



NINETY-NINTH ANNUAL REPORT

**THE AMERICAN MUSEUM  
OF NATURAL HISTORY**

JULY, 1967, THROUGH JUNE, 1968





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THE CITY OF NEW YORK

1968





# NINETY-NINTH 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*

As our Museum approaches its one-hundredth birthday, we come to a turning point in time and decision. The world in which we live is in a stage of transition. The shape of our institutions is changing in response to the demands of a more complex civilization; society is fluid and volatile as never before.

In this era of upheaval, as in the past, the Museum stands upon and moves forward from a solid foundation of scientific truth. It represents not so much a harbor isolated from the world and protected from the turbulence of the times as it does a firm anchorage in which research and knowledge is our holding ground.

Now, as at no other moment, our role is clear. It is to push forward our research and to utilize every available means to educate. Should we falter on either count, we would swiftly lose our position of eminence and relinquish it to those who have held fast. Toward these ends, the discovery and the revelation of scientific truths, our staff continues to confront the challenges and changes as they occur in our world today. It may be the problem of urban tension studied in the teeming streets of Calcutta. It may be the evolution of life as it unfolds in the jungles of New Guinea or it may be the problems much nearer home. Wherever and whatever they undertake, our scientists are quick to forsake the quiet of their offices to explore the laboratories of the field, and subsequently to return from the excitement of the field to evaluate the results of their observations.

To provide a solid framework within which our scientific staff may work toward ultimately and effectively exhibiting the fruits of their research, as in past years we have continued our studies to introduce creative administrative and management techniques. To encourage and assist this program, a Trustee committee, headed by Mr. Rodney Cleveland Gott, was formed for the purpose of expanding the efficiency of our operations within specific areas as suggested by the administration. Although the axiom that a museum cannot be run like a business is as true as its reverse, we completely agree with the statement of Mr. McGeorge Bundy, President of the Ford Foundation, in his annual report of 1967: "Effective management is just as important for the academic institution as for any other large and costly enterprise, and the best men (there are too few) and the best evidence (there is too little) combine to tell us that there is room for great improvement."

For the celebration of our coming Centennial, another committee of the Trustees headed by Mr. Osborn Elliott was appointed to consult with and approve the plans of our scientific staff.

The halls and exhibits that opened this year further illustrate our contributions to creative research, technology, and education. "The World Beneath Our Feet . . . Minerals" marked a significant trend toward the preparation of more frequent, ambitious, and meaningful temporary exhibits. In a similar spirit, but of more massive dimensions, is our new Hall of Man in Africa. This new exhibit, which has already made an indelible impact on the public and press, tells the story of the development of man, not only as a biological entity, but also as a social being. We were proud to open this exhibit to a nation in which more than ten per cent of the population is of African descent. We are equally hopeful that this presentation of African culture, set in historical perspective, will lead to a more comprehensive and intelligent understanding of a continent and its people from whom the world has so much to learn.

We are very grateful to the mass communication media of the city and nation for their cooperation and support in publicizing the role of this Museum. We are particularly grateful to Mayor John V. Lindsay and his staff for their awareness of our needs. Our

gratitude is also extended to the state and federal agencies, our Trustees, our members and subscribers, and an ever increasing number of friends on whose support our survival as well as our success depends.

In December, it was our privilege to announce the donation of the Childs Frick Collection of Vertebrate Paleontology to the Museum. It is the most outstanding collection of fossil mammals ever assembled, and to insure its scientific usefulness the Childs Frick Corporation has endowed this treasure with a sum approaching \$7,000,000. The Museum is deeply grateful to our Trustee, the late Mr. Childs Frick, and to the officers of the Childs Frick Corporation, Dr. Henry Clay Frick, II, and his sisters, Mrs. J. Fife Symington, Jr., and Mrs. I. Townsend Burden, for their helpful and interested cooperation in carrying out the wishes of their father.

The Museum is also grateful to the Trustees of the Charles Hayden Foundation for their generous grant of \$129,000 toward the improvement of facilities in The American Museum—Hayden Planetarium. This fund will make possible the replacement of our present equipment with the newly developed Carl Zeiss Model VI Planetarium Projector. Incorporating the very latest developments in projection and electronic-control technology, this instrument will be the standard of excellence in its field for many years to come and will maintain the position of the Planetarium as the leader in the world among institutions of its type.

We are pleased to announce the election of Mrs. Constantine Sidamon-Eristoff, Mr. L. F. Boker Doyle, Mr. William T. Golden, and Mr. David A. Shepard, and the re-election of Mr. Osborn Elliott, to our Board of Trustees.

The highly satisfactory performance of the Men's and Women's Committees during the year resulted in contributions amounting to \$321,000, an all-time high. These funds are essential to the development of our educational and scientific programs, and both committees are to be congratulated.

Individually we wish to thank Co-Chairmen L. F. Boker Doyle and Sidney S. Whelan, Jr., of the Men's Committee, Mrs. Hart Fessenden, Chairman, and Mrs. William C. Chanler and Mrs. John

C. Bierwirth, Vice Chairmen, of the Women's Committee, for their effective and resourceful leadership. The leadership of the Women's Committee will remain unchanged during the coming year. Messrs. Doyle and Whelan, having served for four successive years, are turning their responsibilities over to Mr. David C. Clark who will serve as Chairman of the Men's Committee, with Mr. Thomas W. Russell, Jr., and Mr. Larson Powell as Vice-Chairmen.

We were saddened by the loss of three outstanding men who served the Museum as valued Trustees for many years. Mr. Duncan S. Ellsworth, a member of the Board since 1954, died on December 3, 1967. He served as a member of the New York State Theodore Roosevelt Memorial Committee from 1952 through 1960, and was then appointed Chairman of the Committee, serving actively in that post until his death. Dr. William F. Jansen, who died on February 22, 1968, served for 20 years, first as a representative of the Board of Education, then, in recognition of his invaluable contributions, was elected an Honorary Trustee in 1958. Mr. H. Nelson Slater, whose interest and generous support of the work of the Museum began many years before he was elected a Trustee in 1948, died on April 22, 1968.

We are happy to report that the Endowment and Pension Funds for the past fiscal year have both increased in market value: the Endowment Fund from \$51,765,054 to \$56,074,391; and the Pension Fund from \$11,214,522 to \$11,892,464.

Our hundredth year falls in the latter part of a century torn by war, revolution, and social unrest. It also marks an era of great humanity, wide communication among peoples, and profound creative exchanges among men of good will. These are the goals that the Museum has striven to embody and to perpetuate. Now we must look to the future not only with the feeling that our existence has been justified, but with the hope and intention of an even-greater role for this Museum in the years to come.

Alexander M. White  
*President*

Charles DeWolf Gibson  
*Vice-President*



## REPORT OF THE DIRECTOR

Last December, in speaking at a symposium on "The Role of Museums in Modern Communication" held during the annual meeting of the American Association for the Advancement of Science, I made the point that museums must advance in two important ways: we must become more involved with the various segments of the public we serve; and we must encourage those who visit our museums to interact more dynamically with our programs. Here at The American Museum of Natural History we are giving careful consideration to all aspects of interrelationship with our public. We know that we must learn more about the people who can benefit from our services—who they are, where they come from, and what their needs are—so that we can plan our programs in a way that will best reach the most diversified audience and help them acquire knowledge most readily. An educational institution that derives financial and spiritual support from the community must be responsive to the needs and problems of all its citizens.

How best to become meaningfully and constructively involved with an increasingly heterogeneous audience cannot be resolved by simple or "pat" answers. Over the years many hundreds of thousands of young people and adults have first experienced a creative interest in science through Museum exhibits, courses, films, lectures, workshops, and field trips; and the Museum has taken its materials to many groups. But in 1968—the year of the Kerner Report and of mounting urban crises—we must come to terms with our obligation to reach segments of the community with whom we have had little or no effective communication in the past. We must not be content with token involvement but must seek to achieve a complete and relevant relationship.

The development of a major new exhibition is one example of how we are attempting to respond to the needs of an audience composed of people of almost every age, educational background, and cultural heritage. As noted in the message of the President,

the Hall of Man in Africa is one of the most successful contributions yet made to the Museum's large series of educational exhibitions. This hall, which is a long-awaited reference treasure house of African culture, has been well received by all our visitors, especially by the black community. By telling the story of man in his varying African environments and showing the richness of his cultural heritage, it corrects misunderstandings about the nature of traditional life in Africa. John Canaday, art critic of *The New York Times*, described the hall as "a fine demonstration of museum craftsmanship using a superb collection of African art as its major source of raw material. . . . It illustrates the dignity and richness of African tribal life and culture before their corruption by European influences, and does so without sentimentalizing or propagandizing. . . . It is the breadth of this perspective that makes this view of Man in Africa so revealing and so enlarges our perception of his art as an integral force in his life."

The successful completion of the hall was possible because of the efforts of many Museum employees. Its enthusiastic reception resulted in part from its wonderful treasures and their artistic presentation and from the lively African music, but also, in substantial measure, it resulted from a long and careful consideration of the reaction the hall might evoke in different visitors and of the steps that should be taken to achieve the most positive response. Our chief concern was to insure that the significance of the exhibition would be evident to twentieth-century Americans living in a society that has traditionally ignored, misunderstood, or undervalued the culture of another continent.

Long before the hall was completed, Dr. Harry L. Shapiro, Chairman of the Department of Anthropology, and Dr. Colin M. Turnbull, Associate Curator of African Ethnology, sought the reactions of colleagues and associates from all parts of the community. Dr. Turnbull talked at length with members of the African delegations to the United Nations, who contributed enormously to the success of the exhibition. He also brought in teachers, student groups, and community leaders from Harlem. In addition, after a number of administrative conferences, we decided on several in-

novations to improve communication. For example, we developed a training course for the attendants who would be assigned to the hall. A series of weekly meetings was initiated at which Dr. Turnbull discussed the intellectual content and concepts of the exhibits. This program proved to be so successful that, despite the time and effort required to conduct the course, the pattern will be followed for all future halls.

I think that no exhibition opened in recent years has engaged the interest of visitors more dynamically. One unexpected occurrence may be prophetic of the kind of response we sought but could only hope to achieve. On the first Sunday afternoon that the hall was open, a group of youngsters, both black and white, were observed quietly and spontaneously dancing to the African music.

The Hall of Man in Africa is only one example of how we are directing our thinking to all ramifications of greater interchange with our visitors and greater contributions to the community both through our exhibits and through our other programs of education. Let me cite several other examples.

For many years the Museum has succeeded, through its Natural Science Center, in introducing young people to a lifelong interest in science. Now we are exploring, in conversations with business and community leaders, the possibility of establishing neighborhood natural science centers. The idea of the neighborhood centers is to use natural history to capture the interest of young people of high school age and older, especially "dropouts" and potential "dropouts," and then to give them related vocational training. Such a center would thus serve a twofold purpose of education and recreation. Also, we are discussing with representatives of the Urban Coalition the possibility of executing plans we developed several years ago for mobile museums to service the outlying communities of the city, bringing representative exhibits.

In a move specifically designed to encourage youngsters from the black community, we have established a summer work program for selected high school students. Thirty girls and boys are currently employed in the "Museum Cadet Corps" to assist the regular attendants in providing information and directions to visitors.

These youngsters were given an indoctrination course by our Department of Education, and the program has been so encouraging that we hope to continue it next summer on an expanded basis, possibly as a combination work and study program.

Programs conducted for young people by our educational and scientific research departments, some of which are sponsored by the Office of Economic Opportunity and the National Science Foundation, give us a wide variation in the types of formal educational experience we are able to offer. These programs vary from ordinary work-training to research assistantships, formal class programs, and the conduct of independent research. The research training programs are carried out in Museum laboratories, in the field, and at the field research stations, and they are designed for youngsters who come from all sectors of the community and who have varying educational backgrounds and vocational skills. All the participants are selected for training programs on the basis of their qualifications for particular assignments.

Just as we have been adding new programs to our educational activities for young people, so we have been exploring new services for adults. For example, for many years we have been taking our materials to a variety of groups, including those confined in hospitals and special schools. Now we are discussing with the Addiction Services Agency of New York City the possibility of starting a series of lectures, to be given by members of the Museum staff to the residents of Phoenix House, a drug-addiction rehabilitation center situated near the Museum where former addicts live and work in their final step back to life in society. We are told that such a program of educational enrichment is needed and would be appreciated.

On still another level, we are planning a special lecture series to be held in connection with our Centennial entitled "Anthropology and the Urban Problem." As presently outlined, the series will deal in depth with such topics as settlement patterns, pollution, and the growth of disassociated groups.

When the Museum opened its early exhibits nearly one hundred years ago, most of its visitors came by horse-drawn carriage. They



were largely the elite of New York's adult society, coming to view the curios of nature that had been assembled from the far corners of the world. Knowledge and appreciation of such strange creatures were recognized attributes of the well-educated individual of the times. Today our visitors represent a broader cross section of the population of the metropolitan area, and approximately 60 per cent are young people of high school age or younger. Our visitors come by foot, by subway, bus, private car, and taxicab. They come for a wide variety of reasons that are far more serious than learning of the curios of the natural world. Today they seek scientific answers to the questions of survival in a world that man has altered to an extent previously unknown; they learn to apply the discipline and techniques of science to the problems of acquiring new knowledge; they search for new insights from the life of other regions and other times; and they strive for new understanding of themselves and their social problems through the study of other peoples.

It is because of the importance of this kind of change that all of us at the Museum must engage in a continuous search to find new ways to meet the varied and evolving needs of our broadest audience, and that we must work both through what we do within these walls and through what we convey to the whole community we serve.

James A. Oliver, *Director*



## REVIEW OF THE YEAR 1967-1968

The distinctions and honors bestowed upon scientists by other organizations during this period include the following:

Department of Anthropology: Dr. Margaret Mead was awarded an Honorary Doctoral Degree from Ewha Woman's University, Seoul, Korea.

Department of Fossil Invertebrates: Dr. Norman D. Newell was designated Honorary Appointee to the Smithsonian Institution and elected a member of the Great Barrier Reef Committee of Australia.

Department of Herpetology: Dr. Herndon G. Dowling was the annual Albertus Magnus speaker at Marist College, Poughkeepsie, New York.

Department of Ichthyology: Dr. Donn E. Rosen was given the Leidy Medal Award by the Academy of Natural Sciences of Philadelphia.

Department of Mammalogy: The American Society of Mammalogists elected Dr. Richard G. Van Gelder and Dr. James N. Layne Vice-Presidents, and Dr. Sydney Anderson Recording Secretary.

Department of Micropaleontology: Dr. Angelina R. Messina was awarded an honorary Doctor of Philosophy degree by the University of Basel, Switzerland, "in recognition of her accomplishments in Micropaleontology," and was elected President of the Eastern Section of the Society of Economic Paleontology and Mineralogy.

Department of Ornithology: Dr. Dean Amadon was elected President of the John Burroughs Memorial Association; Mr. Eugene Eisenmann was elected First Vice-President of the American Ornithologists' Union; Mr. Jean Delacour was awarded the President's Medal of the Avicultural Society, London, "in recognition of outstanding services in the cause of Aviculture"; Dr. Wes-

ley E. Lanyon was awarded the Brewster Medal for 1968 by the American Ornithologists' Union.

Department of Vertebrate Paleontology: Dr. Bobb Schaeffer was elected to membership in the Paläontologische Gesellschaft; the Webb School of California elected Dr. Malcolm C. McKenna an honorary member of the Cum Laude Society.

Staff changes are recorded below, including those effective July 1, 1968.

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

Dr. Thomas D. Nicholson was appointed Assistant Director to succeed Dr. Joseph M. Chamberlain, who resigned. Dr. Chamberlain was Chairman of The American Museum—Hayden Planetarium for eleven years, and from 1964 had served as Assistant Director of the Museum.

Mr. Charles A. Weaver, Jr., Manager of City Relations, was appointed Assistant Director of the Museum.

Mr. Sidney S. Whelan, Jr., was appointed Assistant to the President.

Mr. James M. Williamson, formerly Assistant Treasurer, was appointed Controller.

Mr. George B. Decker, formerly Assistant Controller, was appointed Assistant Treasurer.

Mr. Louis A. Benesh was appointed Assistant Controller.

Mr. Donald Albert was appointed Assistant to the Controller.

Mrs. Catherine M. Johnson was appointed Assistant Executive Secretary.

Mr. Philip S. Ross was appointed Senior Writer in the Office of Public Relations.

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

Department of Animal Behavior: Dr. James Forbes, Dr. Sally M. Hardy, Dr. Winifred B. Trakimas, and Mrs. Madeline L. Cooper were appointed Research Associates. Dr. June Elizabeth Tice was appointed Research Fellow.



Department of Anthropology: Mrs. Carin Burrows was appointed Associate.

Department of Astronomy and The American Museum—Hayden Planetarium: Dr. Franklyn M. Branley was appointed Chairman and Astronomer. Dr. Kenneth L. Franklin was appointed Assistant Chairman and Astronomer. Mr. Martin J. Steinbaum was appointed Scientific Assistant.

Department of Entomology: Dr. Lee H. Herman, Jr., was appointed Assistant Curator. Mrs. Lois W. Suissa was appointed Scientific Assistant, and Dr. Robert L. Usinger was appointed Research Associate. Dr. Wong Siu Kai was appointed Research Fellow, and Mr. Aaron M. Nadler was appointed Associate.

Department of Fossil Invertebrates: Dr. Donald W. Boyd was appointed Research Associate.

Department of Herpetology: Dr. Richard G. Zweifel was appointed Chairman and Curator, and Mr. Charles W. Myers was appointed Assistant Curator.

Department of Ichthyology: Dr. Colin Patterson was appointed Research Associate.

Department of Micropaleontology: Dr. Angelina R. Messina was appointed Chairman and Curator. Dr. William A. Berggren was appointed Research Associate, and Dr. Harold L. Cousminer was appointed Research Fellow.

Department of Mineralogy: Dr. Leonard Zabler was appointed Research Associate.

Department of Ornithology: Dr. Francois Vuilleumier was appointed Research Fellow.

Department of Vertebrate Paleontology: Dr. Malcolm C. McKenna was promoted from Frick Associate Curator to Frick Curator. Mrs. Margaret S. Stevens was appointed Scientific Assistant.

Kalbfleisch Field Research Station: Dr. Jack McCormick was appointed Research Associate.

Department of Education: Dr. Richard S. Casebeer was appointed Chairman. Mr. Martin Rosenberg was promoted from In-

structor to Senior Instructor. Miss Juanita M. Munoz was appointed Instructor.

In the Library, Mr. Thomas G. Basler was appointed Librarian. He succeeds Mr. George H. Goodwin, Jr., who resigned in January.

On *Natural History* magazine, Mr. Jack Hope was promoted from Associate Editor to Senior Editor, and Mrs. Avis Kniffin was appointed Associate Editor.

We are deeply saddened by the death on March 28, 1968, of Mr. Matthew H. Duffy, Assistant Box Office Manager of The American Museum—Hayden Planetarium. He had been with the Museum since 1936 and had served the Planetarium since 1942.

## DEPARTMENT OF ANIMAL BEHAVIOR

Many phases of research carried out in the department are related to the remarkable plasticity of behavior which is an important aspect of ecological adaptation, evolution, and species survival.

To a greater or lesser extent, behavioral modification occurs in all animal phyla. It comes about through many avenues, including environmental changes and learning; changes in the nervous system through the level of hormones and other biochemicals; and through the subtle and continuous interaction of physiological and psychological processes. A striking feature in the evolution of animals is the steady increase in the modifiability or plasticity of behavior, a characteristic that separates man most sharply from other mammals and even from his closest anthropoid relatives.

Dr. Lester R. Aronson, as part of a long-term research program, has been investigating brain function in the learning capacity of fishes. In his most recent work, he is delving into cerebellar function. The cerebellum is the part of the mammalian brain that makes possible the precise movements of locomotion and balance. Interference with the mammalian cerebellum produces such severely disrupted motor processes that other possible functions are masked. Dr. Aronson and his collaborators have, however, discovered that in bony fishes the cerebellum is divided into two parts: one of these deals with motor function; the other, with learning processes. These studies thus reveal aspects of brain functions not so readily accessible for study in the more complexly organized brains of higher forms.

As part of another long-term study, Dr. Aronson, Mrs. Madeline Cooper, and students are examining the physiological pathways through which mating behavior can be modified in the cat. Their experiments this year have been particularly successful in demonstrating the specific nerves that are associated with this behavior in females.

Dr. T. C. Schneirla and students have expanded their researches

on the behavior of army ants. Recent studies reveal that ant behavior is determined in part by phases of the life cycle. Army ants of the species *Neivamyrmex nigrescens* show higher levels of excitation during the nomadic (wandering) phase than during the stary (resting) phase. In addition to greater excitability, adult workers show enhanced sensitivity to stimulation by light and to chemicals secreted by other workers in the colony. It becomes increasingly apparent that complex interrelationships among individual structure, physiology, and group behavior regulate and modify army-ant behavior.

Long-term investigations by Dr. Evelyn Shaw into the biological bases of schooling in fishes have revealed that this unique behavior begins at specific times during early development and that it follows characteristic patterns of approach and orientation. Recent developmental studies have shown that under specific conditions of rearing—if, for example, fish have no opportunity to come in contact with species mates—the schooling tendency is not reduced. Very brief contact with species mates has a long-term effect. When fish meet again several weeks after their brief contact, they school more actively than fish that have had continuous social contact or none at all. The fact that fish will school despite minimal or no experience with one another during development may be considered as an adaptive mechanism. It assures the coming together of portions of the population and the formation of schools even in the open sea where individuals usually do not have prior experiences together and have never seen one another.

In recent studies, Dr. Ethel Tobach has turned her attention to behavior that leads to combat or aggression among animals. Greater knowledge of the roots of aggressive behavior is essential to our times and may lead to the possibility that man can ultimately prevent the development of these unwanted, antisocial characteristics of our civilization. Dr. Tobach and several students are investigating, in fish and mammals, social patterns that lead, on the one hand, to aggression and, on the other, to toleration. Of special interest are her findings that similar behavioral acts precede both aggression and toleration.



In studying sensory capacities of fishes, Dr. William N. Tavolga is using a new technique called "signal detection analysis." This technique will now permit a more accurate determination of variations in auditory thresholds. For example, if food is given as a reward, a hungry fish will more likely respond to a sound signal than a satiated fish, although both can hear equally well. By the use of an avoidance-behavior technique for determining auditory thresholds, the significance of such factors in the experimental situation as shock level, height of water in the aquarium, and time between trials is now being evaluated. Preliminary examination of data indicates that these factors all have measurable effects on hearing thresholds. Dr. Tavolga, who is the recipient of a John Simon Guggenheim Memorial Foundation Fellowship, spent the year on the west coast of Florida where he is pursuing these studies on the hearing of various marine fishes from the Gulf of Mexico.

Dr. Helmut E. Adler, in studying bird navigation, is investigating the sensory capabilities birds may use to establish and maintain directionality and to know their own locations relative to their goals. Dr. Adler reports that these remarkable navigational powers of birds must be based on the utilization of the bird's sensory capacities. This year he has designed experiments to explore the limits of accuracy of the bird's equivalent of the sextant and chronometer which human beings require for accurate navigation.

Dr. David Jacobs is developing a procedure for investigating vision in fishes. Goldfish are being studied to determine the most effective way to train fish for visual discrimination problems. After such training, it will be possible to trace the sensitivity of the eye to various levels of light intensity.

Because the department believes in the importance of training students in behavioral theory, methodology, and technique, all the curatorial staff and several Research Associates participated in educational efforts during the year. Two students received doctoral degrees as part of cooperative programs with New York University and the City University of New York. Currently, fifteen graduate students are working toward master's or doctoral degrees. In addition, the department has provided job opportunities for twelve

college students under Urban Corps auspices, and for ten college students in the National Science Foundation Undergraduate Research Participation Program. Dr. Tobach organized eight behavioral seminars in which some of the country's leading scientists participated.

A departmental effort has resulted in the completion of manuscripts for a major book, "The Development and Evolution of Behavior." The book honors Dr. T. C. Schneirla for his significant contributions to the field of animal behavior. A second volume containing only Dr. Schneirla's works will be published simultaneously.

Departmental research investigations were aided by grants and awards from the National Institutes of Health, the National Science Foundation, the Office of Naval Research, the American Philosophical Society, and the John Simon Guggenheim Memorial Foundation.

#### UNDERGRADUATE RESEARCH PARTICIPATION PROGRAM

For the past nine years, the Undergraduate Research Participation Program, supported by the National Science Foundation, has been a formal channel through which college students have been able to participate in on-going research projects in the Museum and at its field stations. In some instances, students were able to co-author scientific papers with their sponsors; in others, more extensive research was possible because of student contributions.

During the past year, 24 students were selected from 244 applicants from 106 American colleges. Of these, nineteen participated full time for ten weeks in the summer program in 1967. Nine were in residence at the Kalbfleisch Field Research Station; two spent part time at the Southwestern Research Station, Arizona; and eight were at the Museum. Six worked full time in the academic year Work Program at the Museum.

Lester R. Aronson, *Chairman*

## DEPARTMENT OF ANTHROPOLOGY

The outstanding event in the Department of Anthropology this year was the completion and official opening in June of the Hall of Man in Africa. The hall represents the culmination of six years of research and preparation under the direction of Dr. Colin M. Turnbull, whose long field experience contributed greatly to its success. In the use of the rich collections, every effort was made to illustrate the structure and dynamics of traditional African life in a way that would create insight into and understanding of these pre-modern cultures. We hope this new hall will contribute to a better understanding among the racial groups that comprise American society.

The scope and diversity of the science of anthropology are reflected in the department's research activities. As in the past, the various scientists in the department have pursued their research in many far-flung areas of the world: Dr. Harry L. Shapiro in India, Dr. Richard A. Gould in Australia, Dr. Margaret Mead in New Guinea, and Dr. Turnbull in Africa. But more significantly, they have continued to reach into new fields of discovery. Only a cross section of these activities can be outlined here.

One of the major problems in archeology is the extent to which the characteristics of an original culture can be reconstructed from its surviving remnants. To illuminate this problem, Dr. Gould undertook a detailed study of the archeology of an Australian aboriginal culture which was still functioning in its traditional manner. This unusual approach promises to shed light on the problem of drawing cultural inferences from archeological artifacts.

In recent years, the nature of cultural change has become a subject of deep concern. We are becoming increasingly aware of its impacts on our own society, as well as of its crucial effect on developing nations around the world. By using the experiences of a variety of primitive and advanced societies, anthropology has been able to contribute to a fuller understanding of the phenomenon of

cultural change. Several members of this department have been among the leaders in these efforts. Dr. Stanley A. Freed, for example, is now bringing to a conclusion his study on the effects of urbanization on an Indian village. In this case, the forces of cultural change have spread from New Delhi, India, into the surrounding rural communities.

During the year, Dr. Mead pursued a number of investigations tracing the development of cultural change in a New Guinean community she studied previously. This unique opportunity—a before and after comparison—promises to provide valuable insights into the dynamics of cultural change.

Whereas cultural change is usually a rather traumatic experience, proceeding under conditions of stress and pressures of Westernization, cultural evolution—another kind of change—is controlled by other factors. The nature of cultural evolution is a subject of great theoretical interest. Dr. Robert L. Carneiro, who for some time has been examining and analyzing this phenomenon, has already published on the subject and is currently continuing his researches along these lines.

Culture represents a way of life—a working arrangement that permits a community to continue and survive. What happens when a culture faces a major catastrophe? Does it adapt or disintegrate? The answers to these questions obviously depend on the nature of the catastrophe and the nature of the community. Although the cultural results of disintegrative forces is a vitally important topic, little is yet known about culture under such pressures. Dr. Turnbull, in the course of his field studies on the Ik in East Africa, found the tribe threatened by a major famine. The stress produced by the famine profoundly affected the culture of the Ik. During the summer, Dr. Turnbull returned to Africa to complete his research and

*Africa Surveyed: Through diorama and showcase, sound and lighting, the Hall of Man in Africa, which opened in June, 1968, explores and reveals the diversities of that sprawling continent. The diorama here depicts the Pokot people of the grasslands.*



accumulated the materials for a unique study of how culture is affected by disintegrative forces.

The problem of prehistoric contacts between Asia and America continued to occupy the attention of Dr. Gordon F. Ekholm. During the past year, Dr. Ekholm studied the possibility of cultural influences from Bronze Age China on the development of the Olmec culture of Mexico.

Dr. Junius B. Bird, in addition to his continuing study of ancient Peruvian textiles, studied the problem of the antiquity of man in the New World. In connection with this, he collected a representative series of crude lithic material on a field trip to Antigua, the West Indies.

The problems facing the modern cities of the world have become acute and threatening. In the last few years, most of us have become increasingly aware of the need for research to promote the understanding necessary to solve these problems. One aspect of this so-called urban crisis—the biological effect of urban conditions—is being studied by Dr. Shapiro. Two years ago, he undertook a pioneering investigation in this field by beginning a study of the effects of extreme overcrowding in Calcutta. During the summer, he returned to India to continue the study. An analysis of the data will begin shortly.

In addition to the Hall of Man in Africa, five other halls or exhibits on anthropology are in progress. Dr. Shapiro is completing work on the third and final section of the Hall of the Biology of Man. He is also working on the Centennial exhibit, Man and His Changing Environment.

Installation has begun for the Hall of Mexico and Central America, and construction is under way in the Hall of the Peoples of the Pacific. Dr. Walter A. Fairservis, Jr., began work on a new hall to be called Peoples of Asia. The hall will illustrate the prehistoric period, the early civilizations, the concept and spread of civilization, the character of each of the early civilizations, the traditional character of the various Asian civilizations, and the ethnography of mainland Eurasia.

During the year, 70 additions were made to the department's collections. Of these more than 50 were gifts.

Harry L. Shapiro, *Chairman*

## DEPARTMENT OF ASTRONOMY AND THE AMERICAN MUSEUM—HAYDEN PLANETARIUM

Paid admissions at the Planetarium's Sky Shows totaled 595,768, the highest in its 33-year history. Similarly, the number of schools attending the three daily school shows increased from last year's 3437 to this year's 3973. The number of children in attendance also scored another high. Last year, they numbered 172,184. This year, the figure rose to 199,862, and is expected to increase still further when the completion of the new Museum cafeteria expands the reservation capacity.

The diversity of our educational activities continued to meet the multiple needs of the community. Twenty-six programs were offered for adults, children, and teachers. Some were standard; others were offered for the first time. There was, for example, a special program on earth science for high school students. Its success has prompted us to explore possibilities for its continuation and for making use, in subsequent years, of the Lindsley Hall of Earth History, now under construction.

The Planetarium was fortunate to receive outside support for many of its programs. The New York State Council on the Arts granted funds for two teacher-education programs, a lecture laboratory for elementary school teachers, and a series of astronomy workshops for secondary school teachers. In addition, it continued its support of an intern program in Planetarium operation. Other financial aid was provided through National Science Foundation grants for a summer institute for high-ability high school students and for an in-service institute for secondary school teachers and supervisors.

As part of its policy of innovation, the Planetarium opened, during the past year, numerous discussions with both public in-

stitutions and private industry. Talks were begun with Long Island University and the New York State Aerospace Committee. The purpose of these meetings was to explore new ways to meet the educational needs of the community and, indeed, the entire metropolitan area. Staff members also met, and continue to meet, with Allied Chemical Corporation (Chemistry of the Stars exhibit) and North American Air Defense Command (Box Score of Satellites). The object of these discussions is to update several long-term displays.

Looking forward to the coming years, the Management Board of the Museum has approved the purchase of a Zeiss Model VI Projector, the latest and finest instrument available, far superior to our current Model IV. It will be installed in the fall of 1969. The future holds other innovations. We are now, for example, holding consultations in preparation for a complete conversion of the Copernican Theater into a projection theater with a capacity of 750 persons.

During the year the lower level was remodeled into a suite that includes five offices, a reception area, a kitchen-lounge, and a men's locker room. The temporary library room has been converted into a classroom; a storage and art preparation area has been made into a library stack room; and an interim third classroom is now a library reading room. Plans are now being drawn to renovate the Book Corner sales booth to accommodate increasing patronage. Mounting sales figures more than justify the improvement in the sales area. This year they were \$71,815.62 as compared with \$70,206.45 for the same period last year.

The following displays were featured in the exhibition areas during the year: 22 prize-winning pictures in the Planetarium's Second Annual Children's Art Contest; a collection of 42 space paintings by Chesley Bonestell; the National Aeronautics and Space Administration Space Theater; a telescope by Questar Corporation; a collection of camera equipment on loan from Ehrenreich Photo-Optical Industries, Inc.; material from the Leander McCormick Observatory of the University of Virginia; and a collection of astronomical instruments from the Adler Planetarium and Astro-



nomical Museum of Chicago. In remembrance of the first anniversary of the deaths of the three astronauts, Roger Chaffee, Virgil Grissom, and Edward White, a bronze plaque was installed, a donation by a group that wishes to be known simply as "Friends of Man in Space."

The library was used by 342 persons, and 1012 books were circulated to Museum personnel and students. Publications were exchanged with 186 foreign and 148 domestic planetariums and observatories, and more than 1000 reprints and pamphlets were received.

This past year, the Planetarium's staff added substantially to an already impressive list of publications. Dr. Franklyn M. Branley published three books, "The Earth," "High Sounds, Low Sounds," and "Floating and Sinking." He also published an article in a children's science magazine. Dr. Kenneth Franklin wrote an article which appeared in *Natural History*, and Mr. Martin Jay Steinbaum published two articles.

This year's promotional activities have penetrated a variety of media. The Planetarium has been featured on 40 radio and twelve television programs. A series of two-minute Starcaster featurettes is carried weekly by 62 stations in the United States alone and by others overseas. Following last year's successful "Man and the Universe" series, which alternated Museum and Planetarium staff members, WNYC-TV invited us to present a second series. In concert with *Natural History*, we have produced sixteen half-hour television programs which will be released in the fall of 1968.

Other promotional media were effectively utilized. Posters announcing the navigation course of the Planetarium were displayed in fourteen exhibition booths at the National Boat Show, and five Planetarium members led a summer series of public star-gazing sessions in Central Park. Our Dial-A-Satellite telephone service, which operates around the clock and provides a daily two-minute report on visible celestial events and man-made communications satellites, received 53,895 calls this year. This figure represents an increase of 20 per cent over last year's total.

During the summer of 1967, students of the Undergraduate Re-

search Participation Program under the supervision of Dr. Kenneth L. Franklin, contributed to the development of radio astronomy equipment at Kalbfleisch Field Research Station and also converted paper tape records of Jupiter radio activity to standardized coded numbers to facilitate an analysis of data. Additional research, largely carried out by Urban Corps students, decoded daily geophysical information on solar-terrestrial relations. It will now be possible to show the correlation of this work with reception of Jupiter's radio activity.

Franklyn M. Branley, *Chairman*

## DEPARTMENT OF ENTOMOLOGY

The most significant event in the department during the year was the appointment of Dr. Lee H. Herman, Jr., as Assistant Curator of Coleoptera. Dr. Herman, who joined the staff in September, has shown both talent and enthusiasm for his duties. These include responsibility for the department's extensive collection of beetles, now numbering more than 1,000,000 specimens, as well as for research on these animals.

Aided by a National Science Foundation grant, Dr. Jerome G. Rozen, Jr., undertook major field trips to Morocco, Trinidad, and southern Arizona in search of biological information and specimens of bees essential to his research. During the year, his paper "Review of the Biology of Panurgine Bees, with Observations on North American Forms . . ." was published. Although this paper represents Dr. Rozen's own part-time studies during only the last five years, it is nonetheless a compilation and synthesis of all the biological information published during the last century on this large and diverse subfamily of nearly world-wide distribution.

Even before publication, this work was a basis of additional ecological and behavioral studies of the subfamily by Dr. Rozen. He investigated the biology of the most aberrant of all panurgines, the African genus *Meliturgula*, on a visit to the Republic of South Africa in 1966. The same paper also formed the foundation for

his field investigations in April and May of 1968 into the biology of Moroccan panurgine bees belonging to the genera *Melitturga*, *Panurginus*, and *Panurgus*. The results of this most recent study will be the first biological investigation on any group of Moroccan bees. The ultimate purpose of the entire series of life-history studies on the Panurginae is to elucidate the phylogenetic relationships of the panurgine genera and to demonstrate the affinities of the Panurginae to other bees.

Toward the same end, Dr. Rozen is also pursuing other investigations. He is examining the interrelationships of the genera and sub-families by studying the immature stages of the bees—a field long neglected in evolutionary researches. His paper on the South African *Melitturgula* includes the first description of the immature stages of the genus. The Moroccan panurgines are currently being raised in the laboratory so that they, too, can be studied in the immature stages.

Support from the National Science Foundation made possible a varied field program for Dr. Willis J. Gertsch and also helped him in the preparation of several manuscripts. The venomous brown spiders, *Loxosceles*, demanded much of his time. More than 130 cases of necrotic spider bite, attributed to the brown recluse spider, *Loxosceles reclusa*, have been reported in the United States, and six deaths have been charged to it. Dr. Gertsch has begun a reappraisal of the North American fauna on the basis of large new collections and important distributional data. He has recognized at least four new species from the Bahama Islands, Baja California, and northern Mexico, to supplement the eighteen species previously reported in North America and adjacent regions.

The mygalomorph spiders also continued to receive Dr. Gertsch's attention. His discovery of a second species of *Chorizops* in northern Mexico was a noteworthy event. The spiders of this genus and of *Cyclocosmia* have leathery abdomens, truncated behind and forming a hard disk once thought to plug the entrance to the burrow. These are actually ctenizoid trapdoor spiders that dig superb burrows and cap them with thick, beveled, cork trapdoors made of

silk and soil. Dr. Gertsch discovered several additional species of *Ummidia* and studied various types from European museums.

Dr. Frederick H. Rindge devoted research time to revisionary studies on moths of the family Geometridae, of which he is the outstanding authority in the Americas. He completed his studies on the Nearctic genus *Stenoporpia*, of the tribe Cleorini, and is currently working on the genera *Hulstina* and *Pterotaea*. Dr. Rindge also completed a study of the moths of the subfamily Ennominae from Baja California, Mexico. These moths were caught by the Margaret M. Cary-Carnegie Museum Expedition of 1961. Dr. Rindge's subsequent paper is the first comprehensive report on these moths from this interesting geographical area.

Dr. Rindge is grateful to the National Science Foundation for its support of an extensive field trip to Wyoming and Colorado last summer. The specimens gathered on this trip and on previous ones aided by the National Science Foundation have been largely responsible for the growth of the Museum's large collection of moths and butterflies.

Dr. Pedro W. Wygodzinsky devoted most of his attention to two long-range projects. With the help of a National Science Foundation grant for the study of black flies (Simuliidae) of western South America, he and his field associates spent three months collecting in the high Andes of Colombia and Venezuela. In his laboratory, he supervised an extensive program of drawings for his black-fly research. Material taken at medium and low altitudes in the Eastern Cordillera of Colombia proved to be especially significant and aided the identification of black flies suspected of being vectors in an epidemic of Venezuelan equine encephalitis in the Cali area. His extensive collecting confirmed that the northern Andes is a prime center of diversity of this group of flies.

Dr. Wygodzinsky finished work on a second major project, a revision of the unique-headed bugs (Enicocephalidae) of the Western Hemisphere. These bugs comprise fourteen genera, of which eight are new, and approximately 70 species. He began a shorter paper on several new genera of New World Stenopodinae (Reduviidae).

In addition, he published three papers during the year. One of these, a study on the Andean and Patagonian subgenus of black flies, *Pternaspatha*, was prepared jointly with Dr. Sixto Coscarón of Argentina. It is particularly noteworthy in being the first revision of this little-known group.

Dr. Herman's research is concerned with the rove beetles, or Staphylinidae, of which the taxonomy and bionomics are poorly known for most groups. He has begun a study of all the genera of the subfamily Oxytelinae, which contains 1700 species. A manuscript dealing with a revision of the generic classification of the subfamily is in the final stages of preparation. This revision delimits problems in need of further study as well as enabling the development of hypotheses that concern relationships among genera.

Investigations on the taxonomy, behavior, ecology, distribution, immature stages, and evolution of the genus *Bledius* are already in advanced stages, *Bledius* is the largest genus of the Oxytelinae, with about 450 nominal species distributed throughout the world. Dr. Herman also has a manuscript in the final stages of preparation that reports the first record in the New World of a truly troglolithic species of staphylinid. This undescribed species from Tamaulipas, Mexico, also represents an undescribed genus.

The department's collections increased by 57,742 specimens during the year, bringing the grand total to 13,835,629. The acquisition of about 80 new insect cases, made possible by partial support from the National Science Foundation, will permit expansion of our ever-increasing world collection of butterflies and moths and enables the orderly growth of other parts of the collection.

Jerome G. Rozen, Jr., *Chairman*

## DEPARTMENT OF FOSSIL INVERTEBRATES

Top priority in the Department of Fossil Invertebrates has been given this year to the planning and executing of exhibits for the Lindsley Hall of Earth History.

This hall is an interdepartmental project, with substantial con-

tributions being made by this department and the departments of Mineralogy, Education, and Micropaleontology. Dr. Norman D. Newell, who directed and guided all scientific work on the hall, worked closely with the other contributors and the four outside consultants responsible for the design, fabrication, and installation of exhibits.

The hall will dramatically portray the scientific principles by which earth history is deciphered and will trace the dynamic processes involved in earth evolution. Architectural modifications of the hall were completed early in the year, and by June, 1968, 60 exhibits had been installed and virtually completed. Work is proceeding on schedule, and public showing is planned for the first days of 1969, the Centennial year.

After two decades of work, a large international project under Dr. Newell's direction is now in press. With some 1500 page proofs of text and illustrations, "Bivalvia" is a two-volume revision of the world's knowledge of the systematics and morphology of the bivalve mollusks, to be issued as part of the international "Treatise on Invertebrate Paleontology." Twenty American, British, and French scholars have contributed to the project.

Dr. Newell began work with Dr. Donald W. Boyd of the University of Wyoming on monographs of the earliest oyster-like bivalves of the late Paleozoic age, the Pseudomonotidae and the Myophoridae, which were the Paleozoic precursors of the modern *Trigonia*. Drs. Newell and Boyd did field work in Wyoming to obtain additional specimens needed in these two monographs. Two important collecting localities were discovered and exploited on a limited scale in the Wind River Mountains.

Dr. Newell also continued his studies of mass extinctions in the animal kingdom through the geologic past.

Dr. Roger L. Batten spent almost all his time working on the Lindsley Hall of Earth History. He was largely responsible for the procurement of specimens for display, and he made three collecting trips for this purpose. In addition, he provided the over-all design of several display cases, assisted in the design and research

on other exhibits pertaining to the principles of stratigraphy, and was consulted in the development of an exhibit in the Hall of Ocean Life.

Dr. Batten made two field trips during the year to the Allegheny Mountains of West Virginia and Kentucky, where he collected fossil mollusks from Carboniferous rocks. These expeditions have provided exceptionally important specimens for his research on the microscopic structure of primitive gastropod shells, and other material for the phylogenetic systematic studies of bivalves by Drs. Newell and Boyd.

Except for routine activities, the pressure of exhibition work displaced curatorial work during the year. Thus, the reorganization of the department's brachiopod collections, undertaken a few years ago with the aid of Dr. G. Arthur Cooper of the United States National Museum of the Smithsonian Institution, was deferred until more propitious conditions exist.

Two gifts for exhibition, totaling 37 specimens, were received from Mr. Camilo E. Juica of Chile and Mr. T. C. Nichols of Texas. Two loans of 1039 specimens for departmental research were obtained from Mr. E. S. Stumm and Dr. G. A. Cooper during the year. Sixteen outgoing loans totaling 384 specimens were made to other institutions.

As in past years, graduate teaching at the Museum was a major activity. Instruction was given to seven Columbia University graduate students in seminars, thesis guidance, and training in research methods. Two of the department students received the degree of doctor of philosophy at Columbia University and now hold university teaching appointments.

Norman D. Newell, *Chairman*

## DEPARTMENT OF HERPETOLOGY

Field and laboratory investigations combined to produce significant results in several projects during the year.

Dr. Charles M. Bogert discovered a new genus and species of

dwarf boa in a cloud forest of the Sierra Madre del Sur of southern Mexico. Boas and pythons were apparently well distributed early in the Tertiary, 50,000,000 to 60,000,000 years ago, but today only about 70 species exist. Roughly half of these are assigned to twelve genera represented in the Western Hemisphere, where sixteen of the species are restricted to the West Indies.

Prior to Dr. Bogert's discovery, the distributions of only four boas were known to extend into Mexico, where most of them inhabit the lowlands. The occurrence of a well-differentiated genus and species of dwarf boa in a cloud forest at an elevation of 6800 feet in the mountains of Oaxaca, therefore, was an astonishing discovery.

The discovery prompted Dr. Bogert to initiate a study of the dwarf boas of the Americas. Detailed comparisons with other boas revealed several distinctive peculiarities in the cloud-forest species, which resembles other dwarf boas of the Americas largely in having a specialized (tracheal) lung. Unlike all other members of the family Boidae, the dwarf boas have either lost the left lung or retain only a vestige of it. External vestiges of limbs, which consisted of paired spurs resembling claws, are found only on the males of other dwarf boas, but remnants of limbs were retained by the female found in Oaxaca.

While preparing an account of the newly discovered boa, Dr. Bogert extended the scope of his study to the only other genus (*Ungaliophis*) of dwarf boas previously known from Middle America. Quite unexpectedly, this subsidiary investigation shed considerable light on the affinities of an extinct snake known only from vertebrae found in Eocene deposits in Wyoming. Paleontologists had been unable to assign the species to any known group, but the characters of the fossil strongly suggest that small, secretive boas had evolved early in the Tertiary period.

Cloud forests, many of which have only recently become accessible, evidently merit more thorough exploration and study. One indication of what they can yield occurred when Mr. J. Stuart Rowley, while pursuing ornithological studies in the cloud forest



at the Isthmus of Tehuantepec, obtained several amphibians and reptiles as well. Mr. Rowley generously presented his collection to Dr. Bogert, and it soon became apparent that it contained several rarities, including the first green, prehensile-tailed pit viper known from this part of Mexico. Further investigation revealed that the pit viper differed from its nearest relatives in Chiapas and Central America, and it also became apparent that the species in Oaxaca warranted description as one of three well-defined species.

The main objective of Dr. Bogert's investigations in the Sierra Madre was to ascertain the role of interspecies competition in the evolution and dispersal of lungless salamanders of the genus *Pseudoeurycea*. Dr. Bogert was able to demonstrate that members of this group of salamanders normally avoid competition either by inhabiting separate regions or by exploiting different habitats in the same region.

Although Dr. Bogert concentrated on salamanders, he also assembled a collection that contained representatives of more than 50 genera. In addition to finding a new boa, he discovered the breeding habits of a frog, *Eleutherodactylus decoratus*. The frogs of this species, he found, deposit their eggs under rocks in wet environments. The first female discovered was resting on a clump of eggs, which proved to be on the verge of hatching. The day after the eggs were collected, the fully formed young began to emerge from the transparent membranes that had encased them throughout their development.

Dr. Richard G. Zweifel completed or continued several systematic and ecological projects. The object of one investigation was to determine the effect of temperature, body size, and hybridization on the mating calls of two species of toads. He found that a toad's body temperature has a marked effect on its mating call, and that, when the influence of temperature is taken into account, the nature of the call provides excellent evidence for the presence or absence of hybridization.

Dr. Zweifel also completed a study, based on the amphibians inhabiting arid regions in the Southwest, that was designed to reveal the adaptations of frog embryos to various levels of temperature.

Although some of the frogs he studied live in semi-desert environments, their embryos are not exceptionally tolerant of high temperatures. Those breeding in the potentially warmest habitats, Dr. Zweifel found, have unusually rapid embryonic development, so that the embryos pass the earliest, most sensitive stages of life before the full heat of the day reaches them.

Dr. Zweifel continued several studies of the ecology of amphibian and reptile populations at the Kalbfleisch Field Research Station. He also continued his investigations of the systematics of New Guinean frogs.

The department added 5579 specimens to its collection during the year and catalogued 6453 specimens. More than 4000 specimens were lent to other institutions.

Charles M. Bogert, *Chairman*

## DEPARTMENT OF ICHTHYOLOGY

Last year was a year of "beginnings." New research and curatorial programs were inaugurated; fresh starts were made on old projects. This year, the department's report is concerned mainly with statements of progress made on previously initiated departmental activities. Some of the progress has been steady and sure; some of it has resulted in major expansions; and some has led to new areas of interest.

The year's outstanding accomplishment, and one that has exceeded last year's highest expectations, is the development of a highly sophisticated, yet practical, information storage and retrieval system for the ichthyological literature of the world. Officially known as the Dean Bibliography and supported by funds from the National Science Foundation and an anonymous donor, the project will one day be incorporated into a Museum center for information on the cold-blooded vertebrates. It is already expected to produce its first tangible results during the coming year. The fall of 1969 will probably see an annual index and summary of the world's literature on fishes for 1968 stored in the computer facil-

ities of the Biosciences Information Service in Philadelphia; retrieved and printed-out by computer, according to methods worked out by this department; and sent out as a usable document to most ichthyologists here and abroad. The distribution of this initial print-out is expected to produce comments and recommendations. These will assist in providing a permanent, accurate, useful, and comprehensive index to current literature. The index, in turn, will continue to serve the future bibliographic needs of ichthyology and related disciplines. The project has been guided to this highly successful juncture by Drs. James W. Atz and Gareth J. Nelson with the support of their excellent staff of assistants.

Several members of the department embarked on active expeditionary work during the year.

Dr. Donn E. Rosen and Dr. Reeve M. Bailey continued their field investigations of Guatemalan fishes. They were successful in penetrating a hitherto uncollected river in the northern Petén which yielded important new fishes. This project continues to receive support from Mr. James C. Greenway, Jr.

Dr. C. Lavett Smith guided Cruise No. 10 of the Biological Survey of the Bahamas (Lerner Marine Laboratory). He collected, specifically, in the vicinity of Great and Little Inagua Islands, Mayaguana Island, and Samana Cay. The Biology Branch of the Office of Naval Research is supporting this survey.

Dr. P. Humphry Greenwood continued research into the cichlid fishes of the African lakes during the late spring. While there, he helped the local authorities develop sound fisheries programs of their own.

Various smaller collecting trips within New York State were undertaken during the past year by Drs. Smith and Nelson.

The research programs begun last year have already produced several important publications. Dr. Rosen, in collaboration with Dr. Colin Patterson of the British Museum (Natural History), completed a monograph of the fossil and recent representatives of a major section of the teleostean assemblage. This work was supported by the National Science Foundation.

A major review of publications on the behaviorial homology of

fishes has been submitted for publication by Dr. Atz. Dr. Smith significantly advanced his study on sexuality in fishes. He published a major contribution to the theory of hermaphroditism in an effort to explain the biological role of this form of reproduction. Funds from the National Science Foundation support these studies.

Dr. Nelson produced a large series of papers and completed a major monograph on the branchial organs of fishes. Included in the monograph are comments that relate this information to the larger problems of vertebrate classification.

Dr. C. M. Breder, Jr., published an important paper on the organization and survival value of fish schools.

As part of his continuing studies of African fishes, Dr. Greenwood published an important contribution on the biology of a small, fresh-water relative of the herrings. The paper greatly furthers current understanding of both the history and relationships of several major groups of teleosts.

Drs. Greenwood and Rosen have begun a collaborative study on the anatomy and relationships of the largest single group of fresh-water fishes. Included in the group are catfishes, carps, electric eels, and tetras. Dr. Rosen's work is supported by the National Science Foundation.

Several important papers on pigment-pattern inheritance and hereditary sex determination in fishes were published by Dr. Klaus D. Kallman.

During the past year, all members of the department have participated in educational activities. Dr. Rosen, as Adjunct Professor at the City University of New York, taught the fish section of a fall graduate course on the history and phylogeny of the vertebrates. Dr. Atz, as Adjunct Associate Professor at New York University, counseled two graduate students in their doctoral research. Drs. Smith and Rosen, as part of the Undergraduate Research Participation Program of the National Science Foundation, supervised the work of three students at the Museum and at the Kalbfleisch Field Research Station. Dr. Nelson has arranged to present an undergraduate course in comparative anatomy this fall at the Heights Campus of New York University.

The department is planning a study of the mesopelagic fish fauna of the ocean in collaboration with the Lamont Geological Observatory of Columbia University. This joint effort, scheduled for the fall of 1968, will be part of a larger program that has been conducted for some years by the Lamont laboratories on the vertebrate and invertebrate open ocean communities.

Finally, in preparation for the Centennial, members of the department have continued to work on the Hall of the Biology of Fishes and on the Hall of Ocean Life. The exhibitions are well advanced, and the opening of both is scheduled for late autumn or early winter of 1968.

Donn E. Rosen, *Chairman*

## DEPARTMENT OF LIVING INVERTEBRATES

Current investigations in the department primarily concern the composition and evolution of marine molluscan faunas found in the tropics of the New World; the ecology, life history, and taxonomy of free-living and parasitic worms; and the physiological processes that control growth and water metabolism in land crabs. During the year, the results of this research were published in 32 papers. Numerous other papers have been submitted for publication or are in the final stages of preparation.

Dr. William K. Emerson, in collaboration with Mr. William E. Old, Jr., continued an analysis of fossil and living marine mollusks of the Galápagos Islands. A number of mollusks, previously known only as fossils, were discovered to be still living in these insular waters. Several additional recent species were found to be new to science and are in the process of being described. One published paper resulted from this study, and a second report is in press.

Progress was made by Dr. Emerson on a monograph of fossil and living species of the molluscan gastropod genus *Morum*. A paper describing a new species of this genus from off Cocos Island, Costa Rica, was accepted for publication. In addition, at the annual meeting of the American Malacological Union at Pacific

Grove, California, Dr. Emerson presented a review of known representatives of these gastropods in the New World.

In collaboration with Mr. Anthony D'Attilio, Dr. Emerson initiated a long-term study of the radular and opercular characters of the marine gastropods of the family Muricidae.

During the past year, Mr. Old completed taxonomic studies on the collection of Recent amphineurid mollusks. He continued to study the archaeogastropod mollusks and, in collaboration with Mr. D'Attilio, began investigations of the Recent muricid gastropods of western Australia.

Dr. Dorothy E. Bliss and her associates, in their long-term investigations of the land crab *Gecarcinus lateralis*, are seeking to determine how the central nervous system controls several basic physiological processes and how such neuroendocrine control better fits this crab for life on land. With the support of the National Science Foundation, two phases of this research were completed during the past year. The first phase concerns the redistribution of salts and water within the land crab at the time when it sheds its shell. Dr. Bliss investigated this process in the live crab, while her collaborator, Dr. Linda Habas Mantel, worked with tissue that had been removed from the stomach of the crab and mounted in a perfusion medium. Dr. Mantel was able to determine the movement of salts and water across this isolated tissue with the use of radioisotopes.

The second phase was a biochemical analysis of the blood and stomach fluid at various stages of the intermolt cycle and after surgical removal and reimplantation of several neuroendocrine centers. In this work, Drs. Bliss and Mantel were aided by Miss Stefanie M. E. Wang and Mr. Edwin A. Martinez, both research assistants working under a National Science Foundation grant, and Mr. Roger Rodriguez, a college student enrolled in the Urban Corps. Dr. Bliss and her associates also made progress in determining the physical and chemical properties of the hormones controlling color change and those regulating molting and limb regeneration.

A three-day symposium on the adaptations of crustaceans for life on land was organized by Drs. Bliss and Mantel for the Division of Invertebrate Zoology of the American Society of Zoologists. Both Dr. Bliss and Dr. Mantel presented papers at this symposium, which brought together from this country and abroad more than 30 specialists in crustacean anatomy, physiology, and behavior. The administration of the Museum was host to this group at a reception and dinner. The symposium proceedings, edited in large part by Drs. Bliss and Mantel, will be published in *American Zoologist*.

Dr. Ernst Kirsteuer made notable progress on two major projects. The first is on the systematics, anatomy, and ecology of the nemertean worms from the Indian Ocean and the Red Sea. The second concerns marine worms, such as the Nemertini, Gnathostomulida, and Archiannelida, from the Caribbean Sea. The National Science Foundation approved a proposal to expand research on these poorly known invertebrates. During the year, Dr. Kirsteuer published two papers resulting from his studies, and five additional reports were accepted for publication. Also, his investigation at the Lerner Marine Laboratory of nemertean and gnathostomulid worms resulted in the presentation of a paper at the International Symposium on Coastal Lagoons at Mexico City.

With support from the National Science Foundation, Dr. Horace W. Stunkard continued with a research program designed to advance knowledge of the morphology, physiology, life histories, larval stages, and systematics of parasitic worms.

Because of illness, Dr. Libbie H. Hyman retired from all scientific activity in the early part of the year.

Other staff members report progress in their studies. Dr. William J. Clench worked with pulmonate gastropods; Dr. John D. Soule, with bryozoans; and Dr. Donald F. Squires, with stony corals. Mr. Morris K. Jacobson and Mr. D'Attilio advanced their studies of the mollusks. Mr. D'Attilio also progressed in his investigation of the muricid gastropods and collaborated in some studies with Mr. Old. Mr. Jacobson and Dr. Clench completed two monographs on the Cuban Helicinidae. Mr. Arnold Ross, a Museum

Technician, continued to study living and fossil barnacles of the Western Hemisphere and Antarctica.

Valuable additions to the collections were received through donations, exchanges, and purchases. Approximately 42,000 specimens were catalogued and placed in the systematic collections. Several notable acquisitions of rare mollusks were made possible by income received from the Beatrice S. Procter Fund. Generous financial support was received from Mr. and Mrs. Francis Harmon, Mr. Flynn Ford, and Mr. Jacobson.

Two major exhibitions, "Structure and Classification," under the scientific direction of Dr. Kirsteuer, and "Continuity in Life," under the supervision of Dr. Mantel, opened this spring in the Hall of the Biology of Invertebrates. The scientific script for an exhibition on the adaptations of invertebrates is being prepared by Dr. Bliss, Dr. Mantel, and Miss Rose Cupaiuolo, a coordinator for the exhibition program. Dr. Emerson continued to supervise the installation of exhibits on invertebrates for the Hall of Ocean Life.

William K. Emerson, *Chairman*

## DEPARTMENT OF MAMMALOGY

The growth of human populations and the increase in scientific activity in the world have produced both problems and benefits for nearly all fields of science. In mammalogy, perhaps more than in some other areas of natural history, there has been a tremendous growth of information in the form of scientific literature and a corresponding increase in demands for solutions to specific problems. Although technological developments have generally been rather slow in reaching the natural historian, the Department of Mammalogy devoted considerable attention during the year to adapting these advances to the problems of communication, research, and analysis in mammalogy. Data retrieval, computeriza-

*This 94-foot whale, shown under construction, to be hoisted aloft will dominate the largest exhibition area in the Museum: the new Hall of Ocean Life.*





tion, automatic measuring devices, and mammal-detection equipment were some of the areas investigated.

The department's mammal collection of more than 200,000 specimens from all parts of the world is the subject of research not only by the staff, but also by many visiting scientists and correspondents. In order to provide quick information about the collection, the department developed a data-retrieval system in 1966. Today, nearly a million items of information are retrievable in various combinations. This year, when the data input is completed, the department will have the first extensive data-retrieval system being used for any large collection of mammals. The system itself was the subject of a paper that was published in *Curator* by Drs. Richard G. Van Gelder and Sydney Anderson.

The department has continued to publish quarterly lists of "Recent Literature" in the *Journal of Mammalogy*. At present, about 2000 titles appear in these lists as bibliographic references, including author, title, date, and publisher. In many cases, however, the title is not sufficiently explanatory to serve as a direct reference to information. Therefore, to increase the utility of the lists, the department undertook a pilot study to cross-index the literature of 1968, using the equipment and system developed for specimen-data retrieval. About 25 mammalogists from various parts of the world are assisting the department in evaluating the system's suitability. Dr. Anderson outlined the categories to be referenced, and Dr. Van Gelder attended meetings in Mexico and New York dealing with the problems scientists encounter in planning data-retrieval systems.

Although the two retrieval programs now used by the department both scan 10,000 items at a time, they are not electronic. At the present level of use, a change-over to electronic systems does not seem warranted, but, anticipating future needs, Drs. Van Gelder and Anderson began a study of electronic-computer capabilities for information retrieval and research.

For his long-term research project on the hog-nosed skunks of South America, Dr. Van Gelder used a small desk-top computer the department obtained in 1967. Later, in collaboration with Mr. D. M. Vincent Manson of the Department of Mineralogy, he sub-

jected his data to complex analysis by a large, high-speed computer. The results of this analysis, entitled "The Genus *Conepatus* (Mammalia, Mustelidae): Variation Within a Population," were published in the *American Museum Novitates* series. Dr. Anderson also used both the small and the large computer to analyze data for his study of the mammals of Chihuahua, Mexico. One digression on the wood rats of Chihuahua was subjected to a highly sophisticated analysis designed by Mr. Manson. This study, entitled "Taxonomic Status of *Neotoma albigula* (Rodentia) in Southern Chihuahua, Mexico," was submitted to the University of Kansas for publication.

Because many of the Museum's departments are increasingly using the small computer, the administration provided the staff with access to a large computer via a teletype machine. The department is developing programs designed to use this new facility. One program being considered would provide an automatic question-answering service for Museum visitors.

The ability of computers to analyze large quantities of data quickly and accurately has led to the need for equipment that would enable a mammalogist to gather data more rapidly and more broadly. Most of the mammalogical work done at the Museum involves taking measurements, usually to one-tenth of a millimeter, of various dimensions of skulls and teeth. This year, Dr. Anderson devoted considerable attention to the development of a semi-automatic measuring device for craniometry. This instrument includes a movable microscope stage and a transducerized conversion from the mechanical measurements of calipers to a precise electrical readout to one one-hundredth of a millimeter. Progress was also made in converting an electric typewriter to record the measurements. Dr. Anderson used this equipment in his study of Chihuahuan mammals and published a paper in the *Journal of Mammalogy* describing the measuring system. The equipment was also used by Dr. Guy G. Musser in his research on several groups of rodents and shrews from Celebes.

Dr. Van Gelder investigated the feasibility of using infrared sensors to find living mammals in the field. During the winter he visited the Kalbfleisch Field Research Station to attempt to find deer by their radiated heat. The equipment, although extremely

sensitive, was unable to sense the animals, probably because the deer themselves are extremely well insulated and were not radiating heat noticeably from their bodies. During the summer, with the assistance of Miss Graciela Carreno of the University of Miami, National Science Foundation Undergraduate Research Participation Program Trainee, Dr. Van Gelder continued his long-range population studies of small mammals at Kalbfleisch.

All members of the staff made additional progress on other long-term studies. Dr. Karl F. Koopman visited European museums to study African bats for his research on the bats of the Sudan, which is now two-thirds completed. He published one paper on the southernmost bats, and submitted another, on the taxonomy and distribution of bats in the Lesser Antilles, to *American Museum Novitates*.

Dr. Anderson's extensive research on the taxonomy and distribution of the mammals of Chihuahua, Mexico, is nearly completed, Mr. George G. Goodwin's manuscript on the mammals of Oaxaca, Mexico, is in press, and Dr. Musser's revision of the tree squirrels of Mexico was submitted to the University of Michigan Museum for publication. Mr. Hobart M. Van Deusen published a note on the carnivorous habits of the African bat *Hypsignathus monstrosus* in the *Journal of Mammalogy* and made considerable progress on a number of papers on Australian and New Guinean mammals.

During the year Dr. Van Gelder and Miss Elizabeth A. Fryatt devoted considerable attention to various exhibition projects, especially to the Hall of Ocean Life, now nearing completion. Plans were also formulated for the renovation of the Hall of the Biology of Mammals and the Mammals of New York State exhibit.

Richard G. Van Gelder, *Chairman*

## DEPARTMENT OF MICROPALAEONTOLOGY

In order to fulfill the growing needs of industry and education, current activities of the Department of Micropaleontology have become increasingly diversified. The department has continued to pub-

lish the monumental "Catalogue of Foraminifera" and "Catalogue of Ostracoda"; issued the first of a three-volume work, "Catalogue of Index Smaller Foraminifera"; and made rapid progress on a computerized data-storage and retrieval system. The department is also expanding its teaching program and continuing its exhaustive bibliographic search of the literature. The publication of a new series of catalogues (devoted to other microfossil groups) is under consideration.

The first two "Catalogues," both containing data and illustrations of the many thousands of species and genera described in the literature, are continually up-dated as new material is published. Collectively, they are the result of departmental research on taxonomy, nomenclature, ecology, and the stratigraphic significance of foraminifera and ostracodes. At present, 69 volumes (each of approximately 700 pages) make up the "Catalogue of Foraminifera." The "Catalogue of Ostracoda" consists of 27 volumes. Each series is expanding at the rate of three volumes per year.

Because the information contained in these "Catalogues" is so voluminous, the department decided to issue a series that would contain only illustrations, bibliographic references, geographic occurrences, and stratigraphic ranges of the so-called index foraminifera. Since these species are restricted to geologic ages, and have wide geographic distribution, they are most useful to geologists. Completely objective, the publication of these volumes would eliminate the need for a field geologist or a small university library to acquire thousands of obscure publications.

In accordance with this aim, a three-volume work, the "Catalogue of Index Larger Foraminifera," was published between 1965 and 1967. During the year, the department issued the first volume of its companion set, the "Catalogue of Index Smaller Foraminifera." The book consists of data on some of the geologically oldest foraminifera (Paleozoic species), as well as information on planktonic foraminifera of Cretaceous age. Editorial work on the remaining volumes has been finished, and press time has been allocated for their production.

The past several years have brought such a rapid increase in the amount of paleontological literature that new methods must be de-

veloped to cope with it. Accordingly, the department has begun work on a computer-based storage and retrieval program that will organize micropaleontological data. The American Geological Institute and the National Science Foundation have actively supported the project which, during the past year, has prepared a manual to standardize computer input. Moreover, as liaison between the American Geological Institute and other institutions involved in data retrieval, the department aims to insure that the system, once developed, will anticipate the needs of all participants; extend the usefulness of foraminifera and ostracodes in pure and applied science; and serve as a guide to other branches of paleontology. Moreover, such a system will ideally increase the usefulness of the "Catalogues" and provide a new tool in micropaleontology.

In its role as educator, the department continues to offer accredited courses in micropaleontology for students from Rutgers University, the College of the City of New York, and Hofstra College. As a bibliographer, the department catalogued more than 1100 papers on the various phases of micropaleontology.

The department maintains a collection of type specimens and samples from throughout the world. The past year saw the acquisition of 542 faunas from such ages as the Silurian, Jurassic, Cretaceous, Tertiary, and Recent. European and Russian localities contributed the bulk of specimens, and our depository now contains perhaps the most extensive collection of Russian samples in this hemisphere. In the future, the department hopes to mount a ten-year program to collect complete measured sections from the type localities of all major stratigraphic units.

The department continues to assemble exhibition material for display in the new Lindsley Hall of Earth History. These exhibits will include both specimens of lesser-known microfossil groups and greatly enlarged photographs of these specimens.

Finally, the staff continues to publish the quarterly journal *Micropaleontology*, considered to be the leading professional journal in its field.

Angelina R. Messina, *Acting Chairman*

## DEPARTMENT OF MINERALOGY

Our solid earth is, in reality, no more than a fragile outpost, occupying one small region in our solar system and lost in some far corner of space. Notwithstanding man's seeming infinite capabilities, his existence is for all practical purposes even more restricted, confined as it is to the surface of the earth, a shallow depth beneath it, and brief encounters with the space above. The future destiny of all mankind is, therefore, inseparable from the need for an enlightened understanding of the nature of the physical world and the abundance and distribution of the natural resources to be found on it.

Mr. D. M. Vincent Manson is continuing his investigations of empirical chemical variations in meteorites and terrestrial rocks. These studies provide an insight into the historic development of the earth and all its features. They also illuminate the changes that result from man's interaction with his environment, and facilitate a recognition of limiting conditions that may affect man's future survival. As part of this research, highly successful new methods of computer analysis of geologic data have been developed. Considerable effort has been devoted to the development of a computing facility at the Museum. Progress has been made to the point where a remote terminal in the Museum with direct connections to a computer is now operating successfully.

Field expeditions undertaken during the past year to acquire material for collections and exhibits in the course of preparation were highly successful. A two-week expedition on the Colorado River through the Grand Canyon was most notable and emphasized the fact that there is no finer laboratory or classroom than the great outdoors itself.

Collaboration with many other institutions continued, both in research and in the provision of material from the department's world-famous collections.

The department has an active role in education. Urban Corps students are provided with on-the-job training in many areas of mineralogy. Teaching collections of geologic materials have been prepared for several institutions. Mr. Manson gave an adult edu-

cation lecture series in the spring and delivered lectures at several universities. He also attended three meetings of professional societies, presented numerous talks to amateur groups, and participated in several radio and television programs.

Considerable time and energy have been devoted to current exhibition programs. A very rewarding special exhibit, "The World Beneath Our Feet . . . Minerals," was installed and opened on October 1, 1967, in the Corner Gallery. Noticeable progress is apparent in the Lindsley Hall of Earth History, where, in conjunction with other departments in the Museum, the design, preparation, and installation of exhibits graphically portraying 4,500,000,000 years of earth history is proceeding on schedule. Advice has also been provided in the preparation of exhibits for the Hall of Ocean Life and the Hall of the Biology of Invertebrates.

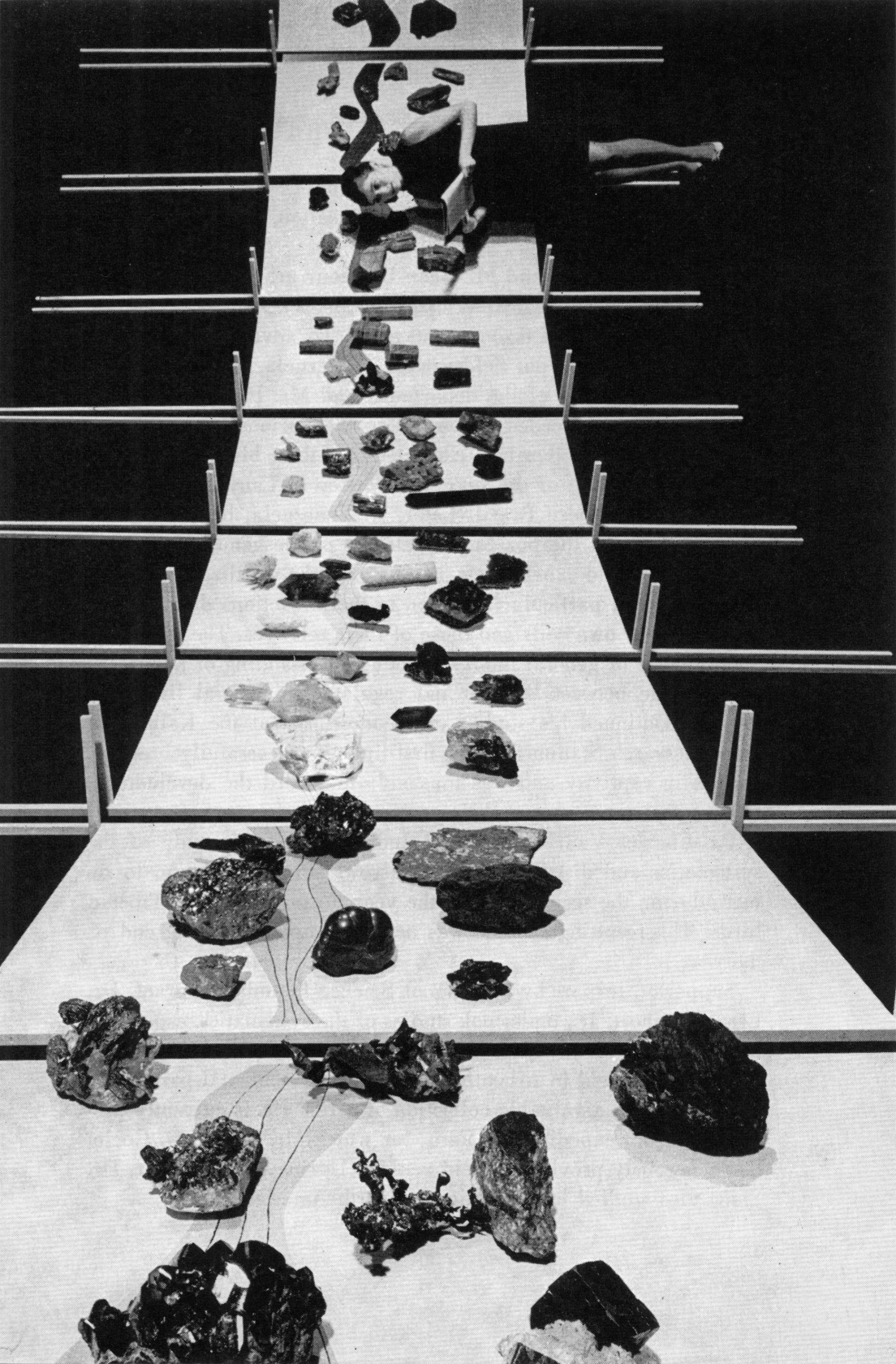
The Morgan Memorial Hall of Minerals and Gems remains closed to the public during the installation of the Lindsley Hall of Earth History. Countless queries from the public as regards the date of completion of renovations in this most popular exhibition area encourage the department in its continued preparation of plans for the new exhibit.

The updating of catalogues, the maintenance of collections, and the handling of routine inquiries and identifications for the public are activities that prove very demanding on the time of a two-man department. Six hundred specimens of minerals, gems, and meteorites were added to the collections, including important suites of minerals from Panesqueira, Portugal, and Tsumeb in South West Africa. An active acquisition program is followed to insure the continued prominence of the collections of the department in the scientific world.

D. M. Vincent Manson, *Assistant Curator*

*A flow of minerals in an evolutionary sequence of more than 3,000,000,000 years of earth history confronts the visitor to "The World Beneath Our Feet . . . Minerals," an exhibit in the Corner Gallery.*





## DEPARTMENT OF ORNITHOLOGY

Through field and laboratory work, the Department of Ornithology advanced knowledge of the classification, evolution, and behavior of birds.

Dr. Dean Amadon and Mr. Jean Delacour are preparing a general work on the tropical American game birds known as curassows. This study focuses on ecology and habit. To advance this project, Dr. Amadon carried out field work in Venezuela, accompanied by Mr. G. Stuart Keith of the department and Mr. Paul Schwartz of Caracas. They succeeded in observing the curious wing-whirring display flights and other behavioral traits of these birds.

At the beginning of the year, Dr. Wesley E. Lanyon visited Argentina and southern Brazil. Later, in Venezuela, he studied the biosystematics of the puzzling flycatchers of the genus *Myiarchus*. By means of field experiments, he analyzed the vocalizations of the birds and paid particular attention to their reactions during playbacks of their own calls and those of their relatives. The results he obtained are of general interest in our understanding of how birds discriminate between species and regulate their social lives. Dr. Lanyon continued his studies of meadowlarks at the Kalbfleisch Field Research Station. For the first time, he successfully bred the species in captivity and was thus able to record the development of the vocal repertoire of their young.

Dr. Charles Vaurie completed and published his study of the systematics and distribution of curassows which freed him to return, during the second half of the year, to his studies of Tibetan birds. The resulting volume was nearly completed by the end of the year.

Supported in part by a National Science Foundation grant, Dr. Lester L. Short, Jr., undertook studies of the systematics, especially hybridization, of woodpeckers. Assisted by Mr. Richard S. Crossin, he was in the field in Argentina where, as an incidental part of his work, he made a valuable collection of birds. He is currently preparing for an expedition to Peru, for which Mr. Robert G. Goelet has generously provided a field vehicle. During the past year, Dr. Short also studied hybridization in North American birds.

During the course of his curatorial activities, Mr. Charles E. O'Brien found three specimens of a Brazilian bird, *Embernagra longicauda*. The only other specimen in existence was collected more than a century ago.

Mr. Eugene Eisenmann, as Chairman of the Check-list Committee of the American Ornithologists' Union, was involved with the systematics of North American birds. His election to the International Commission on Nomenclature and as Vice-President of the American Ornithologists' Union reflects his expertise. Through his efforts, the department has secured specimens of several little-known birds from Panama.

Dr. Robert Cushman Murphy continued work on his monograph of the petrels and albatrosses. Dr. Murphy, Mr. Eisenmann, and Mr. Keith have become actively involved in conservation work. Mr. Keith, as his chief research project, is preparing several reports on African birds.

Mr. John Bull progressed significantly on his book on the birds of New York State, and equally good progress was made by Mr. James C. Greenway, Jr., who is immersed in the time-consuming task of listing and evaluating our type specimens of birds. Mr. Crawford H. Greenewalt has carried out some very basic studies of the anatomical and biophysical mechanisms of bird song, and the project has grown to book proportions.

The Natural History Press edition of "Handbook of New Guinea Birds," co-authored by the late Dr. E. T. Gilliard and by Dr. A. L. Rand, of the Field Museum of Natural History in Chicago, appeared during the year. As a result of the joint efforts of Mr. James C. Greenway, Jr., who wrote a report on the collection from Batanta Island, and Mrs. Mary LeCroy, the results of Dr. Gilliard's New Guinea collections are now almost completed. A grant from the Smithsonian Institution training program made possible the full-time employment of Mrs. LeCroy during the year.

Several members of the department have become involved in formal graduate instruction to be offered at the Museum. Dr. Lanyon made a beginning when he taught part of a graduate course at the University of the City of New York. In order to engage fully in such valuable activities, however, the department's laboratories

on the sixth floor must be completely renovated. Soon, efforts to secure the necessary funds will begin. Meanwhile, thanks to the untiring efforts of Mrs. W. Allston Flagg, the Audubon Gallery has been beautifully arranged.

Until the department can expand its own educational activities, the Frank M. Chapman Memorial Fund continues to assist many graduate students and a few post-doctoral fellows. At its March, 1968, meeting, the committee administering this fund passed on 60 applicants from all parts of America and from several nations abroad. About 40 were given aid. In this way, and by assisting the constant influx of scientists who came to study the collections, the department strives to make the Museum's Department of Ornithology of maximum service to this branch of natural history.

Dean Amadon, *Chairman*

## DEPARTMENT OF VERTEBRATE PALEONTOLOGY

The most outstanding event of the past year was the merger of the Frick Laboratory with the Department of Vertebrate Paleontology. The assets (amounting to \$7,000,000) of the now dissolved Frick Corporation were transferred to the Museum; \$2,000,000 from these funds have been set aside for the construction of the new Childs Frick Wing. The new building will house the fossil mammal collection and provide space for the offices and laboratories of the department. The remaining assets have been added to the Frick Laboratory Endowment Fund, the income from which will be used to pay the salaries and benefits of former Frick Laboratory employees who are now in the department or who are retired. It will also provide funds for the preparation of the 250,000 specimens now in the Frick Collection as well as for field work to complete and refine documentation; for cataloguing; and for research and description of these and additional specimens.

Dr. Bobb Schaeffer continued his studies on Triassic and Jurassic fishes from western North America, and on the braincase of the more primitive ray-finned fishes. He completed two papers. One, on the basic radiation of the higher bony fishes, was read at

a Nobel Symposium in Stockholm. The other, on the vertebrae of bony fishes, was presented at a meeting of the Linnean Society in London.

Dr. Edwin H. Colbert was involved in the description of several rare carnivorous dinosaur skulls, and gathered additional data for the classification of these reptiles. His most exciting project was the identification and study of a Triassic amphibian jaw fragment found within 300 miles of the South Pole. This is the first fossil tetrapod from the Antarctic continent and supports the theory that the southern continents were once one land mass. During the fall, Dr. Colbert participated in several meetings and field excursions in South America concerned with continental drift and Gondwanaland.

Dr. Malcolm C. McKenna's studies on fossil insectivores have demonstrated that true Old World hedgehogs were present in North America during the Miocene and Pliocene epochs. As a result of field work in various parts of the Rocky Mountain region, he has become involved in several stratigraphic and faunal studies that will shed additional light on the history of the early mammals of this area.

Dr. Richard H. Tedford has divided his time between investigations of fossil marsupials (mostly kangaroos) from Australia, and a long-range study of the Carnivora. The latter has resulted in the discovery that the eared seals and the walruses arose from the bears and that the true seals evolved from the mustelids (skunks, minks, and others) during the late Oligocene. During the fall, Dr. Tedford and Dr. Leonard B. Radinsky made a trip to Afghanistan to search for early Tertiary mammals. Although unsuccessful in this objective, they did discover some Oligocene and Miocene mammal localities, as well as some late Cenozoic sites with important rodent remains.

Mr. Morris F. Skinner amplified his detailed review of the genera of fossil horses, based mainly on the Frick Collection. He also completed papers on chalicotheres and on mammal-bearing deposits in Sioux County, Nebraska. He is currently preparing several other stratigraphic reports related to the Frick Collection.

Mr. Ted Galusha continued his stratigraphic interpretations of

the Tertiary Santa Fe Group in New Mexico, and will soon publish his findings in a completed report. In addition to several other projects involving both field and laboratory studies, he has been investigating the origin of the living cat genus *Felis*. He is also comparing the cats of the Pleistocene of the Old World with those of the New World.

Mr. Beryl E. Taylor has been engaged in various studies of the superlative fossil camel material in the Frick Collection. One paper on this group has been completed, and others are in progress. The removal of the camel collection (approximately 30,000 specimens) from the Frick estate at Roslyn, Long Island, involved much of the time of Mr. Taylor, Mr. George Krochak, and Mr. Otto Simonis of the department. About 50 per cent of this material was organized, labeled, and transported to the Museum.

Activities related to the graduate training program in vertebrate paleontology, carried on in collaboration with Columbia University, continued to be an important departmental activity. Fourteen students were enrolled in Dr. Schaeffer's fall semester on the history of the fishes, and twelve in Dr. Colbert's spring session on the history of the amphibians and reptiles. One student completed requirements for his doctoral degree, and four students are currently engaged in doctoral research under the direction of the department staff.

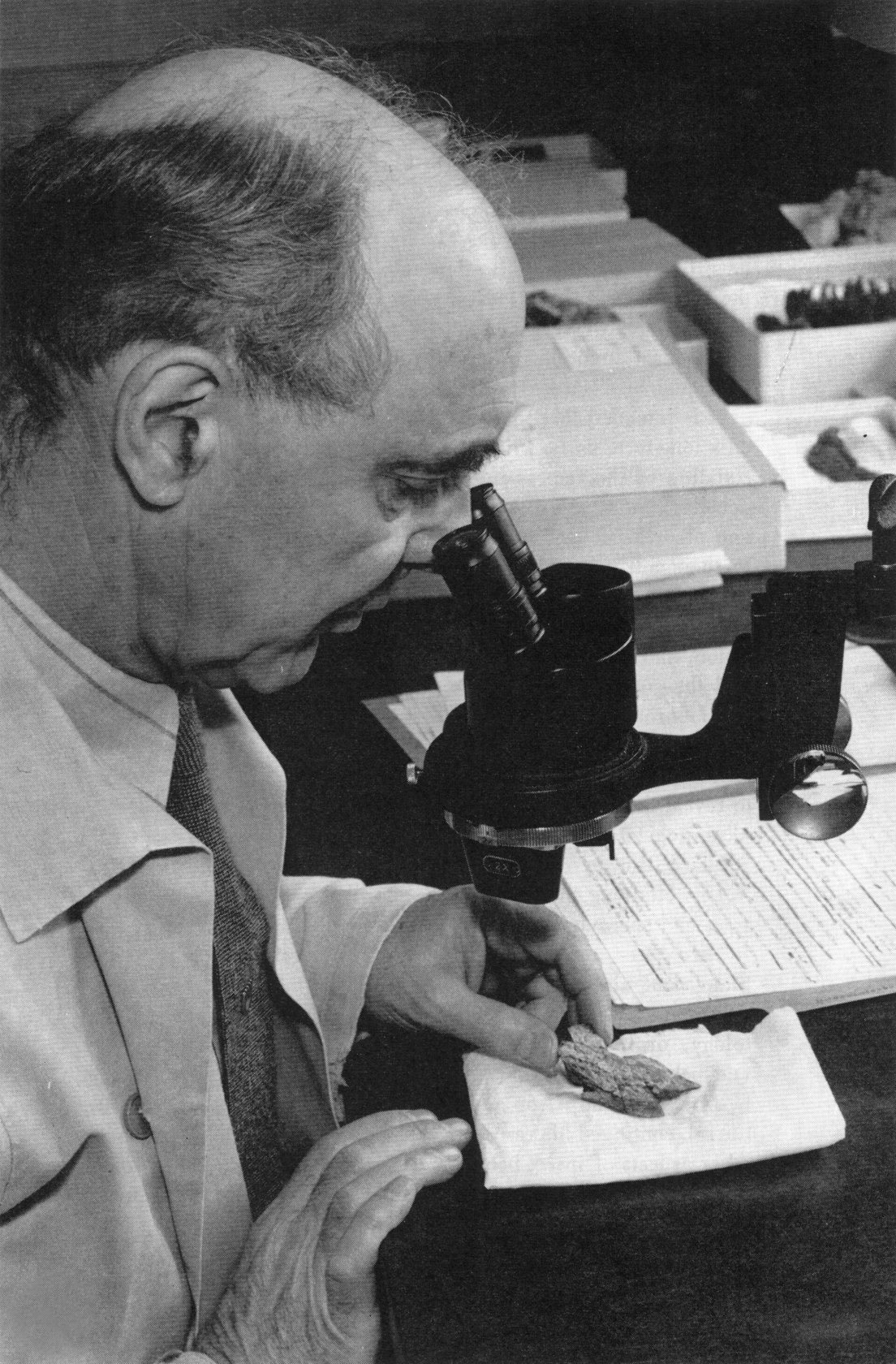
Bobb Schaeffer, *Chairman*

## SPECIAL ACTIVITIES

### ARCHIBOLD BIOLOGICAL STATION LAKE PLACID, FLORIDA

The Archbold Biological Station, which in the past has served chiefly as a research base for visiting investigators, expanded its scope of activities this year with the inauguration of a research

*Dr. Edwin H. Colbert, Curator in the Department of Vertebrate Paleontology, identified this Antarctic fossil as a jawbone of a large Triassic amphibian. The fossil lends support to the theory that the southern continents were once one land mass.*





program by the resident staff under the direction of Dr. James N. Layne.

The primary emphasis of the new program, which encompasses both field and laboratory investigations, is on the ecology of south-central peninsular Florida. The initial phases of the field work have involved the classification and description of the habitats of the station, as well as various aspects of the ecology, physiology, and behavior of vertebrates in the area. Mammals are receiving the greatest attention in these studies, but fishes, amphibians, reptiles, and birds are also included.

It is intended that many of the field projects will be conducted on a long-term basis, with the objective of obtaining a better understanding of the factors influencing habitat orientation, population density, spatial and chronological activity pattern, breeding cycles, and other aspects of the biology of important species. In addition to their intrinsic value, such data will contribute to an over-all knowledge of the ecosystems represented on the station.

Metabolic patterns, water relationships, behavioral thermoregulation, and activity cycles of two mice species (the Florida mouse and the cotton mouse) of the genus *Peromyscus* were studied in the laboratory by Dr. Layne. These species differ markedly in geographic range, habitat, tolerance, and many other features of ecology and life history. The present investigations are designed to reveal the extent to which these differences are related to specific physiological and behavioral factors. In collaboration with Mrs. Alicia V. Linzey of the University of South Alabama, Dr. Layne is also studying the comparative morphology of the male genital tract and spermatozoa of the genus *Peromyscus*.

Forty-three investigators from 20 institutions in the United States and abroad carried on research at the station during the year. Their study areas included entomology, arachnology, herpetology, ornithology, mammalogy, parasitology, geology, ecology, and behavior. Dr. Thomas Eisner of Cornell University, assisted by Mrs. Rosalind Alsop and Messrs. Daniel Aneshanslet and James Carrel, continued his research on chemical defense mechanisms and other aspects of insect behavior. Details of the defensive secretions of the bombardier beetle and the grasshopper *Romalea* were worked



out. In addition, experiments were conducted on the grip strength of the highly specialized tarsi of a small chrysomelid beetle, *Porphyraspis*, that clings tightly to palmetto fronds; and on the function of the trash-carrying behavior of certain chrysopid larvae. Another of the several projects continued by investigators was the study by Dr. Frank E. Kurczewski of the State College of Forestry, Syracuse, New York, of the relationship between temporary nest-closure activity and sand-surface temperature in the wasp *Tachysphex similis*.

Of particular interest among the new projects begun at the station this year was a study of the insects associated with the groundsel tree, *Baccharis halimifolia*, by personnel of the Department of Lands, Queensland, Australia. The groundsel tree, which is native to North America, has been introduced into Australia and has become a serious pest in the coastal and subcoastal regions of southern Queensland and northern New South Wales. Observations and the testing of insects found on the groundsel tree in Florida are taking place, to discover species of potential value for biological control of the plant in Australia. The work thus far has produced several likely candidates. Mr. William H. Haseler was associated with this project from July through November, and Mr. George Diatloff arrived at the station in March to continue the investigation.

In addition to visiting investigators, the persons who visited the station during the year included 20 scientists from thirteen institutions, and thirteen groups, totaling 462 persons, of students and teachers from various universities, colleges, and secondary schools.

The remodeling and equipping of a laboratory for physiological and behavioral studies, and the construction of a small-animal facility in connection with the station's research program, were among the significant changes in the physical plant this year. Additions were made to all reference collections. The greatest expansion occurred in the fish and herpetology collections, to which many specimens of local species not previously represented were added. To facilitate the use of each collection, card catalogues were prepared.

More than 100 books and several hundred reprints were added to the station library, and the number of serials received increased

from about 30 to more than 50.

Three papers were published by the staff this year, and four others are in press. In addition, nine publications based on work done at the station by visiting investigators were published.

Richard Archbold, *Resident Director*

**GREAT GULL ISLAND**  
**LONG ISLAND SOUND, NEW YORK**

Field work on Great Gull Island progressed satisfactorily, with nearly 20 volunteers participating in a variety of projects. One of these projects involved the color banding of 1342 adult terns and several hundred young ones. This was done after special permission was obtained from the Fish and Wildlife Service to color band nesting species so that individual birds would be recognized in the field.

Within the past ten years, the vegetation change on the island has limited the areas suitable for nesting terns. To combat this spread of vegetation, measures were taken that included pulling out a portion of dense beach grass and spraying poison ivy.

The rainy season pointed up the inadequate shelter afforded by the buildings, which are now in disrepair. An effort to correct this situation was begun by several volunteers, who fixed the roof of the one "community" building as well as portions of the dock.

Catherine M. Pessino, *In Charge*

**KALBFLEISCH FIELD RESEARCH STATION**  
**HUNTINGTON, LONG ISLAND, NEW YORK**

The current year marks the tenth anniversary of operation for the Kalbfleisch Field Research Station, a field laboratory for Museum staff research and a center for the training of young scientists in animal behavior and ecology, evolutionary biology, vegetation studies, and radio astronomy.

An interdisciplinary approach by Museum staff specialists in these fields, a continuity of prescribed land use, an environment

free from real estate development and vandalism, and a location within reasonable commuting distance of the Museum all make Kalbfleisch uniquely suitable for these pursuits.

Eight staff members utilized the station's facilities during the year, with a primary emphasis on long-term studies of the population ecology of vertebrate animals and of the succession of vegetation of abandoned farmland.

Dr. Wesley E. Lanyon and Dr. Richard G. Van Gelder studied the responses of bird and mammal populations to the succession of vegetation on abandoned farmland. Dr. Richard G. Zweifel continued his research on the comparative growth and survival of several species of amphibians and reptiles. Dr. Donn E. Rosen studied the factors that determine the relative rates of colonization among egg-laying and live-bearing fishes.

Dr. Max K. Hecht studied the ecology of several species of salamanders. Dr. Kenneth L. Franklin reports progress in his continuing studies of the radiation emanating from the planet Jupiter. Miss Elizabeth A. Fryatt observed the behavior of the station's herd of white-tailed deer.

During the year Dr. Jack McCormick studied the effects of fire, herbicides, and mowing on the development of vegetation. He has also nearly completed a manuscript on the station's flora.

As in previous years, staff members were assisted in their research by student trainees. Eight college undergraduates were in residence during the summer of 1968. They were supported in part by the Undergraduate Research Participation Program of the National Science Foundation. The presence of three postgraduate students in residence during the summer of 1968 reflected the desire of participating staff members to make greater use of the station's facilities for training graduate students in evolutionary biology. In addition, several high school volunteers were apprentices in the summer research program.

Dr. Daniel Marien of the Department of Biology at Queens College continued his long-term field study of the distribution and systematics of fruit flies at the station. He was assisted by a National Science Foundation Undergraduate Research Participant.

The bird-banding laboratory at Kalbfleisch continued to provide

valuable data on the longevity and seasonal status of birds; on the sequence of molts and plumages; and on new criteria for aging and sexing certain species. During a ten-year period, more than 24,000 individual birds, belonging to 123 species, have been banded on the station's 94 acres.

Two scientific articles, based wholly or in part on studies at the station, have been published since July 1, 1967. Five more manuscripts are in preparation.

Wesley E. Lanyon, *Resident Director*

**LERNER MARINE LABORATORY  
BIMINI, BAHAMAS**

After years of preparation, the new facilities at the Lerner Marine Laboratory are nearing completion. The buildings should be ready for occupancy by January of 1969; plans have been made for an official dedication ceremony in February, 1969.

Over the years, the pressure of increasing use created a need for more equipment and newer facilities. The wisdom and untiring efforts of Mr. Michael Lerner, and his generosity, with that of his many friends, have finally filled that need. It has been a monumental task and the entire staff joins in saluting Mr. Lerner and in extending sincerest thanks to him and to his philanthropic colleagues. Among laboratories of comparable size, the Lerner Marine Laboratory, when completed, will have no equal.

Although research activities were strongly curtailed by the building program, more than 57 senior scientists and 90 assistants worked at the laboratory during the year. The number and diversity of their investigations, carried out despite the adversities of the construction period, attest to the need for the laboratory. Dr. Charles J. Hillson and his assistant, for example, used the laundry building as a temporary laboratory in preparing herbarium sheets of local algae for the collections of the Botany Department of the College of Science at Pennsylvania State University.

Five outstanding scientists from the National Institutes of Health, and the Brookhaven National Laboratory, spent many weeks irradiating shark brains under the guidance of Dr. Igor Klatzo, Chief of

the Laboratory of Neuropathology and Neuroanatomical Sciences of the National Institutes of Health. This work was accomplished by using the recently acquired cobalt 60 source in a makeshift enclosure at the aquarium shed. The important immunological studies of Dr. Michael Sigel and the invertebrate studies of Dr. E. Evans of the University of Alabama have continued throughout the building program. Dr. Sigel is working with elasmobranchs and teleosts in the laboratory's dockside pens. In addition, Dr. Ethel Tobach of the Department of Animal Behavior of the Museum and Dr. J. Wodinsky, Associate Professor of Psychology at Brandeis University, continued their work on the behavior patterns of local invertebrates, using improvised tanks and equipment.

During the year, the research vessel "J. A. Oliver" made three month-long cruises as part of the continuing Biological Survey of the Bahamas. The program, under the aegis of the Bahamian Government, the Biology Branch of the Office of Naval Research, and the Lerner Marine Laboratory, has been active for more than five years. This year, as in the past, the survey was staffed by scientists from institutions throughout the world. Of the 21 investigators aboard, five were from the Biological Station of the University of Bergen in Norway. Dr. Hans Brattstrom, Director of that station, and four of his colleagues published complete descriptions of the organisms they found in the Bahamian waters on a previous cruise. Nine new species were described in this work which was published in *Sarsia*, a publication of the University of Bergen.

A study of the currents and sedimentation patterns of the Bimini channel (a project of particular importance to the laboratory) was carried out by a team of twelve investigators under the direction of Dr. Wyman Harrison. The findings of Dr. Harrison and his co-workers, from the Land and Sea Interaction Laboratory (LASIL) at Norfolk, Virginia, contribute much to our understanding of the ecology of the Bimini channel.

The laboratory staff offers sincere thanks to Mr. Dean Holt of the Office of Naval Research in Washington, D. C., and to Messrs. George Kisbany, Richard Peluso, Silvio Ferraris, and Fred E. Walters of the New York branch office of the Office of Naval Research for their continued assistance and support. With the near

completion of the new buildings and the promise of a more functional and sophisticated environment for basic research, the cooperative efforts of the Office of Naval Research and the laboratory take on even greater importance.

A preliminary report presented to the Bahamian Government on a study of the natural history of the pink-lipped conch, *Strombus gigas*, has enlisted further governmental support. This research, carried out by Mr. Robert F. Mathewson, will be used to formulate conservation laws to protect these animals and permit controls on their exploitation as food.

Robert F. Mathewson, *Resident Director*

SOUTHWESTERN RESEARCH STATION  
PORTAL, ARIZONA

The number of scientists and their assistants working at the Southwestern Research Station showed a sizable increase during the year: from 89 to 111. Ten student and faculty groups, totaling 209 persons, also used the station. In all, we had 545 guests—the sixth straight yearly increase and the largest number to utilize the station since its establishment in 1955. Thirty institutions were represented. The dominant field of study was entomology, followed by herpetology, ornithology, and botany. Other projects were carried out in animal behavior, geology, arachnology, mammalogy, bacteriology, genetics, wildlife management, astronomy, and nematology. The studies ranged in type from simple observations and collections to detailed investigations of such subjects as the escape behavior of rodents and the measurements of volcanic materials.

Mr. Vincent D. Roth continued to study and revise the lesser known genera of the spider family Agelenidae. He nearly completed a review of the African Agelenidae which will include descriptions of new species and genera. He finished a list of the Galápagos spiders, with a redescription of *Desis galapagoensis*. In addition, he began two new projects. One is an illustrated key to the North American Agelenidae; the other is a list of spider species from Yuma County, Arizona. Collections for the latter project have been completed, and will soon be published.

During a month's field trip to Alanos, Mexico, Mr. Roth collected about 1000 spiders and a small number of snakes. More than 1500 insects were added to the collection during the year, as well as 50 species of plants and 30 species of spiders. The arachnid collection grew considerably through the continued efforts of Mr. Roth and Dr. Willis J. Gertsch. The insect collection was expanded to 96 drawers containing a good representation of identified species that have been collected locally.

In other studies at the station, Dr. Ethel Tobach, with several colleagues and assistants, investigated the escape behavior of seven species of wild rodents. A total of 45 animals were observed, 20 of them intensively.

Dr. Charles Baker of California State Polytechnic College at San Luis Obispo collected and preserved 30 genera of scarab beetles for use in two studies. Mr. Joel Weintraub of the Department of Life Sciences of the University of California at Riverside made preliminary investigations into the orientation of desert anurans, particularly of the genus *Scaphiopus*. Dr. Wilbur Cook and an assistant, both from Centre College of Kentucky at Danville, continued studies of the antibiotic activity of desert plants on certain bacteria strains.

Fifteen papers based on work done at the station were published during the year.

Vincent D. Roth, *Resident Director*

## DEPARTMENT OF EDUCATION

"The World We Live In," a program designed for public, private, and parochial school classes from the metropolitan area, continued to be one of the most popular offerings of the Department of Education. During the school term, 39,868 children visited the Museum as part of the program. Each class saw a demonstration or slides relating to a topic selected by their teacher; later they visited the pertinent exhibition halls. The 20 topics offered are all carefully correlated with the curriculum of the New York City schools.

To provide a meaningful educational experience for unscheduled classes and groups, the department again offered the program "Exploring the Natural World." This auditorium lecture, utilizing slides, music, and sound effects, featured topics such as "Let's Dig for Dinosaurs" and "Wild Animals of New York State." To reinforce the lecture material, teachers could then take their classes to the related exhibitions. This year, 5587 children attended "Exploring the Natural World."

More than 200 young people registered for special Saturday morning classes this year. Topics included "Fossils and Their Meaning," "Wilderness Wonderlands," and "African Safari." The Museum offered eighteen scholarships for these classes to deserving youths from the local school district.

For children visiting the Museum without a skilled teacher, a series of nine inexpensive question and answer booklets, called "Museum Trails," were sold at the Information Desk. These booklets are designed to involve the children in an activity while in the halls, and stimulate them to think about, and thus learn more from, the exhibits. During the past year, 32,710 "Trails" were sold.

The Information Desk is also responsible for renting Acoustiguides—taped tours of various halls of the Museum. Three new tours were installed this year, one each in French, German, and Spanish. These tours are popular not only with foreign visitors but also with students of the three languages.

Often-neglected children are the "shut-ins" — the physically handicapped or emotionally disturbed children confined to hospitals and special schools. In order to give these children some contact with the world of natural history, the Department of Education again offered a Hospital Visitation Program. With the support of the Avalon Foundation, specially trained teachers visited 130

*Mr. Ronald Brown, Senior Technician, left, and Mr. Morris F. Skinner, Frick Assistant Curator, both of the Department of Vertebrate Paleontology, examine a fossil of Protohippus simmus, ancestor of the horse. This and more than 250,000 other specimens comprise the Childs Frick Collection of Vertebrate Paleontology which was donated to the Museum in December, 1967.*





hospitals or special schools this year. The presentations utilized Museum artifacts and specimens.

Another service rendered outside the Museum was the circulation of 6710 exhibits to New York City schools and other city and state organizations. Two new series of exhibits, "Fossils" and "Pre-historic Man," were designed and constructed to correspond with recent changes in the elementary school curriculum.

A two-day cultural program, supported by the New York State Council on the Arts, was again offered to high school seniors throughout New York State. The program, planned in cooperation with other cultural centers in the city, included an extensive tour of the Museum under the guidance of instructors from the Department of Education. Arrangements are being made with the Metropolitan Museum of Art and the New York State Council on the Arts for a cooperative program in museum training for personnel from smaller museums throughout the state. The program, which is planned for the coming year, will include a one-week workshop at the Museum and visits to other museums in the city.

Attendance at the Natural Science Center for Young People, steadily increasing over the years, reached a high of 28,089 this year. Direct access to the center and the Louis Calder Natural Science Laboratory was provided when the new Hall of Man in Africa opened in June. As a result, more children are expected to visit the center and the laboratory next year. During the year, the center developed several new project exhibits, prepared two new activity bulletins, and helped assemble 200 natural science kits which were distributed to science coordinators in the city schools. In addition, the filmstrip "A Discovery Walk in Natural Science" was prepared in cooperation with the Office of Science Education of the Board of Education. The film, which illustrates natural history subjects to be found within the city, is accompanied by an eighteen-page teachers' guide.

A wide variety of programs was offered for adult audiences, including two major lecture series in anthropology, a number of other special lectures, field walks, gallery and slide talks, films, and credit courses for teachers.

More than 4000 persons attended the two major lecture series—

“Tradition and Change in Contemporary Africa” by Dr. Colin M. Turnbull, and “People of the Pacific” by Dr. Margaret Mead. An additional 4000 persons attended other special lectures and field walks, and 10,320 persons were attracted to highlight tours of exhibition areas, gallery and slide talks, and film programs. The Golden Age Program, offered in cooperation with the New York City Department of Welfare, presented a series of films and talks to elderly persons from local day centers.

Enrollment in courses for teachers rose to 1014 persons, more than double that of the previous year; 23 courses were offered, each providing two units of credit with the City College of New York or the New York Board of Education.

The Department of Education is planning additional programs for next year, including summer courses and institutes.

Richard S. Casebeer, *Chairman*

## DEPARTMENT OF EXHIBITION AND GRAPHIC ARTS

The department was involved in an unprecedented amount of activity this year as it continued preparations for the Museum's Centennial. One new hall was opened to the public, as were three sections of another; work continued on nine new halls or sections; design of two new halls began; renovation of four areas was initiated; twelve temporary exhibits went on display; and work began on a major Centennial exhibit.

The Hall of Man in Africa, which opened to the public June 7, represents an important development in exhibit design that will influence the planning of all future halls. That development is the creation of a total environment, so that the hall itself shares the character and emotive impact of the exhibits. The construction of free-standing “huts” to house the dioramas, the use of bright color zones to set apart the four physical environments, and the installation of fitted carpeting to improve the acoustics of the background music and to engender a softness underfoot appropriate to Africa are examples of the new techniques.

With the April 23 opening of three new sections of the Hall of the Biology of Invertebrates — “Structure and Classification,” “Continuity in Life,” and “Invertebrates and Man”—the entire west half of the hall was completed. Construction of the three remaining subject areas of the east side of the hall should be finished by 1969.

Progress on the Lindsley Hall of Earth History continued rapidly during the year, and completion by the end of 1968 is expected. The Halls of Ocean Life and the Biology of Fishes, which may be considered together since they have a single entrance, should be finished in early 1969. Nine habitat groups in the Hall of Ocean Life are now ready, and the remaining six are in various stages of preparation.

Progress on the construction of the 94-foot blue whale was remarkably free of trouble. The whale should be painted and installed in position by October, with final retouching and detail changes occurring soon thereafter.

The major achievement in the Hall of the Biology of Fishes was the installation of the Phylogeny of Fishes, the exhibit that represents a third of the material in the hall. The focal point of the hall (a ten-minute film of life in the Hudson River) was completed, and installation of projection equipment will soon take place.

The tempo of work in the Hall of Mexico and Central America increased; construction of exhibit cases for the Hall of Peoples of the Pacific progressed satisfactorily; Group Biology, the third section of the Hall of the Biology of Man, is moving slowly to completion; and the Halls of Minerals and Gems and Reptiles and Amphibians awaited city processing of construction plans.

Work began during the year on the Halls of Biology of Mammals and Peoples of Asia. Since the former will be directly above the latter, the halls are being jointly designed to produce structural features that will benefit both.

During this period of intensified work, a growing reliance has been placed on outside contractual work, particularly of the more elaborate exhibits which transcend traditional museum skills. Thus, the abilities of the department will increasingly be channeled into a program of continuous renovation of our older exhibits. The

start of exhibit renovation primarily centered on the Akeley Hall of African Mammals, but also included Birds of the New York Area, the black-light murals in the Planetarium, and the Lincoln Ellsworth memorabilia.

“Man and His Changing Environment,” the theme of the Centennial, will be the most ambitious temporary exhibit ever mounted in the Museum. To be built in the second floor of the Roosevelt Memorial, it will open next April 9 and will run for at least two years.

The return of larger-scale exhibits to the Corner Gallery was marked on October 1, 1967, by the opening of “The World Beneath Our Feet . . . Minerals.” This exhibit, which will last through 1968, includes the more exotic minerals from the temporarily closed Hall of Minerals and Gems, and a free-form sculpture symbolizing the arrangement of atoms in minerals.

To accommodate exhibits of immediate or short-duration interest, a new display area was made from the corridor between the Hall of Man in Africa and the Akeley Hall of African Mammals. The three exhibits that appeared in the area were: “Shorebirds of North America,” 32 paintings by Robert Verity Clem; “New Views of the Moon,” a selection of photographs made available by the National Aeronautics and Space Administration, and “Nature and the Camera,” which included the best photographs submitted to the first photography competition to be printed by *Natural History* magazine.

Another innovation was the “Exhibit of the Month” in the southwestern wall display case in the Seventy-seventh Street foyer, previously used by the Museum Shop to display merchandise. These new monthly exhibits are chosen for timeliness and news value. In addition, two temporary exhibits (a fossilized jawbone and an ancient Afghanistan head sculpture) were displayed in the second floor of the Roosevelt Memorial.

A growing volume of work caused the Graphic Arts Division to commission a record amount of free-lance work during the year. Among the division’s major projects were illustrations, maps, and type layout for the Hall of Man in Africa, as well as the design of posters, promotional art, and the Centennial stationery.

For the fifth year, the division laid out and produced *Nature and Science* magazine. It also provided more than one-third of the art work for *Natural History*, including the design and illustration of the bound-in members' report, and managed the layout and production of *Curator*. Six Natural History Press books were illustrated by the division, including "Methods in Botanical Research," the largest book assignment to date.

A larger share of typesetting and printing was done outside the Print Shop because of the more complicated type used in exhibits and the more ambitious requirements for promotional and publication art. This in no way, however, diminished the activity of the Print Shop, which kept abreast of the need for much greater diversity of forms, letterheads, and other printed ephemera for which there was such great demand.

Gordon A. Reekie, *Chairman*

## LIBRARY

The Museum Library played an increasingly important role in the research activities of students, scientists, and research groups. Utilization of the collection by students demonstrates the wide range of material that supplements college and university collections. The use of the obscure and rare materials by scholars illustrates the depth of the collection. Discussion with librarians in the science-technological and biomedical fields confirmed the fact that the Library's resources are valued on a national and, to a lesser extent, international scale.

During the year, the Library's number of readers increased to 16,134, more than 1000 over that of the previous year. Reference queries increased by nearly 2000 to 17,412. Circulation rose slightly to 65,604.

A slight decrease in the number of inter-library loans last year was probably due to the growing significance in the biomedical

*The "Exhibit of the Month" was launched last December to highlight outstanding artifacts and specimens from the collections of the Museum such as this clay sculpture from the Mayan civilization.*





sciences of the cooperative library groups in the Greater New York area. Such cooperative units as the Medical Library Center of New York have enabled the New York City libraries to find materials with greater efficiency. A decrease in the number of periodical parts received by the Library reflects a decline in new periodical titles purchased, including back issues.

The number of books received and added to the collection increased. That increase reflects both the increase in the funds available because of the purchase of fewer periodical titles, and a renewed effort to catalogue materials as rapidly as possible.

Substantially higher prices for books and periodicals served to limit the number of volumes and journals that were added to the collection. At the same time, more material is being published than ever before.

The Library's resources were increasingly used by other libraries. In addition to the 1737 inter-library loan requests filled by original material during the year, 547 requests were filled by the substitution of 6241 Xerox copies. Colleges, universities, commercial organizations, departments of the federal government, and other museums were among those requesting inter-library loans.

Through purchase and exchange agreements, 310 new serial titles were added to the collection. Since most of the information related to natural history appears in serials, it is essential that the Library continue to acquire significant serial titles.

To facilitate the loan procedure and to assist the Museum's scientific staff, a Xerox 720 has been ordered and will be placed in the alcove of the anthropology stacks. It will be available for the duplication of Library materials only.

Generous gifts of stocks, monetary funds, and books were made to the Library by Mr. Cyril F. dos Passos and Dr. Robert M. Stecher.

The pilot project to recatalogue and reclassify part of the collection in the Library of Congress system, supported by funds from the New York Council on the Arts, continued successfully. A second three-year grant from this Council, totaling \$15,000, will permit the Library to purchase the Library of Congress catalogue cards needed in the project. It is hoped that, by changing to the Library



of Congress classification system, the Museum Library will be able to participate in cooperative cataloguing and union lists of monographs and serials. At the conclusion of the pilot project, the Library will explore the problems and financial needs of recataloguing the entire collection. A large grant will be required for this purpose.

A Library committee was formed to act as liaison between the scientific staff and the Library. Dr. Donn E. Rosen was appointed Chairman. Other members include Dr. James A. Oliver, Dr. Thomas D. Nicholson, Dr. Dean Amadon, Dr. Sydney Anderson, Dr. Dorothy E. Bliss, Dr. Kenneth L. Franklin, Dr. Harry L. Shapiro, Dr. Richard H. Tedford, and the Librarian.

Thomas G. Basler, *Librarian*

## PUBLICATIONS

The American Museum of Natural History maintains the largest and most varied publishing program of any such institution in the country. Three long-established series of scientific publications bring the results of Museum research to libraries and individual scientists throughout the world. In addition, the Museum publishes the quarterly *Curator*, the only journal devoted entirely to museology.

Popular publishing efforts at the Museum rival in scope and productivity those of many independent publishing houses. More than 30 editors, artists, administrators, and other staff people at the Museum are engaged full time in the production of two national magazines and approximately 25 books a year. The books, which appear under the imprint of The Natural History Press, a division of Doubleday & Company that serves as the Museum's publisher, range from children's books to volumes for professionals. *Nature and Science* magazine, also published by The Natural History Press, is circulated to elementary school children and their teachers. *Natural History*, the Museum's 77-year old magazine, reaches a broad spectrum of interested laymen and professionals, including all Museum members. These combined efforts bring to a vast and growing audience, many of whom cannot come

to the Museum itself, new information and new insights from all the natural sciences.

Thomas D. Nicholson, *Assistant Director*

#### CURATOR

The past year for *Curator* has been one of slow but steady growth. The circulation now exceeds 1000, which is a satisfactory progression for a journal of this type. But even more significant, perhaps, is the extremely high rate of renewals that continues to characterize our subscription record. We can only conclude that our readers like the journal.

There have been no major changes in editorial policy during the past year. We continue to seek to cover as broad a spectrum of the museum world as possible.

Harry L. Shapiro, *Editor-in-Chief*

#### NATURAL HISTORY MAGAZINE

The most significant single editorial achievement in this year's ten issues was the appearance of a 32-page supplement, "War: The Anthropology of Armed Conflict and Aggression." Consisting of the eight major papers delivered at a plenary symposium during the annual meeting of the American Anthropological Association on November 30 in Washington, D. C., this special supplement appeared only one day later in the December issue of *Natural History*. One of the papers, "Alternatives to War," was delivered by Dr. Margaret Mead, who joined many other Museum staff members during the year in contributing time and articles to the magazine.

Over all, the editorial and graphic content of the magazine broadened and was more topical. A new vitality was introduced in the book review section: most of the important new books in the natural sciences received immediate and thoughtful attention. Also, the editors inaugurated a series of book essays designed to

identify those books, new and old, that belong in the library of any serious naturalist.

Press coverage of *Natural History* continued to be far-reaching, the most notable example following the announcement in our pages of the discovery, by Dr. Louis B. Dupree, Research Associate in the Department of Anthropology, of the oldest known sculpture in Asia. This story was covered in *The New York Times*, *Life* magazine, and many other mass media.

The response from readers increased sharply, with letters of comment reaching the editors in far greater frequency than ever before. More than 2500 readers participated in the magazine's first annual photographic competition. Winners and entries awarded honorable mention appeared in the June-July issue, and were placed on exhibit in the Museum for the summer of 1968. The photographs were then scheduled to be shown in the Kodak Exhibition Center at Grand Central Terminal in New York.

At year's end, there were indications that the unfavorable conditions in the direct-mail industry were changing for the better, bringing hope for an early increase in circulation, which dropped slightly during this year. At the same time, there was a sharp increase this year in subscription renewal rates and this, combined with another large increase in advertising revenue, has kept the magazine fiscally sound.

James K. Page, Jr., *Publisher*  
The Natural History Press

#### NATURAL HISTORY PRESS BOOK PROGRAM

Among the 25 volumes published this year were several additions to existing series and programs. Three titles, published simultaneously in hardcover and paperback, were added to the American Museum Sourcebooks in Anthropology.

Several books for children were published, notably "Discovering Rocks and Minerals." Written by Mr. Roy Gallant and Mr. Christopher Schuberth, a member of the Museum's Department of Education, this book developed from a special-topic issue of *Nature and Science*. It is another example of the cross-fertilization that

occurs among the various departments of the Press. Similarly, the entire proceedings of the anthropologists' symposium on war appeared in book form just five months after the meeting itself—something of a record in rapid publication of scientific symposia.

The range of publications continued to broaden, including a two-volume guide to the landscape and geology of the national parks, and the first and probably last piece of fiction published by the Press: the entire record, translated from the German, of the snouters.

The Natural History Press was proud to publish the “Handbook of New Guinea Birds,” a magnificent volume by Dr. Austin L. Rand and the late Dr. E. Thomas Gilliard, formerly Curator in the Museum's Department of Ornithology.

Thomas Childs, Jr., *Editor*

#### NATURE AND SCIENCE

In its fifth year of publication, *Nature and Science* published three special-topic issues that drew praise from educators and scientists: “Life in the Deserts” told how plants and animals, including human beings, adapt to desert environments; “Sending and Receiving Messages” concerned communications; and “Spaceship Earth” stressed the effects of man's technology on the fragile resources of our planet. This last-mentioned issue, along with other conservation articles that appeared during the year, reflects the efforts of the magazine's staff to instill an “ecological conscience” in its young readers.

*Nature and Science* responded to suggestions from classroom teachers and began two new features—a regular page of science news items, and the publication of answers to the popular but puzzling scientific “Brain-Boosters” in the teacher's edition of each issue.

In its seventeen issues, the magazine continued to provide a blend of articles about scientists and science, including several “Science Workshops” for youngsters to pursue at home or in school. Hundreds of boys and girls also participated in a paper airplane design contest that was sponsored by the magazine.

During the year, *Nature and Science* published many articles in which scientists described their studies of the behavior of monkeys and tigers, and the ecology of bald eagles and raccoons. Following the tradition of past years, the special summer issue was devoted to outdoor nature investigations. The emphasis this year was on insects.

Twenty wall charts from past issues were selected to be enlarged, printed on heavy stock, and sold to schools. The subjects of these charts include astronomy, evolution, and physics.

Franklyn K. Lauden, *Editor-in-Chief*

#### SCIENTIFIC PUBLICATIONS

The office of Scientific Publications published one part of *Anthropological Papers*, totaling 130 pages, eight articles in the *Bulletin*, totaling 844 pages, and 31 numbers in *American Museum Novitates*, totaling 724 pages—a combined total of 1698 printed pages.

In addition, an estimated total of 1700 printed pages, including a whole volume of the *Bulletin* of 500 pages, is in press, as of June 30, 1968.

Mrs. Florence E. Brauner began work as an editorial assistant in the department on January 15, 1968.

Ruth Tyler, *Editor*

#### PLANT OPERATION AND MAINTENANCE

During this fiscal year, the Lindsley Hall of Earth History and the Hall of Mexico and Central America were structurally rehabilitated and turned over to the Department of Exhibition for the installation of exhibits.

A new incinerator and an emergency generator have been installed. The incinerator meets the current standards of air-pollution control, and the generator will insure emergency lighting service in the event of an area power failure.

Work on the new cafeteria has not yet been completed, but it is hoped that this facility may be opened in the fall of 1968.

Reconstruction of the Hall of Peoples of the Pacific, which began in the winter of 1967, is proceeding well, and the hall should be ready to be turned over to the Department of Exhibition for the installation of exhibits no later than the fall of 1968.

Alexander Lurkis Associates is working on final plans and specifications both for the modernization of the interior electrical distribution system for the entire Museum and for the lighting of the Museum facades. Construction work on both is scheduled to begin in the fall of 1968. The modernization of the electrical system will require about two years to complete; the facade lighting should be in operation for the Centennial.

Burns and Roe, Inc., has recently obtained authority to draw up final plans and specifications for the Hall of Amphibians and Reptiles. Reconstruction of this hall should begin early in 1969.

Certain other items of the Capital Improvement Program such as the installation of a fire detection and alarm system for the entire Museum, the restoration of the Roosevelt Memorial Hall murals, and an air-conditioning survey for the Museum are being delayed while the Department of Parks completes its processing of these matters.

The Maintenance and Construction Division remains fully employed maintaining the Museum plant, performing minor but essential improvements to existing facilities, and assisting the Exhibition Department.

Paul H. Grouleff, *Plant Manager*

## ATTENDANCE

During the fiscal year here reported 2,564,394 persons visited the Museum, and 634,500 (including 595,768 paid admissions) visited the Planetarium, making a total of 3,198,705.

## RESEARCH IN PROGRESS OR COMPLETED

July, 1967, through June, 1968

The American Museum of Natural History

Below is a complete list of all research projects carried out by members of the scientific staff, including Research Associates, Research Fellows, Ogden Mills Fellows, and Emeriti when working in residence, as well as independent investigators and graduate and undergraduate students. It will be noted that the last column shows support in addition to that given by The American Museum of Natural History.

## RESEARCH IN PROGRESS OR COMPLETED

Investigator	Research Project	Additional Sources of Support
DEPARTMENT OF ANIMAL BEHAVIOR		
Lester R. Aronson, Chairman and Curator, with Madeline L. Cooper, Research Fellow, and Robert Stolberg, Scientific Assistant; assisted by Kathleen Meyer, Diane Hernandez, Gladys Wheeler, and Robert Brown, Undergraduate Research Participants	The interaction of androgen level, sexual experience, and genital stimulation on the sexual behavior of male cats	National Institutes of Health; National Science Foundation
Lester R. Aronson, with Carol Diakow, Graduate Student; assisted by Robert Brown, Muriel Kuenane, Student of Afro-American Institute, and Max David Flow-ers, Urban Corps Student	Genital desensitization and mating behavior of female cats	National Institutes of Health; National Science Foundation
Lester R. Aronson with Kenneth K. Cooper, Graduate Student; assisted by Eddie Schild, Urban Corps Student	Genital desensitization and ovulation of female cats	National Institutes of Health; National Science Foundation
Lester R. Aronson, with Harriett Kaplan, Graduate Student	Neurophysiological and endocrine relationships of mechanoreceptors in the penis of the cat	National Institutes of Health
Lester R. Aronson, with Lawrence F. Picker, Volunteer	Function of the forebrain and cerebellum in teleost fishes	
T. C. Schneirla, Curator, with Yvonne Wang, Graduate Student; and Ann Young and Michael Boshes, Research Assistants	Function of the cerebellum in teleosts	National Science Foundation
T. C. Schneirla, with Rosamund Gianutos, Statistical Aide, and Michael Boshes	Comparative studies on cyclic behavior and its biological basis in three genera of army ants. I	
	Comparative studies on cyclic behavior and its biological basis in three genera of army ants. II	National Science Foundation



T. C. Schneirla, with Howard Topoff, Graduate Student	Population characteristics, reversible physiological conditions, and cyclical colony behavior in the army ant <i>Neivamyrmex nigrescens</i>	National Defense Educational Act; National Science Foundation
T. C. Schneirla	A theoretical appraisal of behavior patterns and their biological bases in army ants in terms of the brood-stimulative theory of colony function and behavior	
T. C. Schneirla, with Yvonne Wang	A histological and histochemical investigation of developmental conditions related to brood coordination in two species of the Old World doryline ant <i>Aenictus</i>	National Science Foundation
T. C. Schneirla, with June Tice, Research Fellow	An anatomical and histological investigation of <i>Neivamyrmex nigrescens</i>	National Science Foundation
T. C. Schneirla, with June Tice and Winifred Trakimas, Research Associate	A study of the external and internal anatomy and allometric (differential) growth of <i>Eciton hamatum</i>	
T. C. Schneirla, with Peter Gold, Graduate Student	The functional effect of stimulative factors on the embryonic development of the chick and their influence on post-hatching behavior	National Institutes of Health
Evelyn Shaw, Associate Curator, with Madeline Williams, Graduate Student	Modification of early experience and the development of schooling behavior in fishes	National Science Foundation; National Institutes of Health
Evelyn Shaw, with Richard Sherman, Graduate Student, and Fred Weston, Undergraduate Participant	The role of the forebrain in group behavior in fishes	National Science Foundation; National Institutes of Health
Evelyn Shaw	The development of the optomotor responses in the atherinid fishes	National Science Foundation; National Institutes of Health
	A review of schooling behavior in fishes	National Science Foundation; National Institutes of Health

## RESEARCH IN PROGRESS OR COMPLETED

Investigator	Research Project	Additional Sources of Support
DEPARTMENT OF ANIMAL BEHAVIOR (continued)		
Ethel Tobach, Associate Curator; assisted by Cyrus Chess, High School Student	Social responses in paradise fish; their relation to aggressive behavior	National Institutes of Health
Ethel Tobach, assisted by Larry Bell, High School Student Volunteer	Avoidance conditioning in rat pups	National Institutes of Health
Ethel Tobach, with Martha Cole, Volunteer, assisted by James Payton, Urban Corps Student	Social responses in the gerbil; their relation to aggressive behavior	National Institutes of Health
Ethel Tobach and T. C. Schneirla, with Yves Rouger, Research Fellow; assisted by Sylvie Levovitz, Urban Corps Student, and Martha Cole	The development of olfactory function in the rat	National Science Foundation; National Institutes of Health
Ethel Tobach and T. C. Schneirla in collaboration with William Siler, Downstate Medical Center, State University of New York, Veronica Hall, Leo Vroman of the Veterans Administration Hospital (Brooklyn, N. Y.), and Sally M. Hardy, Research Associate; assisted by Phyllis Tyson, Urban Corps Student	Stress-tension adjustment in the rat: 1. Computer analysis of data. 2. Hematological studies	National Institutes of Health
Benjamin B. Kamrin, Research Associate; assisted by Clyde Newton, Graduate Student	Immunology and behavior. 1. Molecular aspects of the induction of immune tolerance  Immunology and behavior. 2. Correlation of the immune tolerant state with the internal body temperature and evoked overt behavior of chicks	

William N. Tavolga, Research Associate,  
with Roberta Scott, Research Assistant

William N. Tavolga, with Arthur Popper,  
Graduate Student, and Brigitte Cappelli,  
Research Assistant

Helmuth E. Adler, Research Fellow, as-  
sisted by Leonore L. Adler, Research  
Assistant, and Alfred Beuling and Steve  
Koblin, Assistants

David W. Jacobs, Research Fellow, with  
William N. Tavolga; assisted by Brigitte  
Cappelli

Leonore L. Adler

#### DEPARTMENT OF ANTHROPOLOGY

Harry L. Shapiro, Chairman and Curator  
of Physical Anthropology

Auditory capacities in fishes

Hearing in several varieties of the char-  
acid fish *Astyanax mexicanus*

Sensory factors in bird navigation

Visual capacities in teleost fishes

Cross cultural study of fruit-tree draw-  
ings by children

The effects of crowding and urban ten-  
sions on human physiology

Study of the care of the mentally ill in  
the town of Cheel, Belgium

Methods of dating skeletal remains  
through associated pottery

Cranimetric survey of Marquesan  
specimens

Preceramic cultures of Peru; the Paleo-  
Indian in South America

Junius B. Bird, Curator of South Ameri-  
can Archeology

Office of Naval Research

Office of Naval Research

National Science Foundation

National Science Foundation

Indian Statistical Institute, Calcutta;  
Frederick C. Voss Anthropology and  
Archaeology Fund

Family Care Foundation for the Mentally  
Ill; Grace Foundation; University of  
Louvain

Frederick C. Voss Anthropology and  
Archaeology Fund; Junius B. Bird (per-  
sonal funds)

## RESEARCH IN PROGRESS OR COMPLETED

Investigator	Research in Progress	Additional Sources of Support
DEPARTMENT OF ANTHROPOLOGY (continued)		
Gordon F. Ekholm, Curator of Mexican Archeology	Backstrap loom in the Old and New Worlds and its possible significance in the area of cultural diffusion  Series of projects, all related to basic research on probable early trans-Pacific contact  Accumulation of data relating to the scroll-ring motif in early China and Mesoamerica  Principles of cross-cultural and cross-ideological communications  Cultural evolution, learning contexts, and social organization	Textile Research Fund; Junius B. Bird (personal funds)
Margaret Mead, Curator of Ethnology		
Margaret Mead, with Rhoda Metraux, Project Director	Studies in individuality, culture, and culture change, in connection with the project "The Cultural Structure of Imagery"	National Science Foundation
Margaret Mead, with Theodore Schwartz, Assistant Professor, University of California, Los Angeles, and Lola Romanucci Schwartz, Assistant Professor, San Fernando Valley State College	Field study of cultural systematics in New Guinea	National Institutes of Health
Robert L. Carneiro, Associate Curator of South American Ethnology	Study of the transition from hunting to horticulture among tribes of the Amazon Basin  Research into the influence of the writings of Herbert Spencer  A study of evolutionary sequences in culture	

Robert L. Carneiro; assisted by Ronald Caines and Nina Molliver, Undergraduate Research Participants	Application of scale analysis to the study of cultural evolution	National Science Foundation
Colin M. Turnbull, Associate Curator of African Ethnology	African tradition in America	Wenner-Gren Foundation for Anthropological Research
	Wire-drawing of the Ciga of Uganda	
	Ik demography: population movement and political re-alignment	Wenner-Gren Foundation for Anthropological Research
Stanley A. Freed, Associate Curator of North American Ethnology, with Ruth S. Freed, Assistant Professor of Anthropology, New York University	Family background and occupational goals of school children of Delhi Union Territory, India: A study of values and attitudes	National Science Foundation; Social Science Research Council, New York University
Stanley A. Freed, with Ruth S. Freed, and Eve Spangler, Graduate Student, Yale University	A comparative study of role behavior among the Mohave and Washo Indians	Washo field work—Department of Anthropology, University of California, Berkeley; Mohave field work—Frederick C. Voss Anthropology and Archaeology Fund; National Science Foundation
Stanley A. Freed, with Ruth S. Freed; assisted by Nancy Bonvillian, Graduate Student, Columbia University, Mary Castle, Graduate Student, Hunter College, Junie Glazer, Melvin Kaplan, and Helen Fisher, Graduate Students, New York University	A comparative study of role behavior in matrilineal, patrilineal, and bilateral societies	Navaho field work—Voss Anthropology and Archaeology Fund; New York University; National Science Foundation
Richard A. Gould, Assistant Curator of North American Archeology	Field study of the interrelation of the ethnology and archeology of aboriginal tribes in Western Australia	Social Science Research Council; Australian Institute of Aboriginal Studies
	Archeological field study of the caves of Alta Verapaz, Guatemala	American Broadcasting Company; Explorers Club of New York
Carin Burrows, Associate	Comparative study of the ethnology (especially the languages) of the Naga tribes of Assam and northwest Burma	Carin Burrows (personal funds)

## RESEARCH IN PROGRESS OR COMPLETED

Investigator	Research Project	Additional Sources of Support
DEPARTMENT OF ANTHROPOLOGY (continued)		
Charles F. Brush, Field Associate	Analysis of materials excavated by him at archeological sites on the Pacific coast of Guerrero, Mexico	Charles F. Brush (personal funds)
DEPARTMENT OF ASTRONOMY		
Kenneth L. Franklin, Assistant Chairman and Astronomer	Observations of the radio sky to detect significant radio radiation from the sun and Jupiter on a broad spectrum at decimeter wavelengths	National Science Foundation
DEPARTMENT OF EDUCATION		
Richard S. Casebeer, Chairman	Decoding and classifying synoptic geophysical and solar data and correlation with radio observations	
	Systematics and host relationships of the mite family Spinturnicidae in Costa Rica	
	Distribution and host relationships of Costa Rican ticks	
Catherine M. Pessino, Senior Instructor	Breeding biology of Roseate Terns on Great Gull Island	The Mae P. Smith Fund; Linnaean Society of New York
Grace Donaldson, Instructor	Bill color changes in adult Roseate Terns on Great Gull Island	The Mae P. Smith Fund; Linnaean Society of New York
DEPARTMENT OF ENTOMOLOGY		
Jerome G. Rozen, Jr., Chairman and Curator	Review of the South African cuckoo bee genus <i>Pseudodichroa</i> (Hymenoptera, Apoidea)	National Science Foundation
	Researches on the biology of panurgine bees from North America and Morocco (Hymenoptera, Andrenidae)	

Systematics of the larvae and pupae of Moroccan panurgine bees (Hymenoptera, Andrenidae)	National Science Foundation
The larvae of the bee family Anthophoridae (Hymenoptera, Apoidea)	National Science Foundation
Systematic-evolutionary study of the parasitic bee genus <i>Oreopasites</i> Cockerell (Hymenoptera, Apoidea)	National Science Foundation
The biology and immature stages of the aberrant South African panurgine bee genus <i>Melitturgula</i> (Hymenoptera, Andrenidae)	National Science Foundation
The biology and larvae of the parasitic bee genus <i>Dioxys</i> (Hymenoptera, Megachilidae)	
Investigations on the beetle <i>Micromulthus debilis</i> LeConte in amber from Chiapas, Mexico (Coleoptera, Micromalthidae)	
The biology of Neotropical Anthophoridae (Hymenoptera, Apoidea)	National Science Foundation
Biological notes on <i>Colletes compactus</i> and its cuckoo bee <i>Epeolus pusillus</i> (Hymenoptera, Colletidae and Anthophoridae)	National Science Foundation
The biology of <i>Scrapter</i> and its cuckoo bee <i>Pseudodichroa</i> (Hymenoptera)	National Science Foundation; The University of Kansas
Biology of the bee genus <i>Dufourea</i> and its cleptoparasite <i>Neopasites</i> (Hymenoptera)	United States Department of Agriculture
Jerome G. Rozen, Jr., with Frederick D. Bennett, Research Associate	
Jerome G. Rozen, Jr., with Marjorie S. Favreau, Scientific Assistant	
Jerome G. Rozen, Jr., with Charles D. Michener, Research Associate	
Jerome G. Rozen, Jr., with P. Torchio and G. E. Bohart, both Independent Investigators, and Marjorie S. Favreau	

## RESEARCH IN PROGRESS OR COMPLETED

Investigator	Research Project	Additional Sources of Support
DEPARTMENT OF ENTOMOLOGY (continued)		
Willis J. Gertsch, Curator	The spider families Atypidae and Mecicobothriidae in North America	National Science Foundation
	The cave spiders of the United States	National Science Foundation
	The spider genera <i>Cyclocosmia</i> , <i>Bothriocyrtum</i> , and <i>Ummidia</i> (Araneae, Ctenizidae) in North America	National Science Foundation
	Supplementary data on North American species of <i>Loxosceles</i> (Araneae, Scytodidae)	National Science Foundation
	The spider family Filistatidae in North and South America	National Science Foundation
	Spider miscellaneous: Descriptions of various new American spiders supplementing recent revisions	National Science Foundation
Willis J. Gertsch, with A. F. Archer, Professor, Tift College, Forsyth, Georgia	The spider genus <i>Eustala</i> in the West Indies (Araneae, Araneidae)	National Science Foundation
Willis J. Gertsch, with Michael Soleglad, Independent Investigator	The scorpions of the genus <i>Uroctonus</i> in North America (Scorpionida, Vejoviidae)	National Science Foundation
Frederick H. Rindge, Curator	Revisionary studies of the genera of North American Ennominae (Lepidoptera, Geometridae)	National Science Foundation
	Studies of the Geometridae of Chile	





## RESEARCH IN PROGRESS OR COMPLETED

Investigator	Research Project	Additional Sources of Support
DEPARTMENT OF ENTOMOLOGY (continued)		
Alexander B. Klots, Research Associate	A monograph of the North American moths of the subfamily Crambinae (Lepidoptera, Pyralidae)	National Science Foundation
Alexander B. Klots, and Cyril F. dos Passos, Research Associate	A revision of <i>Erora laeta</i> with notes on closely related species (Rhopalocera, Lycaenidae)	
Kumar Krishna, Research Associate	Revisionary studies of Oriental termite genera <i>Homalotermes</i> , <i>Procapritermes</i> , <i>Microcapritermes</i> , <i>Dicuspidermes</i> , <i>Labioapritermes</i> , and <i>Pericapritermes</i>	National Science Foundation
Cyril F. dos Passos	The types of <i>Colias</i> ( <i>Zerena</i> ) <i>eurydice anorphae</i> Henry Edwards (Lepidoptera, Pieridae)	
Cyril F. dos Passos, and L. P. Grey, Independent Investigator	<i>Speyeria</i> ( <i>Speyeria</i> ) <i>nokomis</i> (Edwards), 1862, its distribution and subspeciation (Lepidoptera, Nymphalidae)	
Cyril F. dos Passos, and Alexander B. Klots	The synonym of <i>Anthocaris</i> ( <i>Falcapica</i> ) <i>midae</i> (Hübner) and the description of a new subspecies (Lepidoptera, Pieridae)	
Patricia Vaurie, Research Associate	Revision of the genus <i>Scyphophorus</i> (Coleoptera, Curculionidae)	
	Revision of the tribe Sipalini (Coleoptera, Curculionidae)	
Wilton Ivie, Research Fellow	The spider genus <i>Cicurina</i> in North America (Araneae, Agelenidae)	National Science Foundation

The spider genus <i>Agelenopsis</i> in North America (Araneae, Agelenidae)	National Science Foundation
The spider genus <i>Meioneta</i> in North and Central America (Araneae, Linyphiidae)	National Science Foundation
Notes of the genus <i>Homonopsis</i> V. Kuznetsov (Lepidoptera, Tortricidae)	National Science Foundation
Genera Tortricidarum, Check list of genera and subgenera belonging to the families Tortricidae (Cecropidae, Chladanotidae, Schoenotenidae, and Olethreutidae included) and Phalonidae	National Science Foundation
Some apocryphal species of the Tortricinae (Lepidoptera: Tortricidae)	National Science Foundation
Die Gattungen der palaarktischen Tortricidae III. Addenda und Corrigenda 2. Notes on the Palaearctic Laspeyresini	National Science Foundation
Die Gattungen der palaarktischen Tortricidae II. Die Unterfamilie Olethreutinae. 7. Tribus Eucoomini (Heinr. 1923) — Fortsetzung	National Science Foundation
Records and descriptions of Palaearctic and South Asiatic Laspeyresini (Lepidoptera, Tortricidae)	National Science Foundation
Notes on and descriptions of <i>Aphelia</i> , <i>Clepsis</i> , and <i>Choristoneura</i> species (Lepidoptera, Tortricidae)	National Science Foundation
Descriptions and records of South Asiatic Laspeyresini (Lepidoptera, Tortricidae)	National Science Foundation
The Psocoptera of the Bahama Islands	

Nicholas S. Obraztsov, Research Fellow (deceased); manuscripts completed by A. Diakonoff, Curator, Leiden Museum, the Netherlands

Siu Kai Wong, Research Fellow

## RESEARCH IN PROGRESS OR COMPLETED

Investigator	Research Project	Additional Sources of Support
DEPARTMENT OF ENTOMOLOGY (continued)		
	A numerical study of the world species of Peripsocidae and Ectopsocidae	
	A study of the internal genital systems and chromosome numbers of Psocoptera species	
Tatiana Gidaspow, Independent Investigator	Revision of ground beetles belonging to <i>Scaphinotus</i> , subgenera <i>Neocychrus</i> , <i>Stenocantharis</i> , and <i>Namaretus</i> (Coleoptera, Carabidae)	
DEPARTMENT OF FOSSIL INVERTEBRATES		
Norman D. Newell, Chairman and Curator	Bivalvia—"Treatise on Invertebrate Paleontology"	National Science Foundation
	Salt Range Permian Bivalves	University of Wyoming
Norman D. Newell, with Donald W. Boyd, Research Associate	Bivalvia of the North American Permian—Pseudomonotinae	University of Wyoming
	Bivalvia of the North American Permian—Myophoriidae	Columbia University; National Science Foundation
Roger L. Batten, Curator	Shell microstructure of primitive gastropods	Columbia University
	Origins of main gastropod groups	Columbia University; Geological Survey of Malaysia
	Malaysian Permian gastropods	Columbia University
	Permian gastropods of Japan	

Robert Hinds, Graduate Student, Columbia University	Early Tertiary Bryozoa	Columbia University
	Some Ordovician coelenterates from Utah	Columbia University
	Some Ordovician trepostome bryozoans from Utah	Columbia University
R. Niles Eldredge, Graduate Student, Columbia University	Mathematical population analysis of some Devonian <i>Phacops</i> (trilobites)	Columbia University

#### DEPARTMENT OF HERPETOLOGY

Charles M. Bogert, Chairman and Curator

Revision of the patch-nosed snakes of the genus *Salvadora*, with special reference to phenomena associated with speciation within the group

Variations in the tongue of lizards and an evaluation of lingual characters in families and genera of the suborder Sauria

A supplement to the monograph of the lizards of the family Helodermatidae

A revision of the Mexican lizards of the genera *Abronia*, *Barisia*, and *Gerrhonotus*, with a reappraisal of diagnostic characters

Systematic revisions of the terrestrial plethodontid salamanders of the genus *Pseudoeurycea* in the Sierra Madre del Sur of southern Mexico

Interspecies competition, its role in the diversification and distribution of the plethodontid salamanders of the genus *Pseudoeurycea* in mountains of Mexico

## RESEARCH IN PROGRESS OR COMPLETED

Investigator	Research Project	Additional Sources of Support
DEPARTMENT OF HERPETOLOGY (continued)		
	The distribution, differential characters, and the affinities of the dwarf boas of Middle America	
	The definitive characters and relationships of a boa discovered in a cloud forest in southern Mexico, with a critical appraisal of the characters used to define the <i>Tropidophini</i>	
	A systematic review of the green, prehensile-tailed pit vipers of Middle America, with the description of a new species from Mexico	
	Direct development of the eggs of the Mexican leptodactylid <i>Eleutherodactylus decoratus</i>	
Richard G. Zweifel, Curator	The effects of temperature, body size, and hybridization on the mating calls of the North American toads <i>Bufo americanus</i> and <i>Bufo woodhousii fowleri</i>	National Science Foundation (Undergraduate Research Participation Program)
	Revision of the Asterophryinae (Microhylidae), a subfamily of frogs of New Guinea	National Science Foundation; John Sluder
	Temperature tolerances, developmental rates, and other aspects of the ecology of the embryos of frogs in the deserts of the American Southwest	National Science Foundation

<i>Eleutherodactylus angustii</i> (account of the barking frog prepared for the "Catalogue of American Amphibians and Reptiles")	National Science Foundation
Description of a new species of frog genus <i>Sphenophryne</i> , from New Guinea	
<i>Rana tarahumarae</i> (account of the Tarahumara frog prepared for the "Catalogue of American Amphibians and Reptiles")	
<i>Rana muscosa</i> (account of the mountain yellow-legged frog prepared for the "Catalogue of American Amphibians and Reptiles")	
<i>Rana boylei</i> (account of the foothill yellow-legged frog prepared for the "Catalogue of American Amphibians and Reptiles")	National Science Foundation
Ecology of a population of Fowler's toad, <i>Bufo woodhousii fowleri</i> , on Long Island	
Ecology of a population of painted turtles, <i>Chrysemys picta</i> , on Long Island	National Science Foundation
Comparison of growth and survival in a mixed population of frogs, <i>Rana catesbeiana</i> and <i>Rana clamitans</i> , on Long Island	National Science Foundation
The genera of reptiles and amphibians: a study to consolidate information	National Science Foundation
A new species of <i>Bufo</i> from Africa, with comments on the toads of the <i>Bufo regularis</i> complex	

Richard G. Zweifel, assisted by Alan Brown, Undergraduate Research Participant

Herndon G. Dowling, Research Associate, Itzhak Gilboa, Assistant Project Director, and Irene Palser, Bibliographic Assistant

Ronalda Keith, Associate

## RESEARCH IN PROGRESS OR COMPLETED

Investigator	Research Project	Additional Sources of Support
DEPARTMENT OF ICHTHYOLOGY		
Donn E. Rosen, Chairman and Associate Curator	Studies of the relationship of reproductive specializations to colonization in northern hardy fishes	National Science Foundation
	Studies of New World synbranchid fishes	
	Systematic and zoogeographic survey of killifishes of the western North Atlantic	
Donn E. Rosen, with Reeve M. Bailey, Research Associate	Faunal and zoogeographic studies of Guatemalan fishes	James C. Greenway, Jr.
Donn E. Rosen, with P. Humphry Greenwood, Research Associate	Studies on the origins and relationships of the ostariophysan fishes	National Science Foundation
Donn E. Rosen, with Klaus D. Kallman, Research Associate	Studies of endemism in the Middle American poeciliid genus <i>Xiphophorus</i>	James C. Greenway, Jr.
Donn E. Rosen, with Colin Patterson, Research Associate	Studies on the origins, relationships, and radiations of the spiny-finned fishes	National Science Foundation
James W. Atz, Associate Curator	Systematic studies in the cichlid genus <i>Geophagus</i>	Nixon Griffis
	Development of a storage and retrieval system for the ichthyological literature of the world	National Science Foundation
C. Lavett Smith, Associate Curator	Reproductive systems and phylogeny in teleost fishes, especially hermaphroditism in the Serranidae	National Science Foundation
	Studies of Bahamian fish communities	Office of Naval Research



C. Lavett Smith, with Richard Rosenblatt, Curator of Fishes, Scripps Institution of Oceanography	Revision of eastern Pacific groupers of the genus <i>Epinephelus</i>
C. Lavett Smith, with James C. Tyler, Curator of Fishes, Academy of Natural Sciences of Philadelphia	Studies on garden eels
Gareth J. Nelson, Assistant Curator	Higher classification of clupeoid fishes
	Studies of the functional anatomy and phylogenetic significance of gill arches in engraulid fishes
	A general survey of gill-arch dentition
	Studies of the gill arches of gonorynchi- form fishes
Gareth J. Nelson, with A. L. Tester, Senior Professor of Zoology, University of Hawaii	Analysis of data on shark behavior study
M. Norma Rothman, Scientific Assistant	Comparative anatomical study of anguilli- form and elopiform larvae
Ralph T. Hinegardner, Research Asso- ciate, with Donn E. Rosen	Quantitative studies of haploid DNA in teleostean fishes, and an associated cyto- logical investigation
Jonathan N. Baskin, Graduate Student, Queens College	Taxonomic studies of Middle American catfishes of the genus <i>Rhamdia</i>
	Analysis of the genera of trichomycterid catfishes
John E. Darovec, Graduate Student, Queens College	The comparative anatomy and develop- ment of the caudal skeleton in teleostean fishes
	Office of Naval Research
	National Science Foundation
	James C. Greenway, Jr.
	The City University of New York
	National Science Foundation

## RESEARCH IN PROGRESS OR COMPLETED

Investigator	Research Project	Additional Sources of Support
DEPARTMENT OF ICHTHYOLOGY (continued)		
John E. Darovec, with Merrily McGee, Undergraduate Student, Macalester College, St. Paul, Minnesota	Reproductive ecology of the Japanese rice fish	National Science Foundation
Carlton E. Wynter, Jr., Undergraduate Student, Columbia University, with Joel J. Sohn, Undergraduate Student, City College of the City University of New York	Studies of species diversity in Bahamian fishes	Office of Naval Research
DEPARTMENT OF LIVING INVERTEBRATES		
William K. Emerson, Chairman and Curator	Taxonomy and distribution of Late Cenozoic molluscan marine faunas from the middle latitudes of the New World	
	Monograph on the gastropod genus <i>Drupa</i>	
William K. Emerson, with S. Peter Dance, National Museum of Wales, Cardiff	Monograph of the gastropod genus <i>Morum</i>	National Museum of Wales, Cardiff
William K. Emerson, with William E. Old, Jr., Scientific Assistant	Survey of the fossil and recent molluscan faunas of the Galapagos Islands	
William K. Emerson with Anthony D'Attilio, Associate	Studies on the radulae and operculae of New World muricid mollusks	
Dorothy E. Bliss, Curator, with Edwin A. Martinez, Research Assistant, and Roger Rodriguez, Urban Corps Student	Physical and chemical properties of the color-change hormones in the land crab <i>Gecarcinus lateralis</i>	National Science Foundation
Dorothy E. Bliss, Edwin A. Martinez, and Stefanie M. E. Wang, Research Assistant	Preliminary study of the molt-inhibiting hormone of <i>Gecarcinus lateralis</i>	National Science Foundation

Dorothy E. Bliss, with Stefanie M. E. Wang	Preliminary analysis of the redistribution of water in <i>Gecarcinus lateralis</i> and its neuroendocrine control	National Science Foundation
Dorothy E. Bliss with Carol Ann Mason, Undergraduate Research Participant	Functional significance of the pericardial sacs in <i>Gecarcinus lateralis</i>	National Science Foundation
Ernst Kirsteuer, Assistant Curator	Systematics and ecology of marine Nemertini of the Indian Ocean and Caribbean Sea	
William E. Old, Jr.	Studies on the marine invertebrate interstitial faunas	
William E. Old, Jr., with Anthony D'Attilio	Taxonomic studies of the Recent amphineurids	
Horace W. Stunkard, Research Associate	Studies of the Recent muricid gastropods of western Australia	National Science Foundation
	Studies of the asexual generations, life-cycle, and systematic relations of <i>Microphallus limuli</i> Stunkard	National Science Foundation
	Studies on the pentastomes <i>Waddycephalus teretisculus</i> (Baird, 1862) Sambon, 1922, and <i>Parasambonia bridgesi</i> n. g., n. sp., from the lungs of the Australian snake <i>Pseudechis porphyracus</i>	National Science Foundation
Linda Habas Mantel, Research Fellow	Preliminary analysis of salt and water movements in the isolated foregut of <i>Gecarcinus lateralis</i>	National Science Foundation
	Biochemical analysis of blood, stomach fluid, and pericardial sac fluid during the intermolt cycle of <i>Gecarcinus lateralis</i> and after surgical treatment	National Science Foundation
Anthony D'Attilio	Taxonomic studies of the muricid gastropods	

## RESEARCH IN PROGRESS OR COMPLETED

Investigator	Research Project	Additional Sources of Support
DEPARTMENT OF LIVING INVERTEBRATES (continued)		
Morris K. Jacobson, Associate	A monograph of the terrestrial mollusks of Nicaragua	National Science Foundation; Harvard University
Morris K. Jacobson, with William J. Clench, Research Associate	A monographic study of the Cuban helioid gastropods	
Arnold Ross, Senior Technician	Annotated catalogue of the type specimens (exclusive of mollusks) in the Department of Living Invertebrates	
Harold S. Feinberg, Technician	Studies on the gastropod genus <i>Liguus</i> ; the classification of the phylum Brachiopoda	
DEPARTMENT OF MAMMALOGY		
Richard G. Van Gelder, Chairman and Associate Curator	A systematic revision of the hog-nosed skunks, genus <i>Conepatus</i>	National Science Foundation
	Analysis of variation within a population of striped skunks, genus <i>Mephitis</i>	
Richard G. Van Gelder, with Graciela Carreno, Undergraduate Research Participant	Population dynamics of small mammals at the Kalbfleisch Field Research Station	
Sydney Anderson, Associate Curator	The mammals of Chihuahua: Taxonomy and distribution	
	Methodology and instrumentation in mammalogy	National Science Foundation
	A pilot study of citation retrieval for the mammalogical literature	

Karl F. Koopman, Associate Curator	Taxonomic status of <i>Neotoma albigula</i> (Rodentia) in southern Chihuahua, Mexico	University of Michigan
James N. Layne, Archbold Curator	The bats of the Sudan: Taxonomy and distribution The bats of the Lesser Antilles: Geographic distribution and classification Habitats, bird, amphibian, and reptile populations and ecology of the Archbold Biological Station Population ecology of the mammals of the Archbold Biological Station Comparative ecology of the mice <i>Peromyscus floridanus</i> and <i>P. gossypinus</i> Comparative morphology of the spermatozoa of <i>Peromyscus</i> Systematic studies of Indo-Australian rodents (Muridae) <i>Crocidura</i> (Soricidae) of Celebes: Taxonomy and distribution A systematic revision of Neotropical ichthyomyine rodents (Muridae)	National Science Foundation; Explorers Club of New York
James N. Layne and Alicia Linzey, Research Associate, Department of Biology, University of South Alabama	Summary of the Seventh Archbold Expedition to New Guinea, 1964	
Guy C. Musser, Archbold Assistant Curator	Mammary formulas, breeding seasons, and numbers of pouch young of New Guinea marsupials	
Guy C. Musser, with Karl F. Koopman		
Guy C. Musser, with Emmet T. Hooper, Curator of Mammals, University of Michigan Museum of Zoology		
Hobart M. Van Deusen, Archbold Assistant Curator		

## RESEARCH IN PROGRESS OR COMPLETED

Investigator	Research Project	Additional Sources of Support
DEPARTMENT OF MAMMALOGY (continued)		
	Taxonomic status of the giant bandicoot, <i>Peroryctes broadbenti</i> (Marsupialia, Permelidae)	
	Prey mammals of the sooty barn owl, <i>Tyto tenebricosa</i> , of New Guinea as shown by pellet analysis	
	Additional records of <i>Phalanger atrimaculatus</i>	
DEPARTMENT OF MICROPALAEONTOLOGY		
Angelina R. Messina, Acting Chairman and Associate Curator, with Harold L. Cousminer, Research Associate	Computerized data-storage and retrieval system for micropaleontology	American Geological Institute; National Science Foundation
Angelina R. Messina, Richard Charnatz, Assistant Curator, and Lili E. Ronai, Scientific Assistant	Ranges of index smaller foraminifera	National Science Foundation
	Taxonomy and nomenclature of foraminifera and Ostracoda	
Hugo D. Freudenthal, Research Fellow	Nutrition, ecology, and life cycles of planktonic foraminifera	National Science Foundation
John J. Lee, Research Fellow	A new approach to nutrition physiology and mineral cycling of foraminifera	Atomic Energy Commission
John J. Lee, with Stanley Pierce, Research Fellow	Environmental influence on the morphology, life cycle, and taxonomy of the Allogromiidae	National Science Foundation

# DEPARTMENT OF MINERALOGY

D. M. Vincent Manson, Assistant Curator

Structural geology, Kakamas Keimoes area in the Republic of South Africa

Columbia University

Multivariate analysis of numerical data

Chemical variation in chondritic meteorites

Geometric patterns and geology

Petrogenesis of pegmatite minerals

Pegmatite minerals of the world

Ultramafic nodules in basaltic lavas, San Carlos, Arizona

National Science Foundation

Chemistry and petrology of the mesosiderites

National Aeronautics and Space Administration; Columbia University

David M. Seaman, Scientific Assistant

Martin Prinz, Assistant Professor, Tufts University, and D. M. Vincent Manson

B. A. Powell, Graduate Student, Columbia University

# DEPARTMENT OF ORNITHOLOGY

Dean Amadon, Chairman and Lamont Curator of Birds, with Jean Delacour, Research Associate

Biology of the curassows (Cracidae)

Wesley E. Lanyon, Curator

Biosystematics of flycatchers of the genus *Myiarchus*

Hybridization in meadowlarks (*Sturnella*)

Population dynamics of birds of Long Island field station

National Science Foundation

Wesley E. Lanyon, with George V. M. Powell, Harry L. Jones, David Ewert, Joseph M. Wunderle, Jr., Undergraduate Research Participants

Charles Vaurie, Curator

Systematics of curassows (Cracidae)

The birds of Tibet — distribution and systematics

## RESEARCH IN PROGRESS OR COMPLETED

Investigator	Research Project	Additional Sources of Support
DEPARTMENT OF ORNITHOLOGY (continued)		
Lester L. Short, Jr., Associate Curator	Systematics and evolution of woodpeckers	National Science Foundation
	Systematics of South American meadowlarks (Icteridae)	
	Faunal studies of Argentine birds	
	Hybridization in birds	
Charles E. O'Brien, Assistant Curator	Systematics of birds of the American tropics	
Robert Cushman Murphy, Curator Emeritus	Biology of the petrels (Procellariiformes)	
Walter Bock, Research Associate	Functional anatomy of birds	
Eugene Eisenmann, Research Associate	Preparation of a check list of North American birds	American Ornithologists' Union
	Biology of tropical American birds	
James C. Greenway, Jr., Research Associate	Preparation of list of types of birds in The American Museum of Natural History	
G. Stuart Keith, Research Associate	Taxonomy and distribution of East African birds	
Edwin O. Willis, Research Associate	Biology of ant-following birds	
John Bull, Field Associate	The birds of New York State	



Mary LeCroy, Research Assistant	Systematics of New Guinea birds	
	Systematics of Philippine birds	
DEPARTMENT OF VERTEBRATE PALEONTOLOGY		
Bobb Schaeffer, Chairman and Curator	The braincase of the Cretaceous holostean fish <i>Macrepistius</i> , with consideration of the origin of the holostean braincase from the palaeniscoid type	Paleontology Endowment Fund
	Marine Lower Triassic fishes from Wapiti Lake, British Columbia	Paleontology Endowment Fund
	Jurassic fishes from the Sundance Formation and Wanakah Formation	Paleontology Endowment Fund
	The fishes of the Tethys Sea in relation to the diversification of the holosteans and teleosts	
Bobb Schaeffer, with David H. Dunkle, Research Associate	A redescription of the subholostean fish <i>Ptycholepis</i> from the Newark Group	Natural Science Museum, Cleveland, Ohio
Bobb Schaeffer, with Marlyn M. Mangus, Scientific Assistant	A comparison of the fish assemblage from the Upper Triassic Newark Group with other continental fish faunas of Triassic age	
Edwin H. Colbert, Curator	Triassic tetrapods	National Science Foundation; and institutions in Europe, Brazil, Israel, India, Australia
	The Triassic dinosaurs of North America	
	The Triassic Granton fauna	
	A Jurassic pterosaur from Cuba	
	Triassic reptiles of Brazil	

## RESEARCH IN PROGRESS OR COMPLETED

Investigator	Research Project	Additional Sources of Support
DEPARTMENT OF VERTEBRATE PALEONTOLOGY (continued)		
Edwin H. Colbert, with Dale A. Russell, Curator of Vertebrate Paleontology, Na- tional Museum of Canada	The Cretaceous dinosaur <i>Dromaeosaurus</i>	National Museum of Canada
Edwin H. Colbert, with Wann Langston, Vertebrate Paleontologist, Texas Memo- rial Museum	The Cretaceous Aguja fauna of Texas	Texas Memorial Museum
Edwin H. Colbert, with Peter J. Barrett, and Ralph Baillie, Geologists of the In- stitute of Polar Studies, Ohio State Uni- versity	Triassic amphibian from Antarctica	Institute of Polar Studies; National Science Foundation
Malcolm C. McKenna, Frick Associate Curator	The evolution of the Insectivora	Frick Laboratory Endowment Fund
	Classification of the Mammalia	Frick Laboratory Endowment Fund
	A new family of condylarths	Frick Laboratory Endowment Fund
	A new Miocene fauna from the Bighorn Mountains, Wyoming	Frick Laboratory Endowment Fund
	Late Cenozoic Gerbillinae (Cricetidae: Rodentia) from Afghanistan	
	Morphology of the late Cenozoic Macro- podidae (Marsupialia)	
Richard H. Tedford, Associate Curator	The North American Hemicyoninae (Ursidae: Carnivora)	Frick Laboratory Endowment Fund

Richard H. Tedford and Leonard B. Rad- insky, Research Associate	The phylogeny and classification of the order Carnivora (Mammalia)	Frick Laboratory Endowment Fund
Richard H. Tedford, with E. Mitchell, Fisheries Research Board, Canada	Summary of field work in Afghanistan	
Richard H. Tedford, C. A. Repenning, United States Geological Survey, and S. D. Webb, University of Florida	A new aquatic ursid carnivore (Mam- malia) from the north Pacific early Mio- cene	Fisheries Research Board, Canada
Morris F. Skinner, Frick Assistant Cura- tor	Miocene mammal faunas from Nevada	United States Geological Survey
	A generic review of the Equidae	Frick Laboratory Endowment Fund
	Geology of the Sheep Creek and Snake Creek deposits of Sioux County, Nebraska	Frick Laboratory Endowment Fund
	A Miocene fauna from south-central Dakota	Frick Laboratory Endowment Fund
Ted Galusha, Frick Assistant Curator	The stratigraphy of the Santa Fe Group, New Mexico	Frick Laboratory Endowment Fund
	The geology, stratigraphy, and paleon- tology of the late Tertiary deposits in northwest Nebraska	Frick Laboratory Endowment Fund
	Mammals of the Ceja del Rio Puerco area, New Mexico	Frick Laboratory Endowment Fund
	The affinities of <i>Felis atrox</i> from Alaska	Frick Laboratory Endowment Fund
	The subfamilies of the Camelidae	Frick Laboratory Endowment Fund
Beryl E. Taylor, Frick Assistant Curator	A generic review of the subfamily Poe- brotheriinae	Frick Laboratory Endowment Fund

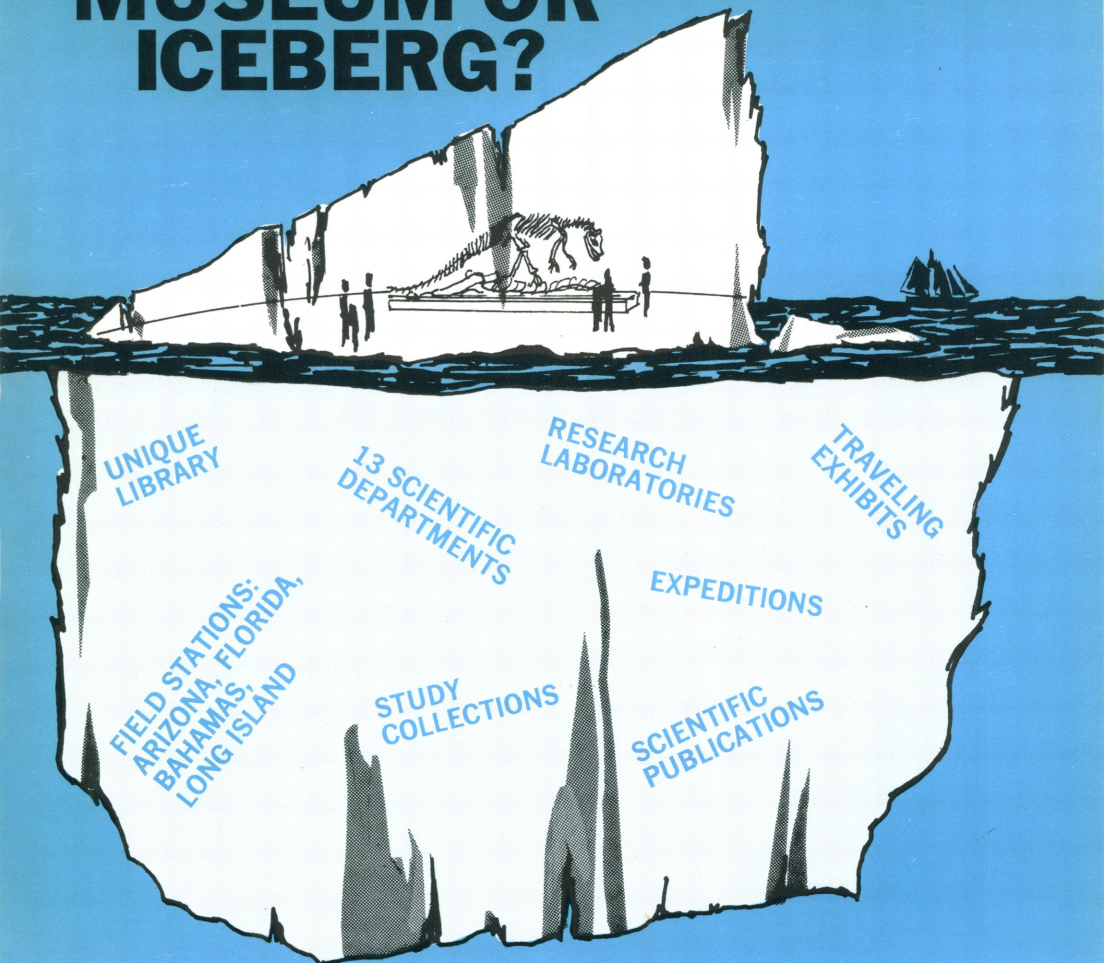
## RESEARCH IN PROGRESS OR COMPLETED

Investigator	Research Project	Additional Sources of Support
DEPARTMENT OF VERTEBRATE PALEONTOLOGY (continued)		
Max K. Hecht, Research Associate	The late Tertiary Antilocaprinae of North America	Frick Laboratory Endowment Fund
	Upper Jurassic frogs of Spain	National Science Foundation
	Eocene alligatorine Crocodilia	National Science Foundation
Max K. Hecht, with M. Seidel, Graduate Student	Variation in snake vertebrae and its relation to fossil identification	Research Grant, City University of New York
Giles T. Mac Intyre, Assistant Professor, Queens College	Evolutionary origins of the order Carnivora	Queens College, New York
	Patterns of ear-region anatomy in mammals and quasi-mammals	Queens College, New York
James S. Mellett, Assistant Professor, New York University	Taxonomy and functional anatomy of the genus <i>Hyaenodon</i>	Frick Laboratory Endowment Fund
Harold F. Roellig, Assistant Professor, Adelphi College	The adaptive significance of pigmentation in fishes and tetrapods	
	The Osteoglossidae, fossil and Recent	
Frederick S. Szalay, Assistant Professor, Hunter College, City University of New York	Uinatosoricinae, a new family of early mammals (?Primates)	National Science Foundation
	Hapalodectinae, and a phylogeny of the Mesonychidae (Mammalia, Condylarthra)	National Science Foundation

Revision of the Anaptomorphidae (Mammalia, Primates)	National Science Foundation
Origin and evolution of mesonychid feeding mechanism	National Science Foundation
Cranial anatomy of the early primates <i>Tetonius</i> and <i>Phenacolemur</i>	City University of New York
Pautolestidae (Insectivora) from the late Eocene of Central Asia	City University of New York
On primitive placental mammals of the early Tertiary of Central Asia	National Science Foundation
The evolution of <i>Eastmanosteus pustulosus</i> and related Middle and Upper Devonian dinichthyid euarthrodires	National Science Foundation; Graduate Traineeship, Columbia University
The internal structure and microstructure of <i>Meniscoessus robustus</i>	National Science Foundation; Foundation Traineeship, Columbia University
Origin and evolution of pleurodires	National Science Foundation Summer Fellowship
Stratigraphy of the Hornerstown Formation	Columbia University
Turtle jaw musculature	
Jurassic turtles of North America	
Variation and operation of the dental apparatus of <i>Didelphis marsupialis</i> and its relevance to the study of variation and occlusion in fossil North America marsupials	Queensborough Community College
Frederick S. Szalay, with Malcolm C. McKenna	
John Boylan, Graduate Student, Columbia University	
Eugene Gaffney, Graduate Student, Columbia University	
Sylvia F. Graham, Graduate Student, Rutgers University	



# MUSEUM OR ICEBERG?



The bulk of an iceberg lies below the surface, unseen and dreaded by mariners. Much of the work of The American Museum of Natural History is not seen by the public, but these endeavors are an aid, not a hindrance, to man's navigation among the mysteries of life. Each of our thirteen scientific departments represents a discipline which fills a vital role in the understanding of nature, from the terrible strains of overpopulation in India to the ability of migrating birds to chart a thousand-mile flight. We publish substantially more scientific literature than any other museum of natural history. Our scientists and collections are known literally on every continent. But what is our image in New York City? "Entertaining the kids on a rainy day." We're out to change that image.

For thousands of New York children a visit to this museum is more than entertainment. For example, 700 from Campaign Culture, a summer program in the Bedford-Stuyvesant area, attended a sky show at the Planetarium in the course of which they heard Dr. Branley explain the achievements of Negro astronomers. They also saw our newest hall, "Man In Africa," and here is a comment which makes worthwhile six years of work on the hall: "I want to go to Africa now. If you had called me black last year I would have punched you in the face. I never knew there was anything to our heritage except half-naked people running around the rain forest before this program."



# ENDOWMENT FUND GIFTS AND BEQUESTS

In the past ten years the endowment funds of The American Museum of Natural History have grown from \$21,820,135 (book value) to \$44,786,576. This has been due to the generosity of individuals and corporations who have wished to participate in our vital work through bequests, purchases of life membership (\$500) and gifts. Without income from unrestricted endowment, our research, exhibition, publishing and educational programs (including our library) as well as our field stations would be drastically curtailed. We were the recipient of endowment funds from the following sources during the fiscal year ended June 30, 1968:

## ESTATE BEQUESTS:

ELMER C. OTTO .....	\$ 6,777.42
EUDORA HULL SPALDING .....	10,335.09
LOUIS HAUSWIRTH .....	300.57
ADELAIDE DEGROAT .....	5,000.00
LOUISA COMBE .....	2,913.39
ROSAMOND SMITH .....	160.46
DUNCAN S. ELLSWORTH .....	10,000.00
EDWARD MORITZ .....	1,248.53

## OTHER GIFTS:

LIFE MEMBERSHIPS (10) .....	5,000.00
HUMBLE COMPANIES CHARITABLE TRUST .....	10,000.00
CHILDS FRICK CORPORATION .....	6,200,628.98
	<u>\$6,252,364.44</u>

**YOUR WILL** . . . a legacy to man's greater understanding of the world of nature, including his ability to survive on this ever shrinking earth.

While it is suggested that an attorney assist in arranging a bequest, this simple form is adequate:

"I give and bequeath to The American Museum of Natural History, a corporation organized under the laws of the State of New York, the sum of \$....." (or describe stocks, bonds, real property or other bequests). Bequests, as well as all other forms of donations, are exempt from federal gift and estate taxes.



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

**FINANCIAL STATEMENTS**

**AS OF JUNE 30, 1968**

**THE AMERICAN MUSEUM**  
**BALANCE SHEET,**

<b>ASSETS:</b>	<b>General Fund</b>	<b>Special Funds</b>
Cash:		
Demand deposits	\$ 438,475	\$ 240,247
Time deposits		1,014,095
Accounts receivable	487,699	18,058
Investments (Notes 1 and 2):		
Bonds		1,995,434
Preferred stocks		
Common stocks		
Planetarium Authority bonds (Note 3)		
Total investments		1,995,434
Prepaid expenses and other assets	171,685	6,952
	<u>\$1,097,859</u>	<u>\$3,274,786</u>
<b>LIABILITIES AND FUNDS:</b>		
Accounts payable and accrued liabilities	\$ 211,462	
Deferred income	805,155	
Advance from the City of New York	150,000	
Funds:		
General fund (deficit)	(68,758)	
Special funds (Note 4)		\$3,274,786
Endowment funds (Note 5)		
Investment in Planetarium Authority bonds		
Pension Fund		
Frick Employees Retirement Fund		
	<u>\$1,097,859</u>	<u>\$3,274,786</u>

The accompanying notes are an

OF NATURAL HISTORY

June 30, 1968

Endowment Funds	Investment in Planetarium Authority Bonds	Pension Fund	Frick Employees Retirement Fund	Total
\$ 303,898		\$ 111,927 20,000	\$ 69,553	\$ 1,164,100 1,034,095 505,757
24,998,264 2,460,741 17,278,846		6,914,479 534,643 2,798,102	488,362	34,396,539 2,995,384 20,076,948 425,000
	\$425,000			
44,737,851	425,000	10,247,224	488,362	57,893,871 178,637
45,041,749	425,000	10,379,151	557,915	60,776,460
				\$ 211,462 805,155 150,000 (68,758) 3,274,786 45,041,749 425,000 10,379,151 557,915
45,041,749	425,000	10,379,151	557,915	60,776,460
45,041,749	425,000	10,379,151	557,915	60,776,460

integral part of these statements.

# SUMMARY STATEMENTS

for the year ended

	General Fund
Balance (deficit), July 1, 1967	(\$ 34,809)
Additions:	
Appropriation from the City of New York	1,874,308
Gifts, bequests and grants (Note 6)	321,115
Interest and dividend income:	
Endowment funds	1,492,767
Other	42,327
Net profit on sales of investments	
Contributions of pension fund members and Museum (Note 8)	
Other income (Notes 3, 6 and 7)	598,726
	4,329,243
Deductions:	
Expenditures for:	
Educational activities	1,786,989
Special purposes and objects for which the funds were established	
Payments to pensioners and beneficiaries	
General administrative expenses	810,377
Plant operating and maintenance expenses	1,361,299
Pension and other social benefit expenses (Note 8)	442,224
	4,400,889
Transfers between funds	37,697
Balance (deficit), June 30, 1968	(\$ 68,758)

The accompanying notes are an

OF CHANGES IN FUNDS

June 30, 1968

<u>Special Funds</u>	<u>Endowment Funds</u>	<u>Pension Fund</u>	<u>Frick Employees Retirement Fund</u>
<u>\$1,255,295</u>	<u>\$39,797,420</u>	<u>\$ 9,830,314</u>	
1,081,561	6,507,537		\$564,443
388,887			
16,896		464,489	
	1,591,868	101,896	
507,549		452,938	
<u>1,994,893</u>	<u>8,099,405</u>	<u>1,019,323</u>	<u>564,443</u>
2,743,367			
	5,000	465,131	
44,414		5,355	6,528
<u>2,787,781</u>	<u>5,000</u>	<u>470,486</u>	<u>6,528</u>
<u>2,812,379</u>	<u>(2,850,076)</u>		
<u>\$3,274,786</u>	<u>\$45,041,749</u>	<u>\$10,379,151</u>	<u>\$557,915</u>

integral part of these statements.

## NOTES TO FINANCIAL STATEMENTS

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

Investments are recorded at cost in respect of those purchased, and in respect to 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. Market valuations of investments are as follows:

Special funds	\$ 1,995,781
Endowment funds	56,025,666
Pension Fund	11,760,536
Frick Employees Retirement Fund	489,689
	<hr/>
	<u>\$70,271,672</u>

3. The investment in bonds (\$570,000 principal amount) of The American Museum of Natural History Planetarium Authority is carried at cost. The financial statements of the Authority, which is operated under the supervision of the Museum's management, are annexed. Interest income of \$25,650 received during the year from the Planetarium is included in other income of general funds.
4. The balance at June 30, 1968 of special funds (funds which are received or appropriated for specific purposes) is net of overdrafts of approximately \$300,000. These overdrafts represent expenditures in anticipation of gifts, grants, other income and transfers from other funds.
5. Endowment funds (including certain funds functioning as endowment) are summarized as follows:

	<u>Restricted Purposes</u>	<u>Unrestricted Purposes</u>	<u>Total</u>
Endowment funds, income available for	\$20,892,464	\$ 8,771,777	\$29,664,241
Funds functioning as endowment, principal and income available for	4,107,701	11,269,807	15,377,508
	<hr/>	<hr/>	<hr/>
	<u>\$25,000,165</u>	<u>\$20,041,584</u>	<u>\$45,041,749</u>

6. The Museum owns an interest in certain mining properties (acquired by bequest) which is not reflected in the balance sheet. During the year, royalties received from this source

- were credited to general funds (\$50,000, included in other income) and endowment funds (\$16,989, included in bequests).
7. Other income of general funds includes net income of \$143,848 from magazine and book shop operations. Gross income from these operations amounted to \$1,666,475.
  8. The pension plan of the Museum covers substantially all its employees. The Museum and each member contribute to the Pension Fund 6% and 5%, respectively, of the member's compensation as defined. Contributions by the Museum (including the Planetarium Authority) amounted to \$246,905 for the year.

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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, 1968 and the related summary statements of changes in funds for the year then ended. Our examination was made in accordance with generally accepted auditing standards, and accordingly included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

In our opinion, the accompanying balance sheet and related summary statements of changes in funds present fairly the financial position of The American Museum of Natural History at June 30, 1968, and the results of its operations for the year then ended, in conformity with the accounting principles referred to in Note 1 applied on a basis consistent with that of the preceding year.

LYBRAND, ROSS BROS. & MONTGOMERY  
Certified Public Accountants

New York, August 6, 1968.

**THE AMERICAN MUSEUM  
PLANETARIUM  
BALANCE SHEET,**

**ASSETS:**

<b>Cash</b>		<b>\$137,821</b>
<b>Accounts receivable</b>		<b>1,592</b>
<b>Inventory, publications and souvenirs, at cost</b>		<b>21,195</b>
 <b>Equipment, fixtures, etc. (Note 1) :</b>		
<b>Zeiss planetarium instrument, at cost</b>	<b>\$135,059</b>	
<b>Less, Allowance for depreciation</b>	<b>57,400</b>	
	<hr/>	<b>77,659</b>
 <b>Furniture, fixtures and equipment, at cost, less allowance for depreciation, \$139,526</b>	 <b>1</b>	 <b>77,660</b>
	<hr/>	
 <b>Building, at cost (Note 1)</b>		 <b>569,209</b>
 <b>Land (donated by the City of New York )</b>		 <b>—</b>
		<hr/>
		<b>\$807,477</b>
		<hr/> <hr/>

**The accompanying notes are an**



OF NATURAL HISTORY  
AUTHORITY

June 30, 1968

LIABILITIES:

Accounts payable	\$ 7,357	
4½% Refunding Serial Revenue bonds, past due (Note 2)	570,000	
Accrued interest, past due	315,450	
	<u>892,807</u>	

CONTRIBUTED CAPITAL AND DEFICIT:

Contributed capital:		
Charles Hayden	\$156,869	
Charles Hayden Foundation	250,925	
	<u>407,794</u>	
Deficit, as annexed	493,124	85,330*
	<u>807,477</u>	<u>\$807,477</u>

\* Denotes deduction.

integral part of these statements.

**STATEMENT OF INCOME, EXPENSES AND DEFICIT**  
for the year ended June 30, 1968

**Income:**

Admission fees, less allowances and commissions	\$444,406	
Auxiliary activity, sales booth	88,165	
Special lectures and courses	19,430	
Miscellaneous	3,932	\$555,933
	<hr/>	

**Expenses:**

Preparation, presentation and promotional	214,558	
Operation and maintenance	144,284	
Special repairs and improvements	45,496	
Auxiliary activity, sales booth	70,036	
Administrative and general	21,726	
Pension fund, social security and other employee benefits (Note 3)	31,758	527,858
	<hr/>	<hr/>

Income before interest and depreciation		28,075
Interest on past due 4½% Refunding Serial Revenue bonds	25,650	
Provision for depreciation (Note 1)	6,753	32,403
	<hr/>	<hr/>

Net loss for year		4,328
Deficit, July 1, 1967		488,796
		<hr/>
Deficit, June 30, 1968		\$493,124
		<hr/> <hr/>

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 otherwise discharged. At that time, its personal property passes to The American Museum of Natural History and its real property passes to the City of New York to be maintained and operated in the same manner as other city property occupied by the Museum. It is the policy of the Authority to capitalize only major additions and replacements of equipment, machinery and other plant items and to depreciate such items over their useful lives. Because of the nature of the ownership of the property, provision for depreciation of the building is considered unnecessary.
2. The Planetarium Authority bonds were purchased by The American Museum of Natural History in 1948. The Charles Hayden Foundation contributed \$200,000 to the Museum toward the purchase of such bonds.
3. Substantially all the Authority's employees are members of The American Museum of Natural History Pension Plan. Contributions to the plan by the Authority amounted to \$12,982 for the year.

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, 1968 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.

In our opinion, the accompanying balance sheet and related statement of income, expenses and deficit present fairly the financial position of The American Museum of Natural History Planetarium Authority at June 30, 1968 and the results of its operations for the year then ended, in conformity with the accounting principles referred to in Note 1 applied on a basis consistent with that of the preceding year.

LYBRAND, ROSS BROS. & MONTGOMERY

Certified Public Accountants

New York, August 6, 1968.

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<sup>1</sup>The President is *ex-officio* a member of all advisory committees.



## THE STAFF

*July 1, 1968*

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