been studying the dynamic relationships between the various morphological elements of the human skull, continuing research in connection with a report on the human species, and devoting a considerable amount of time to the supervision of exhibition work on several anthropological halls. The Hall of the Biology of Man is nearing the final stages of completion, and the installation of the exhibits is expected to begin this fall. In addition, Dr. Shapiro's study "The Jewish People: a Biological History" was published as a special book by UNESCO.

Dr. Junius B. Bird developed a system of textile analysis using IBM data-sorting techniques that will greatly aid his research on the early cultural development of South America. One of the more important results of this study is the recognition that far more designs exist among the preceramic fabrics than was previously suspected. The fabric designs are usually invisible, depending on color contrasts and the extent of color disappearance, but the original figures can be recovered in many instances by the microscopic study of yarn movements. His work has enabled Dr. Bird to demonstrate that fabrics are the oldest medium of



During his archeological survey of Pakistan, Dr. Walter A. Fairservis, Jr., discovered the remains of a vast ceremonial center more than 4000 years old. Shown in the upper left of the map is the center, known as Edith Shahr. Dr. Fairservis walks through the ruins of the prehistoric ceremonial center he discovered in Pakistan. Photograph: Jack Bryan, United States Department of State.

artistic expression in Peru. There is evidence of a highly stylized art form dating from the third millenium B.C. which was the source of some features of later Peruvian art.

Also working in South American anthropology is Dr. Robert L. Carneiro who has nearly completed his monograph of the Kuikuru Indians. Dr. Carneiro's work involves a system of analyzing cultural evolution based on a scale of some 350 traits. Several aspects of these studies are now in press, and at the close of the fiscal year he and his wife, Dr. Gertrude Dole, departed for a prolonged period of study in the Montaña of Peru.

Dr. Gordon F. Ekholm's basic research problem has been the study of materials excavated at Comalcalco, Mexico, in the two field seasons of 1956-1957. He also directed a field research project called "Relationships of New World Culture" sponsored by the Institute of Andean Research and financed by funds from the National Science Foundation. His special responsibility in the project was a survey and excavations in the Tehuantepec region of Oaxaca.

Dr. Margaret Mead's prolific studies have produced reports on such widespread subjects as "Cultural Contexts of Puberty and Adolescence," "Research: Cult or Cure?," "Closing the Gap Between the Scientists and the Others," "Significance of the Individual," and "Creativity in Cross-Cultural Perspective," as well as many shorter reports and a book entitled "Peoples and Places."

Since joining the staff in September, 1959, Mr. Colin M. Turnbull has been organizing and analyzing materials that he collected during his field work with the Ituri Pygmies of Africa. He also initiated and supervised the popular special exhibit on primitive musical instruments entitled "Lute, Flute, and Drum: Musical Instruments Around the World."

With the appointment at the end of the year of Dr. Stanley Freed as Assistant Curator of North American Ethnology the Department of Anthropology has the distinction of having the largest curatorial staff of any department in the Museum. Three are

presidents of national professional organizations. Dr. Harry L. Shapiro, President, American Eugenics Society; Dr. Junius B. Bird, President, Society of American Archeology; Dr. Margaret Mead, President, American Anthropological Association. Additional honors conferred on Dr. Mead were the Spirit of Achievement Award by the Albert Einstein College of Medicine and an honorary Doctor of Laws degree from Goucher College.

DEPARTMENT OF MAMMALS

The Department of Mammals continued to emphasize studies in the systematics, zoogeography, and ecology of mammals, Chairman Richard G. Van Gelder reports. Attention was directed to faunal surveys of such widely separated areas as Australia, southern Mexico, and Long Island, and to long-range taxonomic investigations of bats, squirrels, and skunks.

Mr. George G. Goodwin, working in cooperation with Mr. Arthur M. Greenhall, completed a major study of the bats of Trinidad and Tobago. The study not only deals with the classification of the numerous bats on these islands, but contains information on their food habits, roosting sites, social behavior, and their relation to the outbreaks of rabies and other diseases on the islands concerned. Mr. Goodwin also continued his major research project on the mammals of Oaxaca, Mexico.

An extensive study of the striped and hog-nosed skunks was initiated by Dr. Van Gelder with a grant from the National Science Foundation. This work, following Dr. Van Gelder's reclassification of the spotted skunks, is a continuation of his long-range study of the skunks of the world. Dr. Van Gelder also devoted much time to research on the mammals collected by the Puritan-American Museum of Natural History Expedition to Western Mexico in 1957 and published two reports on his findings.

A survey of the mammals of the Museum's Kalbfleisch Field Research Station on Long Island, which Dr. Van Gelder began last year with assistance from the National Science Foundation,

was continued, with emphasis on ecological investigation of population dynamics.

Progress by Dr. Joseph Curtis Moore on his revision of the Oriental squirrels included studies of the zoogeography of certain species. This work led to an analysis of disjunct rain-forest populations as well as studies of the numbers of mammae as taxonomic criteria in relation to climate and latitude for squirrels of the world. Dr. Moore also analyzed the relationships of the American gray squirrel, and studied and published on the twelfth known specimen of the beaked whale.

The Sixth Archbold Expedition to New Guinea returned in March after eight months of field work, which included the most extensive biological survey ever undertaken on Mt. Wilhelm, the highest mountain in eastern New Guinea. Mr. Leonard J. Brass, leader and botanist of the expedition, and Mr. Hobart M. Van Deusen, expedition mammalogist, collected about 76,000 animal and plant specimens which will help to fill several major gaps in scientific knowledge of this region. The expedition began its work near the port town of Lae on the Huon Gulf, where it established three collecting camps extending from the tropical rain forests of the coast to beech forests at an altitude of 6800 feet in the Lae hinterland. The party then proceeded into the central highlands and established camps on Mt. Wilhelm, the highest at 11,800 feet, and at six other localities. Two additional camps were established in the Markham Valley on the return journey to the coast. Particularly significant among the mammal specimens collected are three little-known, high-altitude rodents in the water-rat subfamily. The work of the expedition, added to that of previous Archbold expeditions to this area, is expected to shed new light on the ecological and geographical relationships of the fauna and flora of New Guinea and Australia.

Complementing the work of the Archbold Expeditions, the Spalding-Peterson Expedition to Australia and New Guinea spent four months in the field and returned with approximately 1200 animal specimens. Participants were Mr. Philip Spalding,



The Sixth Archbold Expedition to New Guinea returned in March with approximately 76,000 animal and plant specimens. Unpacking their collections at the Museum, Mr. Leonard J. Brass (center), expedition leader and botanist, and Mr. Hobart M. Van Deusen (left), expedition mammalogist, show specimens of giant acorns to Dr. Richard G. Van Gelder, Chairman of the Department of Mammals. Photograph: Len Gittleman.

sponsor and co-leader, and Mr. Russell F. Peterson, co-leader and mammalogist. The group worked in northern Queensland and the Northern Territory of Australia, and later at several locations in the Territory of Papua, New Guinea.

The department received an interesting collection of mammals from Taiwan as a result of Colonel Robert Bruce White's participation in a collecting trip on Taiwan with Commander Robert E. Kuntz of United States Naval Medical Research Unit Number 2. Earlier, Colonel White and Mr. Thomas L. Blakemore had attempted to collect a Japanese bear in northern Japan for the department. They were unable to capture a specimen, but obtained several skulls.

The collection of mammals for installation in fourteen new habitat groups in the corridor of the Hall of North American Mammals was completed by Mr. T. Donald Carter. On three field trips to Canada, western United States, and Louisiana, he collected wolverines, flying squirrels, martens, badgers, Kaibab squirrels, and muskrats. In addition, Mr. Carter continued his work on the African mammal collection. It is expected that several gaps in this collection will be filled by the Model-Blagden African Expedition which is at present in the field. Sponsored by Mrs. Jean Model, the expedition is working for three months in Kenya.

The department made considerable progress in processing the accumulated backlog of specimens. Approximately five per cent of the collection was reorganized, rearranged, and labeled.

DEPARTMENT OF BIRDS

During the year the Department of Birds was involved in a number of research projects concerning the birds of the portions of the Western Hemisphere south of the United States. Dr. Dean Amadon, Chairman of the department, carried out field studies in Argentina which will be incorporated in his monograph on the birds of prey of the world, now in preparation. The work of the expedition was part of a long-range project on the birds of South



The Japanese Bird Group in the Birds of the World Hall was completed during the year. A hillside showing birds typical of the Japanese landscape is dominated by Mt. Fuji in the background. The group was donated to the Museum by Mr. and Mrs. Robert D. Sterling. Photograph: The American Museum of Natural History.

America and resulted in a carefully selected collection of rare birds from that country.

Dr. Robert Cushman Murphy accompanied a United States Government expedition to Antarctica on the icebreaker "Glacier." His trip, sponsored by the National Science Foundation, resulted in a large file of useful observations as well as in a collection of invaluable photographs and specimens. Dr. Paul Slud, newly appointed Research Fellow in the department, continued his study of the birds of Costa Rica, a project to which he has devoted more than five years of field work. Dr. Wesley E. Lanyon, as part of his research on the flycatchers of the genus *Myiarchus*, spent some time in the West Indies and western Mexico.

Other research included work on the material collected last year in New Guinea and New Britain by Dr. and Mrs. E. Thomas Gilliard. In addition to a fine collection of birds from which two new species, one also a new genus, have been described, the Gilliards brought back fine collections of mammals, reptiles, and invertebrates.

Exhibition projects were a major part of the departmental activities during the year. A new alcove in the Sanford Hall of the Biology of Birds entitled "Birds and Their Environment" was opened to the public. The alcove, which was a gift of one of our Trustees, Mr. Cleveland E. Dodge, was given as a memorial to the painter Mr. R. Bruce Horsfall. Also completed at the end of the year was the final group in the Birds of the World Hall. This exhibit depicts the bird life on a Japanese hillside, with Mt. Fuji dominating the background.

Emphasis in the department has now shifted to the renovation and rebuilding of the Chapman Hall of North American Birds. Plans and financing have been completed, and the contractors have proceeded with the major tasks of removing the old dome and providing new ceilings and floors and new fronts for the cases.

The management of the Leonard C. Sanford Trust Fund, an important source of income for the department, was reorganized

during the year. The fund, established in the will of an outstanding patron of the Department of Birds, supplements many of the department's activities. Dr. Sanford's son, Mr. William F. Sanford, is now chairman of the fund, and other members of the Trust Committee are: Mr. F. Trubee Davison, Mr. C. DeWolf Gibson, Mr. Robert F. Page, Mr. E. C. Childs, and Dr. James A. Oliver. This year the Trust Committee voted an award to the department for eight specific projects.

The department was saddened by the death, during the year, of Mr. Walter W. Naumburg. Mr. and Mrs. Naumburg were the founders of and the principal donors to the Frank M. Chapman Memorial Fund. At the death of Mr. Naumburg, a further bequest from the estate of his wife, who predeceased him, has become available, making the total endowment of the fund very substantial. This will permit the department to accomplish a number of major projects in the future.

DEPARTMENT OF AMPHIBIANS AND REPTILES

Much of the research emphasis of the Department of Amphibians and Reptiles under the direction of Chairman Charles M. Bogert continues to be placed upon the importance of voice in the amphibian. He reports that the analysis of mating calls, coupled with studies of mating behavior, has been particularly fruitful. The development of electronic devices for recording, reproducing, and analyzing sound has broadened the horizon of behavioral and systematic studies and added significantly to our understanding of the mechanics of evolutionary processes, providing a much clearer understanding of the interplay of phenomena that lead to the formation of new species.

Voice unquestionably plays an important role in the reproductive behavior of frogs, and there is evidence for the belief that it is employed in the maintenance of territories. It is conjectural whether the voices of frogs broke the silence of Mesozoic swamps, but it is becoming increasingly apparent that sound, as an element in the environment, played a conspicuous role in the

evolution of frogs. The origin of mechanisms for sound production, the utilization of mating calls as integrated elements in complex patterns of mating behavior, and the use of the voice as a means of discriminating between the sexes or the species are all indicative of the antiquity of anuran vocality.

The intricacy of the behavioral patterns of frogs, and the role of the voice in bringing the sexes together, become apparent from observations of mixed choruses. In portions of North America more than a dozen species may breed simultaneously at one site. In the complicated environment of the chorus, with hundreds of individuals participating, the chances that any given female will find a mate of her own species might appear to be limited. Nevertheless, observations reveal that relatively few mismatings occur. Taped recordings of frogs assembled over a seven-year period provide the basis for analyzing and interpreting the significance of mating calls as elements in patterns of behavior that inhibit interbreeding. Spectrographic analysis of mating calls provides a means of assessing differences between species and thus becomes an important adjunct to taxonomic studies. Progress in our efforts to understand the significance of the various sounds emitted by frogs, however, is also contingent upon field observations, as well as a critical appraisal of the published work of earlier investigators.

In order to provide a firm basis for the interpretation of the data assembled since the first recordings were made in 1953, Mr. Bogert prepared a critical review of the literature dealing with the sounds produced by frogs. The report, prepared as a contribution to a symposium on "Animal Sounds and Communication," summarizes our knowledge of mechanisms of sound production among frogs, their hearing, their reproductive physiology and behavior associated with vocality, the role of vocality in orienting the movements of frogs, and the significance of mating calls as elements in patterns of behavior intimately associated with mechanisms that discourage interbreeding and hence account for the diversification in frogs. It also includes an ap-

praisal of mating-call analysis as an adjunct to systematic studies, the variations encountered, and the influence of environmental changes on characteristics of the calls of individual species.

Dr. John A. Moore, a Research Associate of the department and Professor of Zoology at Barnard College and Columbia University, spent his sabbatical leave working in the department on the large collection of Australian frogs that he assembled several years ago and completed his monograph on these amphibians. This report includes detailed accounts of the morphology, distribution, life histories, and the systematic status of the frogs of eastern Australia, consists of more than 600 manuscript pages, with numerous figures and plates, and is unquestionably the most comprehensive, detailed, and important contribution to the study of Australian frogs ever prepared. There are few regions outside Europe and North America of which the frogs have been treated in such meticulous detail. Dr. Moore provides information concerning the life histories of more species of Australian frogs than have the combined efforts of all previous investigators in the region.

Dr. Moore also continued his experiments dealing with the transfer of the nuclei of the eggs of one species of frog to the cytoplasm of another. Experiments of the sort demonstrate the importance of cytoplasmic influences on the hereditary units contained in the nucleus. The implications of such work may have an important bearing on theories of inheritance. Earlier studies of Dr. Moore's on the leopard frog (*Rana pipiens*) provided experimental evidence to demonstrate that physiological adaptations may modify the genetic composition of the frogs in a local population to the extent that they are no longer capable of interbreeding with a geographically separated population. He and Mr. Bogert made a special trip to Mexico in March of 1960 to secure critical material for the continuation of the studies of hybridization in the leopard frog.

Dr. Richard G. Zweifel continued his systematic studies on

the complex and highly variable whiptail lizards of the genus *Cnemidophorus*. In addition he extended his investigations of the New Guinea frog fauna to New Britain where Dr. E. Thomas Gilliard of the Department of Birds had made a collection. Dr. Zweifel's report on this material is awaiting publication.

Dr. Samuel B. McDowell, Jr., has undertaken systematic studies on some of the extensive collections of snakes from New Guinea that have been amassed by the Archbold expeditions. He has also made detailed anatomical studies of the arterial canals in the skull of a testudinoid turtle. His report on this work points out the systematic implications of this feature of turtle anatomy.

Field work in the department, other than the already mentioned trip of Messrs. Bogert and Moore to Mexico, consisted of a more prolonged trip to another region of Mexico during the summer. On this field project Mr. Bogert took along three student assistants who were participating in the Undergraduate Research Participation Program supported by the National Science Foundation. The group established headquarters in the vicinity of Lake Chapala and made numerous trips to other nearby areas. A number of aspects of amphibian vocalization were investigated, and specimens were collected for the augmentation of the department's collection. Dr. Zweifel's field activities were centered at the Kalbfleisch Field Research Station where he initiated several long-term studies on the amphibians and reptiles of the area.

Additions to the collection set a new record total of 8108 specimens. The bulk of the material was obtained by the Sixth Archbold Expedition to New Guinea and by Dr. Albert Schwartz in Cuba. Other notable specimens came from the following sources: Dr. Sherman A. Minton, Jr., who donated a collection he had made in Pakistan; Dr. Walter A. Fairservis, Jr., who brought four snakes from Mr. V. P. Karpenko of the Tashkent Zoo, Uzbek S.S.R.; Colonel Robert Bruce White, who secured material from Commander Robert E. Kuntz in Taiwan; Mr. Philip Spalding, sponsor and co-leader of the Spalding-Peterson Expe-

dition to Australia and New Guinea, who brought back 692 amphibians and reptiles; Mr. Harold Cogges of the Australian Museum, who sent some rare and colorful live frogs of a species described by Dr. John A. Moore in 1953 and still known from very few specimens; and Prof. David Barker of the University of Hong Kong, who sent specimens of the very rare snake *Opisthotropis andersoni*.

DEPARTMENT OF FISHES AND AQUATIC BIOLOGY

An interesting new investigation into the movements and migrations of tuna is reported by Dr. Charles M. Breder, Jr., Chairman of the Department of Fishes and Aquatic Biology. Sponsored jointly by the Museum, the United States Fish and Wildlife Service, and the Woods Hole Oceanographic Institution, the project is under the immediate supervision of Field Associate George A. Bass. During the period under consideration, experiments were conducted to develop a satisfactory telemetering device which can be attached to an individual tuna. It is expected that the device, when perfected, can give data that no amount of simple tagging could provide, covering such matters as the actual trajectories of the fishes, their depth movements, and the speed and directness of their transit.

Dr. Breder devoted considerable attention to the completion of his monograph on the reproductive habits of fishes, and continued his field studies on the ecology and life histories of marine fishes of the Florida Gulf Coast. The latter work included the successful culmination of efforts to develop a special trap for taking very small fry without injury. Using six such traps for comparative fishing during the spring, Dr. Breder obtained data on the characteristics of the movements of various small fishes. In another phase of the Gulf Coast studies—the phenomenon of the stationing of solidly black teleost fishes of several species over a light background—enough field work has now been done to give a fair understanding of the process, although the precise reasons for the behavior remain elusive. During the fall, observa-

tions were made of two species, *Lagodon rhomboides* and *Menticirrhus saxatilis*, not hitherto known to behave in this fashion. It is now evident from all the accumulated data on the subject that these black fishes have been found only from June through November, thus making it a summer and fall activity.

In the departmental laboratory at the Museum, the project on the metabolism of marine fishes reached a point where extremely interesting results were obtained. Dr. Breder, working with the collaboration of Dr. Vladimir Walters, secured high-speed motion pictures of fishes in the smaller of two water tunnels provided by the Goodyear Aircraft Corporation, and analyzed them by single-frame projection to determine the frequency, amplitude, and wave form of the body undulations, the velocity of the water, the changes in fin attitudes, and the changes in the acceleration of the fish.

The project on the evolution of cave fishes has also made good progress since the last report. Histological data on *Mollienisia* maintained since birth in darkness were compared with similar data obtained earlier on *Astyanax*, and some interesting contrasts were observed. Behavioral data on the two species were compared with reference to light and flowing water.

Miss Francesca R. LaMonte, continuing her studies on the speared fishes, examined Pacific marlins in Kona, Hawaii, during August. She also obtained needed specimens of the rarely caught spearfish *Tetrapturus* from the Caribbean through the operations of the "Oregon," the research ship of the United States Fish and Wildlife Service. Miss LaMonte is working in close cooperation with institutions and individuals in various countries, including Italy, Portugal, Morocco, and Venezuela, on the compilation of field data.

In the invertebrate section of the department, Dr. William K. Emerson made considerable progress towards the completion of his comparative studies of the composition and distribution of the late Pleistocene and modern metazoan invertebrate faunas in southern California and Baja California, Mexico. Mr. Edwin C.



The "Oregon," research ship of the United States Fish and Wildlife Service, made a preliminary survey of the tuna in the southeastern Caribbean in preparation for the new tuna tracking project on which the Department of Fishes and Aquatic Biology is collaborating with the Service and the Woods Hole Oceanographic Institution.
Photograph: M. Rascovich.

Allison of the University of California and Dr. Emerson undertook an investigation of the rich, late Pleistocene megafaunas of Turtle Bay, Mexico, in an effort to evaluate the significance of habit and thermal requirements of the faunules within the embayment. During the year, Dr. Emerson published six reports on the collections made by him on the Puritan-American Museum of Natural History Expedition to Western Mexico in 1957. In other major research projects, he completed his revision of the Class Scaphopoda, and began work on a monograph on the gastropod genus *Drupa*.

Dr. Dorothy E. Bliss continued her studies on the neurosecretory control of various aspects of the physiology of the land crab, *Gecarcinus lateralis*, in reference to its ecology. Studies on the relationship of light and darkness to growth and molting as mediated through the endocrine system were nearly completed this year, and good progress was made on related studies on the locomotor activity of the crabs. Dr. Bliss and Mrs. Mary Weitzman of the Albert Einstein College of Medicine advanced almost to completion the text of an anatomy of this crab. There is no similar book on the anatomy of the crab with such a wealth of fine detail or with up-to-date reference to the physiological significance of the various morphological structures. In addition, Dr. Bliss devoted considerable time to the preparation of an extensive tabulation on oxidation in invertebrate tissues. Compiled in collaboration with Dr. Dorothy Skinner of Brandeis University, the table is the first to utilize all available data on the subject. It will be published by the Museum and should prove a valuable contribution to invertebrate physiology.

In May, Dr. Libbie H. Hyman went to England to receive the Gold Medal of the Linnean Society of London, its highest honor and a mark of international distinction in the field of biological research. The award was made in recognition of Dr. Hyman's outstanding contribution to invertebrate zoology which is embodied in her monumental treatise "The Invertebrates." During the year, Dr. Hyman continued work on volume 6 of this impor-

portant series and devoted a minor portion of her time to taxonomic studies of free-living flat worms.

Dr. Horace W. Stunkard pursued his investigations into the life histories of parasitic worms, chiefly those found in mollusks, with field work at the Marine Biological Laboratory in Woods Hole, Massachusetts. He also worked at the Lerner Marine Laboratory in the Bahamas, studying the parasites of the octopus, which seems to be very lightly infected at that location.

The principal curatorial activity during the period was the continuation of the rearrangement, according to the modern system of classification, of the mollusk collection by Dr. Emerson.

DEPARTMENT OF INSECTS AND SPIDERS

Significant staff changes took place within the Department of Insects and Spiders during the year. The retirement on June 30, 1960, of Dr. C. Howard Curran, after a long period of service that began in 1929, has deprived the department of its specialist on Diptera. Dr. Curran had a broad and deep knowledge of insects, and his interests went far beyond their systematics into the field of practical control entomology. As an entomologist, a writer, and a consultant, Dr. Curran gained an international reputation in his specialty and had been called the "dean of American dipterists." The great impact of his work will long be felt on the American scene.

Dr. Mont A. Cazier relinquished his chairmanship of the department and transferred his full attention to the Southwestern Research Station near Portal, Arizona. Dr. Cazier, Chairman since 1946, is well known for his research on the Coleoptera and has published much on the beetles of the families Cicindelidae, Buprestidae, and Scarabaeidae. During his tenure the department made important gains, and Dr. Cazier was able to draw support from outside sources for expeditions and for purchases that enlarged and improved the study collections.

Dr. Willis J. Gertsch, who temporarily served as Acting Chairman, continued his studies of the spider fauna. In the fall of

1959 he spent two and one-half months in California and the northern coastal states where he collected over 7000 specimens for research projects on several groups of spiders.

Dr. Frederick H. Rindge pursued his studies of the Rocky Mountain Lepidoptera, with emphasis on the Geometridae. He spent July and August collecting in the mountains of Wyoming. The results were better than those of any similar previous trip, and 10,287 specimens were brought back. The field studies of both Dr. Gertsch and Dr. Rindge were supported by grants from the National Science Foundation.

There were three noteworthy additions to the insect collections: (1) the outstanding Henry Bird collection of *Papaipema*, comprising 1871 specimens of handsome moths of the family Noctuidae; (2) the Paul Ehrlich collection of North American *Erebia*, comprising 2193 specimens; and the Alfred Kistler collection of Cychrini and Carabini, comprising 2500 excellent specimens of ground beetles.

Progress has been made towards the publication of the "Butterflies of the American Tropics, the Genus *Anaea*." This magnificent work is expected to be completed during the fall of 1960.

In the material published this year have been Dr. Gertsch's study of the *fulva* group of spiders of the genus *Steatoda* and Dr. Rindge's revision of the genera *Glaucina*, *Synglochis*, and *Eubarnesia*.

DEPARTMENT OF ANIMAL BEHAVIOR

The necessity of training scientists is rapidly becoming recognized as one of the most urgent matters facing the United States and the world. As science becomes more and more important in all aspects of our lives, the need for scientists of all disciplines becomes increasingly apparent. Preparing young people for the pursuit of science has traditionally been a concern of this Museum. Therefore, we are proud that the American Museum is one of the institutions selected to take part in the Undergraduate Research Participation Program sponsored by the National Science

Foundation for the training of college students in the methods and aims of research.

The undergraduate program at the Museum was organized in 1959 under Dr. Lester R. Aronson, Chairman of the Department of Animal Behavior, serving as Executive Director, and Dr. Evelyn Shaw, Research Associate, as Administrative Director. College science majors were invited to apply for participation in one of several different advanced projects in work in the Departments of Amphibians and Reptiles, Animal Behavior, Astronomy, Birds, and Mammals. Eleven students were selected in open competition from among 123 applicants. Some of the projects were conducted in the laboratories of the Museum; others involved field work at our research stations on Long Island and in Arizona; and one required traveling to Mexico.

Following the summer program, nine students were chosen from 72 applicants for projects in the Departments of Animal Behavior, Anthropology, Astronomy, and Birds to be pursued on a part-time basis during the 1959-1960 academic year.

Two student seminars were held at which each participant reported on the work in progress, and at the end of the program each presented a final report. The results of this program were so impressive and gratifying that both the Museum and the National Science Foundation agreed to its repetition during the following year, and Dr. Shaw is preparing a proposal to the National Science Foundation for the continuation of the program for the next three years. One student, Miss Joan Bricker of City College, won the Fabergé Award for outstanding promise in research.

The research activities of the Department of Animal Behavior include long-term investigations of a varied nature. These have long overtaxed the facilities of the department, and it is indeed happy news that a grant of \$80,000 from the National Science Foundation, mentioned earlier, has been made to provide new laboratory facilities.

Dr. Aronson is continuing his investigations into the role of

hormones in sexual and parental behavior in the blue acara (*Aquidens latifrons*), a cichlid fish. He is also working on the function of the forebrain in the fish *Tilapia macrocephala*. Dr. Theodore C. Schneirla is continuing his complex and large-scale study of the effects of stress on rats. He is working in collaboration with Drs. Ethel Tobach and Leo Vroman on this project. This team of investigators is also studying the influence of early stimulative experience in its effects on perception in adult rats.

Another phenomenon being analyzed by Drs. Schneirla, Tobach, and Vroman is the effect of handling or manipulating rats at an early age. It has been stated by others that handling rodents by various techniques may change their resistance to later disturbances. Dr. Schneirla and his coworkers have found that the effects of this early experience are more complex and variable than has been supposed. They are now studying the effects of a number of factors that may have some influence on behavior.

Dr. Helmut E. Adler has been adapting starlings and robins to darkness to study their sensitivity to different light stimuli in order to learn more about the complex biological processes involved in bird migration. Dr. Adler is also investigating the ability of birds to make accurate judgments on long intervals of time, an important factor in celestial or solar navigation.

To Dr. Evelyn Shaw the word "school" has two important professional meanings. When she is conducting a seminar of the student participants in the research training of the program of the National Science Foundation, she thinks of her activities in terms of the usual school context. However, when she is pursuing her own research investigations, she considers a school as an organized group of moving fish, orientated in the same direction and swimming at approximately similar distances from one another. Dr. Shaw and her associates are investigating the sensory cues involved, the development of the behavior, and the orientation factors of schooling in fish.

Other studies being carried on in the Department of Animal Behavior include the effect of self-reflection in the appearance

of sexual behavior in the platyfish *Xiphophorus maculatus* and an analysis of under-water sounds produced by marine fishes. The former study is being made by Dr. Shaw. The latter is a long-range series of investigations conducted by Dr. William N. Tavolga.

DEPARTMENT OF GEOLOGY AND PALEONTOLOGY

During the past year Dr. Edwin H. Colbert, Chairman of the Department of Geology and Paleontology, has continued his research on late Triassic amphibians and reptiles from various parts of the world, and on late Cretaceous reptiles, primarily dinosaurs, from North America. The problems dealing with Triassic forms were concerned particularly with the completion of a study of *Poposaurus*, a reptile from Wyoming, the completion of a study of a new procolophonid from Pennsylvania, and work on a very interesting discovery of small reptiles at North Bergen, New Jersey. These small reptiles are important, because they indicate some absolutely new elements hitherto unknown in the Triassic faunas of North America.

At intervals since 1954 Dr. Bobb Schaeffer has been compiling data, based upon nearly 1000 localities, on the Mesozoic fish faunas of the world. The purpose of this long-range project is to analyze the temporal changes in the faunal assemblages of the major sedimentary basins or units in relation to paleoecology and paleogeography. The work has now progressed far enough to indicate that new and meaningful deductions on the evolution of the fishes during this critical interval in their history can be made.

Dr. Malcolm C. McKenna, who joined the department during the past year, came from the University of California with a number of research and field projects in paleomammalogy already under way. He is proceeding with a study of the comparative cranial anatomy of the fossil and recent insectivores. Most fossil insectivores are not closely related to living members of the order, yet the living genera serve as the principal basis of compari-

son with other mammalian orders. Excellent undescribed material of the fossil forms is now available, and studies of the comparative osteology of members of the superfamilies Pantolestoidea, Leptictioidea, and Mixodectoidea are under way.

Field and laboratory work under the direction of Dr. Norman D. Newell has been completed on an ecological and geological study of the Great Bahama Bank. Collaboration in studies of the Bank with Dr. John Imbrie and Mr. Edward G. Purdy is drawing to a close, and a joint report on the oolite of the Bank is now in press. Field studies in Arizona begun in June, 1959, by Dr. Newell and Mr. G. Robert Adlington provided many new, unusually fine specimens of the *Schimidus* group, to be included in a monograph on Permian pelecypods of the southwestern United States.

Largely through a ten-month intensive field study, Dr. Donald F. Squires collected materials that will permit the completion of an investigation of New Zealand post-Paleozoic corals. This project was begun in 1953, and the systematic treatment was published in 1958 by the New Zealand Geological Survey. The second part, to include evolutionary studies, the ecologies of fossil assemblages, the sequence of faunal invasions, zoogeography, and dispersal, will also be submitted to that Survey for publication. Dr. Squires carried out his field work under a Fulbright Research Grant from February 6, 1959, to November 6, 1959. Another grant from the American Philosophical Society made possible a project on a comparative ecological study of Lord Howe Island and the Great Barrier Reef. The collections brought back from these studies are now being analyzed.

Dr. Brian H. Mason carried out research on several projects. One was an investigation of the mineralogical and chemical composition of the stony meteorites, work on which continued throughout the year. Detailed descriptions of five meteorites from the Museum collection were completed. As a result of this work, a new theory of the origin of the stony meteorites was formulated; a paper describing this theory was presented at the American Geo-

physical Union meeting in April and will soon be published. A second large research project dealt with the mineralogy and petrology of the Southern Alps of New Zealand. Field work was carried out in the summers of 1954 and 1958, during which more than 2000 square miles of difficult alpine terrain was mapped geologically for the first time. Laboratory work on the rocks and minerals has been going on at the Museum during the past six years. Other studies conducted by Dr. Mason concern the minerals of the New Jersey trap rocks and the mineral clinoptilolite from Patagonia.

The major exhibition project with which the department was concerned during the year was the special exhibit, "Charles Darwin: The Evolution of an Evolutionist," planned and supervised by Dr. Colbert. It opened on November 24, 1959, the one-hundredth anniversary of the publication of "Origin of Species," and was on view for several months. Featured were reproductions of old drawings and illustrations, documents, books, an original manuscript page from the "Origin of Species," specially designed maps and drawings, and a superb model of the "Beagle" made by Mrs. Lois Darling. The material illustrated Darwin's life, his voyage on the "Beagle," and the development of his evolutionary theories. The exhibition was subsequently circulated by the Smithsonian Institution to museums throughout the country.

Dr. Colbert noted with regret the retirement, after more than three decades of service, of Mrs. Rachel Husband Nichols, Scientific Assistant in charge of the Osborn Library. Her work has been of great importance not only to members of the Museum staff, but also to distinguished paleontologists all over the world. She will be missed in the years to come.

DEPARTMENT OF MICROPALAEONTOLOGY

In addition to continued work on the catalogues of Foraminifera and Ostracoda and the quarterly *Micropaleontology*, Dr. Brooks F. Ellis reports that four developments during the year

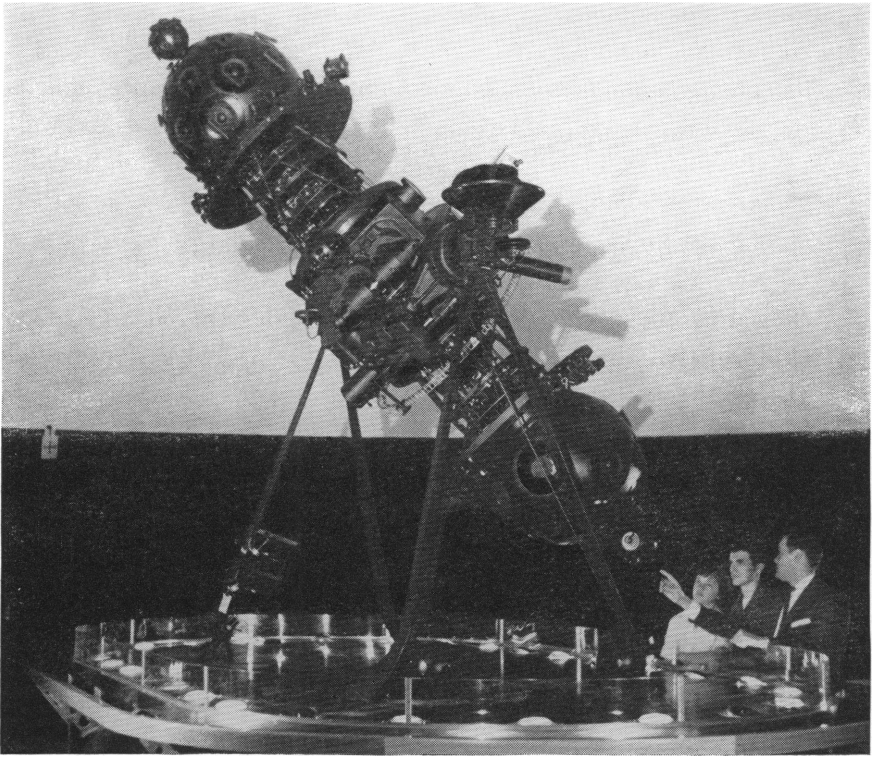
were of considerable importance to the department. The first was the accelerated distribution of the microfilmed edition of the "Catalogue of Foraminifera." The second was the establishment of a new biological laboratory, which is supported by a grant from the National Science Foundation, equipped and staffed to conduct studies of living species of Foraminifera. Third, plans have been formulated to issue several new catalogues, including one of index Foraminifera, and an extension of the "Catalogue of Foraminifera" to include more than 6000 new genera and species described as new in the Russian literature. The fourth development, an unwelcome and disturbing one, was a great decrease in laboratory service work done for oil companies. Virtually the entire petroleum industry has effected a sharp cut-back in exploration as a result of world-wide over-production. It is hoped that this is a temporary development and that the department will resume its full-scale contractual operations in the not-too-distant future.

Cooperation with the Geology Department of New York University continues, both in the training of students and in the study of sediments and sedimentation in Long Island Sound. The first half of the sampling program of this latter activity has now been completed.

DEPARTMENT OF ASTRONOMY AND THE AMERICAN MUSEUM-HAYDEN PLANETARIUM

The twenty-fifth anniversary year of the Planetarium was marked by the extensive modernization of facilities used in the public sky presentation, and by continued development of the research and educational programs.

Planetarium Chairman Joseph M. Chamberlain reports that during most of January the Planetarium was closed to the public to permit the installation in the Sky Theater of a new Zeiss projector, made possible by a generous gift of the Charles Hayden Foundation. The instrument, incorporating the most re-



The purchase and installation of a new Zeiss projector for the American Museum-Hayden Planetarium were made possible by a generous gift from the Charles Hayden Foundation. Here, Planetarium Chairman Joseph M. Chamberlain describes to visitors the complex workings of the new instrument. Photograph: Myles J. Adler.

finer optical, mechanical, and electrical advances, makes possible smoother and more accurate motions and greatly enhances the beauty of the projected sky. Supplementary improvements included the installation of a modern instrument platform as well as cushioned seats and new floors in both the Sky Theater and the Copernican Room.

The sky presentations, under the supervision of Mr. Thomas D. Nicholson, continued to emphasize the most recent findings, as well as the techniques, of astronomical research and space exploration. The construction of several new devices for special visual effects permitted greater flexibility of program content than ever before.

The teaching program, under the direction of Dr. Franklyn M. Branley, is unique among planetariums. The thirteen regular courses presented during the past year included specialized instruction in astronomy for teachers and engineers, as well as courses for laymen and young people. An intensive training program in astronomy and space science for 200 qualified high school students was offered for the first time, with support from the National Science Foundation. Participating lecturers included outstanding astronomers and space scientists from industry, colleges, universities, and the Federal government. The program was extremely well received and is being repeated in the summer of 1960.

Dr. Kenneth L. Franklin continued his research in radio astronomy with the assistance of two student participants in the Undergraduate Research Participation Program of the National Science Foundation. Progress was made in adjusting the highly sensitive receiving equipment installed for this work at the Kalbfleisch Field Research Station, and Dr. Franklin obtained interesting records of solar activity during the spring. The instrument has not yet performed its intended function of responding to radiation from the planet Jupiter, but it is expected that further adjustment will make this possible. Two other research problems to which Dr. Franklin devoted his attention during this pe-

riod were concerned with the structure of the galaxy and the scale of the solar system.

Additions to the corridor exhibits in the Planetarium during the year included a scale model of the 140-foot radio telescope at the National Radio Astronomy Observatory in Green Bank, West Virginia. The model was presented by the E. W. Bliss Company, prime contractor for the building of the instrument. The large exhibit called "Computers in Astronomy," sponsored by the International Business Machines Corporation, was completely rebuilt, with the addition also of many improvements. The display on space exploration, sponsored by the Republic Aviation Corporation, was kept continuously up to date with each new satellite launching.

The concept of reasonable balance among education, research, and exhibition was maintained during the year. The educational function, however, remained the primary emphasis, with the regular sky presentation serving as the basic vehicle for this purpose. In an attempt to evaluate the sky presentations, the staff prepared a questionnaire, to be mailed to the leaders of groups after their visits to the Planetarium. School groups were made the subject of the evaluation during the period under consideration here, and their extremely favorable response to the presentations was most gratifying to the Planetarium staff. Reservations for the increased number of school groups at morning performances were worked out smoothly under the supervision of Mr. James S. Pickering. An outstanding problem revealed by the questionnaires was the inadequacy of available luncheon facilities for these groups.

Contributions of the American Museum-Hayden Planetarium, the publication series inaugurated in 1958, has been very well received by the personnel of other institutions, to which it is circulated on an exchange basis. The five issues of this fiscal year included four reviews and surveys and one report of research.

Two members of the staff were honored for significant achievements in the interpretation of astronomy for the layman. "As-

tronomy for You," the nationally distributed educational television series in which Mr. Pickering served as instructor, won a Sylvania Television Award. "Experiments in Sky Watching," a book for young amateur astronomers written by Dr. Branley, received the Thomas Alva Edison Foundation Award for the best science book for children published in 1959.

Planetarium attendance for the twelve-month period was 560, 431, which represents a decrease of approximately 55,000 from the figure for the previous fiscal year. The loss was due in large part to the fact that the building was closed in January for renovations.

VEGETATION STUDIES

The vegetation survey of an area of 600 square miles centered on the Chiricahua Mountains of southeastern Arizona was carried into its second year of field work, reports Dr. Jack McCormick, In Charge of Vegetation Studies. Continuing a quantitative analysis of the various plant communities that occur from the 3600-foot elevation at the valley floor to 9800 feet at the crest of the range, Dr. McCormick surveyed and permanently marked sample plots from which data were collected and recorded. Work was also begun on a key to the trees, shrubs, cacti, yuccas, and sotol of the region. This key will utilize only vegetative characteristics, whereas all available manuals on the subject require the presence of flowers for identification.

A program of vegetation studies at the Kalbfleisch Field Research Station on Long Island was initiated this year, with an inventory of the existing vegetation in several fields and in one large tract of forest. Biweekly clippings were made in small sample plots to determine the rate of productivity of each vegetation type. Studies of productivity will be correlated with quantitative information on shifts in animal populations and food habits.

The studies in the Chiricahuas and at the Kalbfleisch Station were assisted by college students participating in the Under-

graduate Research Participation Program of the National Science Foundation. Other vegetation study areas to which Dr. McCormick devoted attention during the year included the New Jersey Pine Barrens and a section of Montgomery County, Indiana.

In cooperation with Dr. A. W. K  chler, Research Associate, Dr. McCormick completed the compilation of a catalogue of references to approximately 2500 published vegetation maps of various parts of the world. Plans to publish the catalogue were initiated, with the hope that it would provide an impetus to various workers throughout the world to continue the work of cataloguing vegetation maps of their own regions. The compilation of a bibliography of the literature on natural and semi-natural vegetation of North America was also continued during the year.

Considerable reference material was gathered for the projected Hall of Botany, and Dr. Erika Rawitscher, Consultant in Botany, submitted subject outlines for proposed exhibits on fungi and photosynthesis.

Arrangements were made whereby photomurals of Museum exhibits on forest conservation will be installed as an outdoor display by the United States Forest Service at the National Headquarters of the Boy Scouts of America in New Brunswick, New Jersey.

FIELD STATIONS

The four field stations of the Museum comprise an important extension of its research facilities and add immeasurably to the flexibility and vigor of the total research and educational program.

Each station differs from the others in its ecological and climatological environment. Each is similar to the others in that it offers exceptional, if not unique, conditions, both natural and controlled, for the pursuit of given scientific investigations.

During the past year the field stations welcomed representa-

tives of many institutions, who conducted a wide range of studies in the natural sciences. An important innovation was the establishment of training programs in which both science teachers and undergraduates were given specialized instruction in both the aims and methods of research and in basic scientific concepts.

Research projects conducted at the field stations of the Museum have resulted in a substantial number of scientific publications. Examples of some of the projects conducted during the past year follow in the reports of the individual stations.

ARCHBOLD BIOLOGICAL STATION

The Archbold Biological Station at Lake Placid, Florida, reported an active year both in research work and in educational activities pursued at the Station. Projects of the former type, continued from previous years, included studies of fungus-growing ants by Dr. Neal A. Weber of Swarthmore College; parasitological investigation by Dr. Lawrence R. Penner, University of Connecticut; field observations of cattle egrets and night herons by Dr. Austin L. Rand, Chicago Natural History Museum; and research on the collecting of insects with light traps by Dr. Stuart W. Frost of Pennsylvania State University. Dr. Jane Brower and Dr. Lincoln Brower of Mt. Holyoke College and Amherst College, respectively, began a three-year program of research in the mimicry of butterflies.

A comprehensive investigation of the arthropod-borne viruses in Florida was begun by Dr. Richard Morland Taylor, Yale University School of Medicine. In connection with this project, Dr. Telford H. Work of the Virus Laboratories of the Rockefeller Foundation collected some blood samples from Seminole Indians.

Visiting scientists from overseas included Dr. Hendryk Szarski of Copernicus University in Poland, who collected and prepared specimens for study of the circulatory system of Amphibia, and Prof. Kodo Maeki of Kwansei Gakuin University in Japan who collected butterflies for chromosome studies.

Among the several educational activities utilizing the facilities of the Station was the Summer Institute in Field Biology for New York high school teachers sponsored by the Museum. One of the teachers in this group later conducted a field trip in Florida with a visit to the Station, for 38 New York City high school students interested in biology.

Activities of the Museum staff at the Station included Mr. Richard Archbold's collecting of solitary wood-nesting wasps for the research of Dr. Karl V. Krombein, United States National Museum, and Mr. Leonard J. Brass' collaboration with the Gray Herbarium, Harvard University, and the University of Florida on the "Oligocene Hills" research program. During the greater part of the year, Mr. Brass was with the Sixth Archbold Expedition to New Guinea, discussed in the report of the Department of Mammals.

KALBFLEISCH FIELD RESEARCH STATION

Comprehensive surveys of the fauna and flora of the Kalbfleisch Field Research Station, near Huntington, Long Island, were considerably advanced during the second year of operation of the Station through the continued improvement of its facilities and through the work done by students under the Undergraduate Research Participation Program sponsored by the National Science Foundation.

Dr. Wesley E. Lanyon, Resident Director, reports that a grid system of 50-meter square quadrats was established with permanent steel posts over the entire 94 acres of the Station. The system enables investigators to compare and correlate data from studies on animal populations and vegetation. These studies are described in the respective departmental reports.

During the fall the pond was cleaned and slightly enlarged in order to make it more useful for research activities. New equipment was installed in the botany, radio astronomy, and bird-banding laboratories, as well as in the residence hall where

students in the National Science Foundation program lived during the summer.

Dr. Lanyon continued his studies of the bird population of the Station throughout the year. To date, nearly 1500 individuals of 50 species have been banded. "Returns" of birds banded during the winter of 1958-1959 have contributed to a better understanding of the movements of the winter residents.

A hybrid junco \times white-throated sparrow, one of the few such hybrids known to science, was trapped at the Station in the fall of 1959. Its discovery suggested an experiment which Dr. Lanyon began the following spring. In an effort to produce additional hybrids, he placed several juncos and white-throated sparrows, appropriately paired according to sex, in an aviary incorporating the natural vegetation. If the experiment proves successful, he hopes to study and compare the behavioral development, including voice, of the hybrid offspring with that of the known parents.

LERNER MARINE LABORATORY

Field studies utilizing the facilities of the Lerner Marine Laboratory at Bimini, Bahamas, continued to cover a wide range of research problems. Dr. Henry Kritzler, Resident Naturalist at the Laboratory, continued investigation on the effects of sound in the orientation of sharks. Using the unique facilities provided by the newly installed experimental pens, Dr. Perry Gilbert of Cornell University, Dr. Kritzler, and others are obtaining interesting information on the behavior of sharks. It is hoped that the shark studies, with support from the Office of Naval Research, will lead to a body of knowledge that can be utilized in the development of a functional shark repellent and the prevention of shark attacks.

Dr. Alfred Marshak of Jefferson Medical College, Pennsylvania, in collaboration with Dr. Kritzler, initiated a study of the fate of DNA during the maturation of eggs in sea urchins. The DNA chemical, found in the nucleus of cells, is widely held



The Undergraduate Research Participation Program, conducted by the Museum under the sponsorship of the National Science Foundation, is providing opportunities for selected college science students to take part in advanced research projects in museum laboratories and in the field. Here, a student traps small mammals for study at the Kalbfleisch Field Research Station. Photograph: Arline Strong.

to be the chemical basis for heredity, and investigation of its role may help to elucidate the problem of abnormal cell growth, such as is found in cancer.

A number of studies involved the carbonate sedimentation of the Great Bahama Bank, the largest area in the world where limestone is currently being formed. Dr. William R. Kanes of Columbia University studied the oolite fauna and its associated environments. Dr. Stephen Streeter, also of Columbia, investigated the microecology of Foraminifera. Dr. Eugen Seibold, Geologisch-Palaeontologisches Institut der Universitaet Kiel, West Germany, explored the relations between carbonate sediments and Foraminifera and the stratification of the sediments.

A study of thyroid activity in parrot fishes was carried on by Dr. Allyn J. Waterman of Williams College, and chemical analysis of nerve cells in the barracuda was undertaken by Dr. Holger Hyden of the University of Göteborg, Sweden. The Laboratory also served the needs of some 40 other visiting scientists.

Through the generosity of Mr. Michael Lerner, an attractive new brochure, ably written by Mr. Philip Wylie, was produced about this station. It is being distributed to scientists throughout the world, calling their attention to the unique facilities afforded at the Lerner Marine Laboratory.

SOUTHWESTERN RESEARCH STATION

The Southwestern Research Station in Portal, Arizona, completed its fifth year of operation. Dr. Mont A. Cazier, relinquishing his duties at the Museum, took over as full-time Resident Director of the Station. A National Science Foundation grant made possible the construction of additional housing units, thereby establishing an important balance among the housing, laboratory and dining-room capacities. The units were completed and used during the summer. More than one hundred scientists and specialists, often accompanied by their families,

made use of these facilities. College and high school biology teachers and their classes, numbering 140 individuals, visited the Station and its laboratories.

Studies in agronomy, animal behavior, arachnology, bacteriology, general biology, botany, desert biology, ecology, education, entomology, genetics, geology, herpetology, ichthyology, malacology, mammalogy, mineralogy, ornithology, and range and wildlife management occupied investigators from 29 different universities or museums.

The reference collections of the plants and animals of the area have continued to grow. Dr. Cazier is adding rapidly to the collection of insects. The library of the Station is also expanding, and it now contains a sizable number of pertinent reprints.

DEPARTMENT OF PUBLIC INSTRUCTION

The past year for the Department of Public Instruction has been one of extremes, difficult and discouraging, yet, for the most part, challenging and encouraging. Because no significant change was made by the city in the salary schedule for museum instructors, the department was faced again with the loss of trained teachers, who left for more remunerative positions, and with the difficulty of replacing these vacancies with qualified personnel.

Our teaching services for school groups showed a marked decline over the preceding year as a direct result of a 34 per cent decrease in available teaching personnel for the elementary school program. It does not seem likely that this unfortunate situation will improve until the salary schedule for instructors is increased to a rate more comparable to that for elementary school teachers in the New York area.

On the challenging and encouraging side of the past year's activity was the dedicated service of the department staff which enabled it to begin a long-planned expansion of the work in adult education. The first Summer Institute of Biology Teachers, which was sponsored by the Museum and supported by a National Sci-

ence Foundation grant, was held at the Archbold Biological Station in Florida. It provided high school teachers with much needed experiences in field study and research in zoology and botany. A renewal of the grant for 1960 made it possible to offer an institute during the present summer at the Southwestern Research Station of the Museum.

In response to hundreds of requests the first Evening School for Adults ever to be offered by the Museum was opened in the fall of 1959. A generous grant from the New York Fund enabled the department to finance this project. Two series of lecture courses in natural science were given, one in the fall of 1959 and one in the spring of 1960. The courses were very well attended, and the income was such as to indicate that this new service should be self-sustaining in another year or two.

An anonymous donor again made possible the presentation of the special course in mineralogy for selected high school science students, and it is hoped that the next year will see industrial support for this course, which has already proved effective in influencing students to major in geology when they go on to college.

The Natural Science Center flourished under an additional grant of \$5000 from the Brookdale Fund and continued to attract large numbers of young people interested in science.

Considerable progress was made on the New Jersey Nature Project sustained by the contribution of Mrs. Lewis S. Thompson of Red Bank, New Jersey. Nature trails were installed at the Marlboro State Hospital and at the Woman's Reformatory at Clinton Farms under the supervision of departmental personnel. In addition, nature programs were set up for the children at the Child Treatment Center at Allaire.

A five-week survey of all school groups visiting the Museum was started on May 2. In addition to the registering of the name and size of each group, pertinent information regarding such points as the purpose and length of the visit and the services needed was secured. It will take some time to analyze the data, but it is hoped that this analysis will make it possible for the



Mr. C. Bruce Hunter, Supervisor of Adult Education at the Museum, explains the details of a pre-Columbian Mexican temple to a group of teachers he led on an archeological study tour. Photograph: The American Museum of Natural History.

Museum better to serve the great number of out-of-town school classes that flock to the Museum, particularly in the months of April and May.

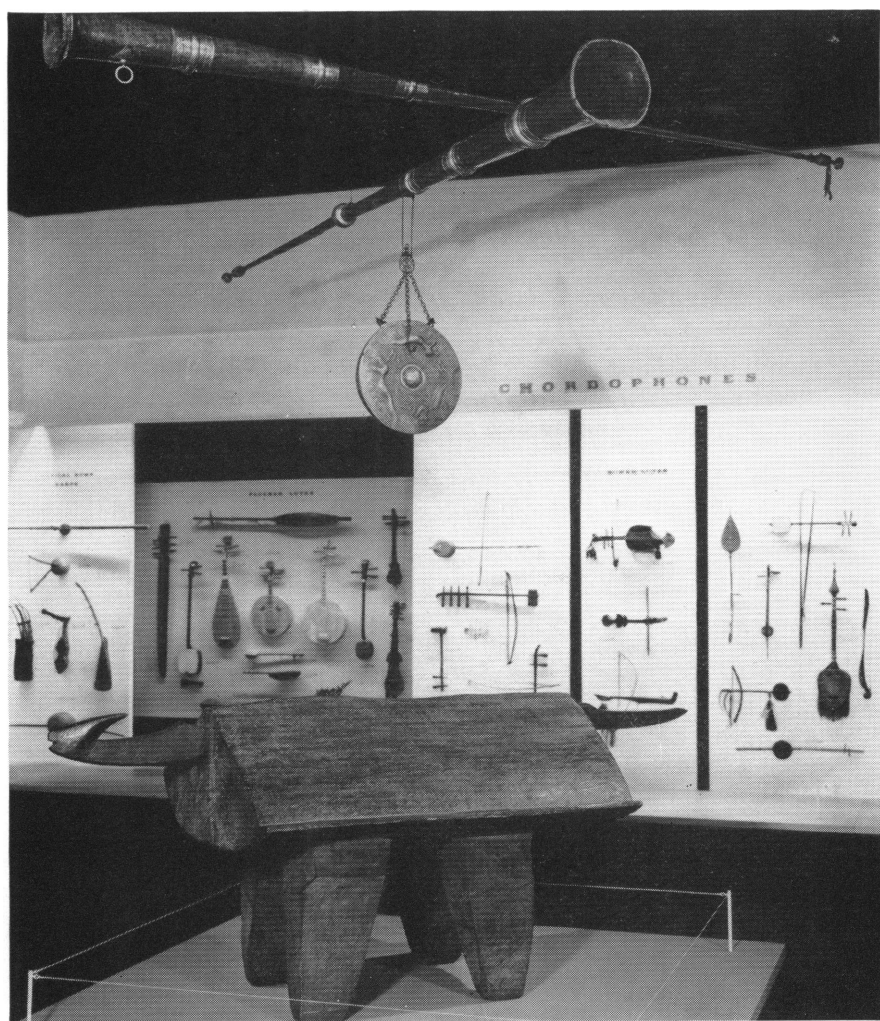
All other programs continued in operation, diminished only when lack of teaching personnel forced such curtailment. Actually, during the year, the department was able to take several steps in a long-awaited reorganization. This reorganization includes the arranging of teaching assignments and the location of personnel into three distinct divisions: the Division of General Education (Grades K to 12), the Division of Adult Education, and the Division of Special Projects. The Natural Science Center is in this last division. These three teaching divisions, plus the Division of Circulating Exhibits, will constitute the new organization of the department, which should make for more efficient operation and scheduling of personnel.

A total of approximately 15,700,000 contacts were made by all the educational programs and services of the Museum. Of this number, 325,000 were teaching and lecturing contacts at the Museum. The Department of Public Instruction alone, through its programs and services at the Museum and its extension services, made more than ten million contacts.

DEPARTMENT OF EXHIBITION AND GRAPHIC ARTS

The two major changes in the department during the year are discussed elsewhere in the present report: the redistribution of the responsibility for supervision of the construction and planning forces of the Museum, and the greatly expanded exhibition program planned for the next ten years. This latter point has made it necessary to begin increasing the number of people in the department.

In addition to the completed exhibitions mentioned earlier, work was begun or continued on a number of other displays. All the field trips for the fourteen habitat groups of small mammals in the corridor of the Hall of North American Mammals have been undertaken, and actual preparation on many of them has



"Lute, Flute, and Drum: Musical Instruments Around the World," has proved one of the most popular temporary exhibitions held at the Museum in many years. More than 200 instruments from Africa, the South Seas, the Orient, and the Northwest Pacific Coast, all chosen from the collections of the Museum, are on display. Their sounds are demonstrated by specially recorded music played in the gallery. Photograph: The American Museum of Natural History.

been under way for some time. Preliminary design work on the exhibits for the projected Hall of the Indians of the Eastern Woodlands and the Plains was started in March, and several displays have already been laid out.

A major concern of the department during the year has been hall renovation. Our aim is to improve the appearance of exhibition areas that are scientifically and structurally sound, but that, with the passage of time, have become dingy and, in some cases, outmoded in form of presentation. The first area chosen for restoration was the Hall of the Indians of the Northwest Coast. New wall cases have been constructed, murals have been cleaned, new lighting is being installed, and a rearrangement of the collections is now in progress.

As a means of encouraging more representative thinking in originating temporary exhibit ideas, a new Temporary Exhibition Committee has been formed. Members include staff scientists as well as representatives of the department.

During the year six temporary exhibits were mounted in the Corner Gallery. Among these were "Museum Treasure Hunt," "Charles Darwin: The Evolution of an Evolutionist," and "Lute, Flute, and Drum: Musical Instruments Around the World." Three other Corner Gallery exhibits were "Australian Bark Painting," "Peoples of Morocco" (photographs by William G. Murray), and "Plants of Woodland and Wayside" (watercolors by Su Zan Swain).

SCIENTIFIC PUBLICATIONS

Miss Ruth Tyler, Editor of Scientific Publications, reports the production of 53 numbers of *American Museum Novitates*, with a total of 1118 pages, one part of *Anthropological Papers of the American Museum of Natural History*, totaling 203 pages, eleven articles in the *Bulletin of the American Museum of Natural History*, totaling 930 pages, and the *James Arthur Lecture on the Evolution of the Human Brain*, for 1959, 38 pages.

NATURAL HISTORY

With the January, 1960, issue, the circulation of *Natural History* magazine was expanded to well over 100,000 as a result of the incorporation of *Nature Magazine*, the periodical of the American Nature Association. Many of the most popular features of *Nature Magazine* now appear exclusively in *Natural History*. Since the merger, no issue of the magazine has contained fewer than 64 pages, and the average has been nearer 72. Paid circulation during the year, through May, 1960, reached 124,917, including 34,524 *Nature Magazine* subscribers, as compared to 85,920 in the previous year.

Natural History enjoyed the distinction of receiving two of the three honorable mentions awarded to American periodicals by the American Association for the Advancement of Science-Westinghouse Science Writing Award Committee for distinguished science journalism in 1959.

CURATOR

The circulation of *Curator* in its third year is 810 institutional and individual subscribers, including museums and libraries in all 50 states of the nation and in 43 foreign countries on six continents.

JUNIOR NATURAL HISTORY MAGAZINE

The Editor of *Junior Natural History Magazine*, Mrs. Marion B. Carr, reports on the introduction of a new editorial program of contacts for intimate, on-the-spot information from all over the world. A scheduling of articles, photographs, and drawings from authorities in different scientific organizations was begun during the year and will be amplified in the coming year. Contacts have been established with those in the educational field both here and in Europe, Africa, and the East. There will be contributions from children of these lands and from writers and photographers traveling through them. To date members of the

Institute for Regional Exploration, the faculty of two of our universities, members of the Society of Women Geographers, the United Nations, and others have given generously of their time and effort to enable the magazine to bring the fast-changing world into focus for children, and to establish a better understanding of its relationships, its resources, and its legacies. During the year pertinent contacts were made at the White House Conference on Children and Youth, at special exhibits of the magazine. A long-standing deficit has been reduced to a minimum, and renewals and new subscriptions have increased.

ATTENDANCE

During the fiscal year here reported on, 1,788,392 people visited the Museum, and 560,431 visited the Planetarium, making a combined total of 2,348,823. This figure represents a decrease of 112,203.

MEMBERSHIP

Membership in the American Museum of Natural History increased by 35,345 this year, to a total of 118,129.

James A. Oliver

THE AMERICAN MUSEUM OF NATURAL HISTORY

FINANCIAL STATEMENTS

FOR THE YEARS ENDED JUNE 30, 1960 AND 1959

THE AMERICAN MUSEUM

BALANCE SHEETS

ASSETS:	1960	1959
Current funds:		
General funds:		
Cash	\$ 57,975	\$ 45,414
Accounts receivable	246,261	261,472
Inventories, principally publications	85,211	104,012
Prepaid expenses	118,502	87,604
	<u>\$ 507,949</u>	<u>\$ 498,502</u>
Special funds:		
Cash	\$ 727,143	\$ 696,749
Investments (market June 30, 1960, \$874,000) (Note 1):		
U. S. Government bonds	898,626	861,977
Preferred stock	2,387	2,387
Accounts receivable	11,270	14,369
	<u>\$ 1,639,426</u>	<u>\$ 1,575,482</u>
	<u>\$ 2,147,375</u>	<u>\$ 2,073,984</u>
Endowment funds:		
Cash	\$ 41,701	\$ 278,916
Investments (market June 30, 1960, \$34,339,000) (Note 1):		
Bonds	16,763,070	12,681,233
Preferred stocks	1,567,138	2,059,493
Common stocks	10,448,825	10,814,763
Other	3,884	4,095
	<u>\$28,824,618</u>	<u>\$25,838,500</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	\$ 92,830	\$ 127,408
Investments, at cost (market June 30, 1960, \$7,072,000):		
Bonds	5,115,032	4,566,117
Preferred stocks	595,270	699,871
Common stocks	1,012,906	985,673
Loan receivable		30
	<u>\$ 6,816,038</u>	<u>\$ 6,379,099</u>
	<u>\$38,213,031</u>	<u>\$34,716,583</u>

The accompanying notes are an integral part of these statements.

OF NATURAL HISTORY

JUNE 30, 1960 AND 1959

FUNDS AND LIABILITIES:	1960	1959
Current funds:		
General funds:		
Accounts payable and payroll taxes withheld	\$ 104,061	\$ 83,242
Deferred income, principally unearned subscriptions	448,007	409,012
Appropriations for outstanding commitments	53,330	30,877
	<u>605,398</u>	<u>523,131</u>
Deficit	97,449	24,629
	<u>\$ 507,949</u>	<u>\$ 498,502</u>
Special funds:		
Balances of funds received or appropriated for specific purposes	\$ 1,639,426	\$ 1,575,482
	<u>\$ 2,147,375</u>	<u>\$ 2,073,984</u>
Endowment funds:		
Endowment funds, income available for:		
Restricted purposes	\$12,473,093	\$11,585,097
Unrestricted purposes	7,073,499	6,514,303
Funds functioning as endowment, principal and income available for:		
Restricted purposes	2,083,128	870,393
Unrestricted purposes (Notes 2 and 5)	7,194,898	6,868,707
	<u>\$28,824,618</u>	<u>\$25,838,500</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	\$ 6,813,911	\$ 6,376,972
Welfare fund balance	2,127	2,127
	<u>\$ 6,816,038</u>	<u>\$ 6,379,099</u>
	<u>\$38,213,031</u>	<u>\$34,716,583</u>

The accompanying notes are an integral part of these statements.

GENERAL FUNDS
SUMMARY STATEMENTS OF CHANGES
for the years ended June 30, 1960 and 1959

	<i>1960</i>	<i>1959</i>
Deficit, beginning of year	\$ 24,629	\$ 90,606
Less, Transfer from unrestricted funds functioning as endowment	<u>24,629</u>	<u>90,606</u>
	<u>—</u>	<u>—</u>
Income:		
Appropriation from the City of New York	\$1,370,586	\$1,432,792
Endowment funds	1,073,238	1,016,457
Outside trusts and foundations	55,880	60,866
Gifts and grants	208,303	205,589
Other (Notes 2, 3 and 4)	378,855	391,611
	<u>\$3,086,862</u>	<u>\$3,107,315</u>
Expenses and appropriations:		
General administration	\$ 530,108	\$ 513,850
Educational activities	1,323,452	1,244,045
Pension and other social benefits	256,550	245,951
Operation and maintenance of physical plant	1,051,748	1,127,834
Appropriation for outstanding commitments at end of year	<u>53,330</u>	<u>30,877</u>
	3,215,188	3,162,557
Less, Appropriation for outstanding commitments at beginning of year	<u>30,877</u>	<u>30,613</u>
	<u>\$3,184,311</u>	<u>\$3,131,944</u>
Deficit, end of year	<u>\$ 97,449</u>	<u>\$ 24,629</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, 1960 and 1959

	<i>1960</i>	<i>1959</i>
Balance, beginning of year	<u>\$1,575,482</u>	<u>\$1,391,996</u>
Income:		
Endowment funds	\$ 147,394	\$ 130,244
Gifts and grants	855,777	681,127
Other	192,684	288,974
	<u>\$1,195,855</u>	<u>\$1,100,345</u>
Expenditures for the special purposes and objects for which the funds were established	\$1,067,024	\$ 901,859
Transfer to endowment funds	64,887	15,000
	<u>\$1,131,911</u>	<u>\$ 916,859</u>
Balance, end of year	<u>\$1,639,426</u>	<u>\$1,575,482</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, 1960 and 1959

	<i>1960</i>	<i>1959</i>
Balance, beginning of year	<u>\$25,838,500</u>	<u>\$23,524,043</u>
Additions:		
Gifts, bequests, etc. (Note 2)	\$ 1,346,638	\$ 1,074,929
Net profit on sales of investments	1,863,364	1,343,460
Transfer from special funds	<u>64,887</u>	<u>15,000</u>
	<u>\$ 3,274,889</u>	<u>\$ 2,433,389</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	62,800	20,300
To dispose of operating deficit of preceding year	24,629	90,606
Transfers to pension fund	<u>1,342</u>	<u>3,026</u>
	<u>\$ 288,771</u>	<u>\$ 118,932</u>
Net additions	<u>\$ 2,986,118</u>	<u>\$ 2,314,457</u>
Balance, end of year	<u>\$28,824,618</u>	<u>\$25,838,500</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, 1960 and 1959

	<i>1960</i>	<i>1959</i>
Balance, beginning of year	<u>\$6,379,099</u>	<u>\$5,900,115</u>
Additions:		
Contributions of members	\$ 143,264	\$ 140,830
Contributions of Museum	171,330	170,749
Contribution to welfare fund		1,000
Income from investments	266,589	245,505
Net profit on sales of investments	108,899	149,853
	<u>\$ 690,082</u>	<u>\$ 707,937</u>
Deductions:		
Payments to members and beneficiaries	\$ 248,440	\$ 224,250
Expenses	4,703	4,703
	<u>\$ 253,143</u>	<u>\$ 228,953</u>
Net additions	<u>\$ 436,939</u>	<u>\$ 478,984</u>
Balance, end of year	<u>\$6,816,038</u>	<u>\$6,379,099</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 1960 and 1959 royalties received, net of expenses, amounted to \$58,380 and \$58,258, 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 1960 and 1959. These amounts are included in other income of the general funds.
4. Other income of the general funds includes (a) net loss from magazine and book shop operations of \$15,999, for the year ended in 1960 and net income of \$46,367 from these operations for the year ended in 1959, and (b) transfers from unrestricted funds functioning as endowment of \$62,800 and \$20,300 for the respective years. Gross income from magazine and book shop operations amounted to \$849,321 and \$837,138 for the respective years.
5. The Museum has remaining commitments of unrestricted funds of \$140,000 and \$47,100 representing the respective maximum amounts which the Museum may be required to expend in connection with completion of alterations to the existing electrical system and modernization of the auditorium.

LYBRAND, ROSS BROS. & MONTGOMERY

Certified Public Accountants

The Board of Trustees,

The American Museum of Natural History,

New York, N. Y.

We have examined the balance sheet of THE AMERICAN MUSEUM OF NATURAL HISTORY as of June 30, 1960 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, 1959.

In our opinion, the accompanying balance sheets and related statements of funds present fairly the financial position of the Museum at June 30, 1960 and 1959 and the results of its operations for the years then ended, on a consistent basis.

Lybrand, Ross Bros. & Montgomery

New York, August 15, 1960.

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

FINANCIAL STATEMENTS

FOR THE YEARS ENDED JUNE 30, 1960 AND 1959

THE AMERICAN MUSEUM
PLANETARIUM
BALANCE SHEETS,

ASSETS:	1960	1959
Cash	\$ 18,365	\$ 82,235
Accounts receivable	1,593	1,318
Inventory, principally publications	<u>16,210</u>	<u>21,381</u>
	<u>\$ 36,168</u>	<u>\$104,934</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 (Note 2)	135,059	126,434
Deposit on new Zeiss planetarium instrument		50,917
Copernican planetarium instrument	<u>30,435</u>	<u>30,435</u>
	274,586	316,878
Less, Allowances for depreciation	<u>139,747</u>	<u>259,651</u>
	134,839	57,227
Building, at cost (Note 1)	569,209	569,209
Land (donated by the City of New York)	—	—
	<u>\$704,048</u>	<u>\$626,436</u>
Prepaid insurance	<u>\$ 1,660</u>	<u>\$ 2,167</u>
	<u>\$741,876</u>	<u>\$733,537</u>

The accompanying notes are an integral part of these statements.

OF NATURAL HISTORY

AUTHORITY

JUNE 30, 1960 AND 1959

LIABILITIES:	1960	1959
Accounts payable	<u>\$ 463</u>	<u>\$ 12</u>
4½% Refunding Serial Revenue bonds, and interest thereon (Note 3):		
Interest:		
Unpaid coupons, past due	\$259,830	\$259,830
Accrued on past-due unpaid bonds	<u>270,270</u>	<u>244,620</u>
	530,100	504,450
Less, Payments on account, including \$25,650 in each of the respective years	<u>214,650</u>	<u>189,000</u>
	<u>\$315,450</u>	<u>\$315,450</u>
Principal, past due	<u>\$570,000</u>	<u>\$570,000</u>
	<u>\$885,913</u>	<u>\$885,462</u>

CONTRIBUTED CAPITAL AND DEFICIT:

Contributed capital:		
Charles Hayden	\$156,869	\$156,869
Charles Hayden Foundation (Note 2)	<u>250,925</u>	<u>180,925</u>
	407,794	337,794
Deficit, as annexed	<u>551,831</u>	<u>489,719</u>
	<u>\$144,037*</u>	<u>\$151,925*</u>
	<u>\$741,876</u>	<u>\$733,537</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, 1960 and 1959

Income:	1960	1959
Admission fees less allowances and commissions	\$302,906	\$340,151
Special lectures and courses	13,647	14,131
Miscellaneous	1,875	2,972
	<u>\$318,428</u>	<u>\$357,254</u>
Auxiliary activity, sales booth	\$ 77,413	\$ 78,389
Total	<u>\$395,841</u>	<u>\$435,643</u>
Expenses:		
Preparation, presentation and promotional:		
Salaries	\$137,632	\$125,274
Supplies and expenses	32,698	32,260
	<u>\$170,330</u>	<u>\$157,534</u>
Operation and maintenance:		
Salaries	\$ 78,805	\$ 71,379
Supplies and expenses	37,903	42,302
Special improvements, renovations, etc.	45,568	18,885
	<u>\$162,276</u>	<u>\$132,566</u>
Administrative and general:		
Salaries	\$ 7,500	\$ 7,500
Pension fund, social security and other employee benefits	20,315	15,369
Miscellaneous	8,821	10,783
	<u>\$ 36,636</u>	<u>\$ 33,652</u>
Auxiliary activity, sales booth	\$ 56,531	\$ 59,414
Total	<u>\$425,773</u>	<u>\$383,166</u>
Income (loss) before interest and depreciation	<u>(\$ 29,932)</u>	<u>\$ 52,477</u>
Interest on 4½% Refunding Serial Revenue bonds, including \$25,650 and \$24,562 on past-due bonds for the respective years	\$ 25,650	\$ 25,650
Provision for depreciation (Note 1)	6,530	3,153
Total interest and depreciation	<u>\$ 32,180</u>	<u>\$ 28,803</u>
Net income (loss) for year	<u>(\$ 62,112)</u>	<u>\$ 23,674</u>
Deficit, beginning of year	489,719	513,393
Deficit, end of year	<u>\$551,831</u>	<u>\$489,719</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.

Since the purchase in 1948 of the Planetarium Authority bonds by The American Museum of Natural History, it has been the general policy of the Authority to charge to expense purchases of plant and equipment. During the year ended June 30, 1960, the Authority amended this policy to provide for the capitalization of major additions to or replacements of plant and equipment.

2. During the year, installation of the new Zeiss planetarium instrument was completed at a cost of \$135,059. The Charles Hayden Foundation contributed \$120,000 toward such cost, of which \$70,000 was received during the year ended June 30, 1960.

In accordance with the change in policy described in Note 1 above, the cost of the planetarium instrument was capitalized which reduced the deficit for the year by \$131,683 after provision for depreciation.

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

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, 1960 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, 1959.

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, 1960 and 1959 and the results of its operations for the years then ended, on a consistent basis, except for the change described in Note 1 relating to additions to plant and equipment, with which change we concur.

Lybrand, Ross Bros. & Montgomery

New York, August 15, 1960.

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