

AMERICAN MUSEUM OF NATURAL HISTORY
115th annual report



1983—1984

**American Museum of
Natural History
Central Park West at 79th Street
New York, NY 10024**

Since its founding in 1869, the American Museum has conducted investigations in the anthropological, mineralogical and zoological sciences in an attempt to learn more about the natural world. Research projects in these disciplines form the basis for education programs and exhibitions which were enjoyed by some 2.6 million visitors in 1983-84.

The Museum complex occupies 22 interconnected buildings on 25 acres—four square blocks—on the upper west side of Manhattan across from Central Park. There are 39 exhibition halls, three theaters, classroom and lecture facilities, laboratories, a library, cafeteria and restaurant, and storage areas for more than 35 million artifacts.

The American Museum is the largest natural history museum in the world and is a renowned center of research in the basic sciences. Among its collections are 16 million insect specimens; 23,000 reptiles and amphibians; 600,000 fish; 8.5 million invertebrates; 250,000 mammals; 120,000 rocks, minerals, gems and meteorites; one million birds; 330,000 fossil invertebrates; and 8 million anthropological artifacts.

Some 200 researchers—scientists and their assistants—study these specimens for clues to evolutionary history, life cycles, chemical composition and cultural significance. They conduct field studies around the world and share their findings with colleagues from other institutions through publications. Their research efforts at times form the bases of further applied studies in the health sciences and technology-related industries.

The American Museum was incorporated 115 years ago by the New York State Legislature. Today the Museum receives support for its facilities and programs from several major sources including the City of New York which provides budgetary funds and owns the Museum buildings, the New York State Council on the Arts, National Endowment for the Arts, National Endowment for the Humanities, National Science Foundation, Institute for Museum Services, some 300 corporations, 100 private foundations, 485,000 members, and numerous individual contributors. Visitor contributions and fees for special services also provide a significant and growing source of revenue.

HIGHLIGHTS

1983/July

- "South of Winter: Scenes from Aransas National Wildlife Refuge," funded by Conoco, a Du Pont company, opened as one of three special exhibitions held in conjunction with the Centennial Meeting of the American Ornithologists' Union.

August

- The special exhibition, "Louis Agassiz Fuertes: A Celebration of Birds," featured 100 watercolors, sketches and oils by the artist who is known for dramatic, lifelike illustrations of birds in motion.

September

- The American Ornithologists' Union, founded at the Museum in 1883, marked its 100th anniversary with a meeting at the Museum attended by more than 1000 scientists.
- The special exhibition, "Frances Lee Jaques: Artist and Naturalist," a collection of 50 drawings by Jaques, honored the artist who specialized in birds and painted many of the dioramas at the Museum.
- Twenty New York film premieres were featured among 50 films in the seventh annual Margaret Mead Film Festival.

October

- Three stunning gems on loan from New York gem dealer Allan Caplan were displayed in the Morgan Memorial Hall of Gems.

November

- The traditional Origami Holiday Tree lighting ushered in the holiday season with caroling and festive treats. The annual tree is an Arthur Ross Exhibit of the Month.

December

- A gala party, "A Night for All Creatures," attracted 500 new supporters of the Museum and raised funds for the Natural Science Center.

1984/January

- The National Endowment for the Humanities supported the upcoming special exhibition: "Asante: Kingdom of Gold," with a grant of \$148,878. The Federal Council on the Arts and Humanities provided an indemnity.
- For the third year, a grant from Mobil enabled the Museum to remain open free of charge from 5 p.m. to 9 p.m. on Fridays and Saturdays.

February

- The special exhibition, "Silk Roads/China Ships," funded by the American Express Foundation, explored 2000 years of east/west trade.
- A benefit held in connection with "Silk Roads/China Ships," and funded by the American Express Foundation, raised \$260,000.
- Pop singer Michael Jackson chose the Theodore Roosevelt Memorial Hall as the site of a CBS Records tribute to his music.
- Fifteen Museum scientists joined an international expedition to Cerro de la Neblina, the "Mountain of the Mists," in southern Venezuela.

March

- Lewis Thomas, author, scientist, physician and educator, delivered a series of three addresses titled "The Developing Human Species" in the annual Mack H. Lipkin Man and Nature Lectures.
- The Booth Ferris Foundation awarded \$150,000 to renovate the Hall of Human Biology and Evolution.

April

- Scientists from 20 institutions in 10 countries gathered at the Museum to examine 40 of the world's most important human and pre human fossils assembled for the special exhibition, "Ancestors: Four Million Years of Humanity."
- Gallery 1, a new special exhibition hall, opened with the "Ancestors" exhibition.

May

- The American Association for the Advancement of Science opened its annual meeting with a reception at the Museum.
- The special exhibition, "Peonies of Greece: Myth, Science and Art," opened in the Naturemax Gallery.
- The Department of Anthropology completed installation of a metal compact storage system and created a new 10,000-square-foot mezzanine level to store portions of its ethnographic collections.
- Alexander Marshack, Research Associate at Harvard University's Peabody Museum, delivered the 54th annual James Arthur Lecture on the Evolution of the Human Brain.

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One hundred and fifteenth Annual Report of the President

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

In expressing their goals for the Museum in its Act of Incorporation 115 years ago, the Founding Trustees used language appropriate to their time. They created the Museum:

"for the purpose of establishing and maintaining in [New York] a Museum and Library of Natural History; of encouraging and developing the study of Natural Science; of advancing the general knowledge of kindred subjects, and to that end of furnishing popular instruction."

Often, as I sit in my office managing our affairs, or walk through the halls observing our present vast and impressive facilities, I ponder these simple words and wonder whether what I see going on about me is what my predecessors had in mind. Not so much physically, for the "master plan" to govern the Museum's future construction was developed quickly, but rather whether this or that exhibit, program, publication, lecture series or scientific report is an adequate present-day reflection of the purpose they stated so briefly and clearly long ago.

Given the chance today, would we restate our purposes differently? Should they be recast, not in language, but with respect to purpose, in recognition perhaps that today's world of science and education requires something different of us; that what the Trustees envisioned as a significant purpose is no longer so; that the idea and the ideals of a museum, especially a museum of natural history, no longer have the relevance to society that they foresaw?

While these questions could be asked of any museum, they are particularly important to one of our scale and stature, even more so at the point where we stand today in our history and in the evolution of our science.

The American Museum of Natural History was founded, I believe, to be a great center in the Americas for scholarship in the natural sciences. This was perceived at the time as appropriate for a museum rather than some other kind of institution. If we were to accept this as the real goal of our institution, that is, significant scholarship and education in the natural sciences, how would we then redefine our purposes, our structure, our activities?

These are the kinds of questions to which our staff and Trustees ought to address themselves from time to time, and I have urged them to do so, not out of dissatisfaction for what we are and do, but rather out of concern that we realize the greatest possible potential from the opportunities available to us. In our ambitions for the future, is there growth to which we should strive in function and purpose, as well as in scope, while preserving the very best of what we have? This is the charge I laid out for the Long-Range Planning Committee I appointed this year from among our Trustees, with Mrs. Anne Sidamon-Eristoff as its chairman. I expect that the Committee's report, when it is presented next year, will be far-reaching.

The potentials for museums in serving broader roles in society while still preserving their traditional goals and functions were stressed in *Museums for a New Century*, recently published by the American Association of Museums with generous support from the Phillip Morris Company. This searching study into the structure, diversity, needs and future of museums points the way to similar studies that could and should be undertaken at individual museums such as ours, and also in regional groups of institutions, such as those that serve the New York City community. That valuable insights into the past, present and future can emerge from such studies is well illustrated by the A.A.M. report.

As I reviewed this year's events in preparation for compiling my report, I was struck by the number of examples that illustrate our continuing commitment to the purposes expressed by our founders, and also impressed by the evidence that we have looked beyond traditional museum roles to a

broader interpretation of our place in today's more sophisticated and complex society. Three outstanding examples of the latter come to mind: the meetings of the American Ornithologists Union in September, the program for "Ancestors: Four Million Years of Humanity" and the year-long series of events presented by the Education Department and the Membership Office in our outreach program.

The American Ornithologists Union was founded at the Museum 100 years ago and has met here periodically. Our curators have consistently been active in its affairs and leadership. Now grown to eminence in its field, it ranks among the largest organizations of ornithologists in the world. More than 1000 registrants participated in the scientific sessions held here to celebrate the A.O.U. centenary. Their week-long sessions, in which 370 papers were presented, was climaxed at a gala banquet in the Hall of Ocean Life, bringing to a close the largest and most successful bird study meetings ever organized.

Recognizing the public's interest in birds, we took this opportunity to plan and carry out major renovations in our permanent bird exhibition halls and to present several significant and attractive special exhibitions. New labeling, new lighting and new displays have vastly improved our halls of North American Birds, Birds of the World, and Biology of Birds, and solutions have been found, to be implemented soon, for perplexing problems in the Hall of Oceanic Birds that have plagued us for decades. The special exhibits we presented conveyed our love and concern for birds to wider audiences. "A Celebration of Birds: Louis Agassiz Fuentès and his Art" and "Francis Lee Jacques: Artist and Naturalist" were retrospectives of the sensitive and beautiful bird life renderings executed by these two noted illustrators. Some of their art, produced for the Museum decades ago, still appears in our popular bird dioramas. "South of Winter: Scenes from the Aransas National Wildlife Refuge," on the other hand, illustrates the concern of one industrial company, Conoco, Inc., for protecting the bird habitats in a Gulf coast area where the company operates major oil production facilities.

"Ancestors: Four Million Years of

Humanity" began as a special exhibition and became an instrument of purpose touching nearly every American household in the impact of its extensive news coverage. The Director in his Annual Report message reviews this program in some detail, but I would like to stress just one point. "Ancestors," in presenting its powerful message on human evolution and the unity of all humanity, demonstrated that innovative planning can identify the broader role in community life museums can serve. *Only* a major museum could present a program such as "Ancestors," but a resourceful institution, concerned with the broadest possible interpretation and implementation of its function, could make the important message of this special event come alive for scholars, students, Museum visitors, our members, the museum community world wide and the broader public. I reiterate what I have said often, that "Ancestors" was the most significant event undertaken by the American Museum of Natural History in my memory.

The Museum is particularly grateful to a number of public agencies which supported "Ancestors," including the New York State Council on the Arts for financial support in planning the exhibition and in presenting the public programs; the Federal Council on the Arts and Humanities for granting a Federal Certificate of Indemnification for the specimens; the U.S. Information Agency and the Department of State; and the Wenner-Gren Foundation, the L.S.B. Leakey Foundation and the National Science Foundation for support of the scientific symposium.

Perhaps less dramatic in its immediate impact, but truly far-reaching in its implications and its effects, is the rich and diverse series of outreach programs presented again this year by Education and Membership. By outreach I mean literally to "reach out" in identifying and serving audiences. It is not enough in today's world to serve the audience that comes to you. We have believed for years that we should seek out and nurture new audiences. That is the rationale behind the exciting evening and daytime events offered; the African-American and Caribbean pro-

grams; the celebration of Black History month, Celtic month, African month; the annual Margaret Mead Film Festival; the weekly and weekday films, lectures, dance and music recitals that bring a serious, adult audience to us regularly from the commuting areas around us. These programs are designed to identify, in the real world of people in which we live in New York, the potentials for developing the Museum audiences on which we will depend in the future. That they are succeeding in their goals was demonstrated in the results of the visitor survey about which the Director wrote in last year's Annual Report.

Many of our significant activities this year reflected more traditional though no less important Museum purposes and goals. That the age of terrestrial exploration and discovery is far from over was illustrated in the expedition to Cerro de la Neblina, an isolated mountain mass in southern Venezuela. Museum curators and others from five departments, along with colleagues from Venezuela, Brazil, Colombia, Great Britain and other institutions in the United States carried out research trips to the 9000-foot-high "Mountain of the Mists" and its surrounding jungle. The venture was organized by the Fundación para el Desarrollo de las Ciencias Fisicas, Matematicas y Naturales, in Caracas. Funding for the project came from the William H. Phelps Fund, the Phelps Ornithological Fund and the National Science Foundation.

Equally significant were the continuing archeological excavations and zoological studies carried out by Museum scientists and others under our direction at St. Catherines Island, Georgia, supported by the Edward J. Noble Foundation; and the successful recruitment of an economic geologist to supplement the permanent curatorial staff in our Department of Mineral Sciences. The leadership that produced this innovative mineralogy step came from Vice President and Trustee Plato Malozemoff, who used his influential position in the mining industry to attract \$500,000 in gifts and pledges from mining corporations over a five-year period to aid in supporting the position. Demetrius Pohl, from Stanford University, accepted the appointment we offered to the first such

position established at an American museum.

The year's exhibition program, in fulfillment of our continuing commitment to this aspect of our services, played a major role in the success of the year, both directly and indirectly. It illustrates also the broader interpretation of function that exhibition can and does serve. This year's special exhibitions, in addition to those identified above, included:

- "Silk Roads," a loan collection from the Royal Ontario Museum, Toronto, sponsored by American Express. The exhibition served as the focus for a benefit gala attended by more than 600 persons. American Express, in underwriting its costs, contributed substantially to the \$260,000 generated in Museum support.
- "Theodore Roosevelt—A Natural Naturalist" focused on the 26th President's travels, interests in natural science and concerns for environmental protection. It was presented to celebrate the 125th birthday of Theodore Roosevelt, which the Museum marked at a reception and dinner for the Theodore Roosevelt Association.
- Three stunning gems, the 217.80 carat carved Mogul emerald, an emerald crystal of 667.14 carats, and a "pigeon blood" colored Burma ruby of 15.97 carats, loaned to us by Allan Caplan, a New York dealer who has donated many fine mineral specimens, were placed on display after their preview for the Friends of the Museum, a group of nearly 150 persons who give us special support. The preview provided an opportunity to thank these important benefactors for their interest and generosity.
- "Peonies of Greece: Myth, Science and Art" featured original color lithographs of native Greek peonies, based on botanical studies and illustrations by Mrs. Niki Goulondris. The exhibition was prepared jointly by the staff of the Goulondris Natural History Museum at Kifissia, near Athens, and our staff, illustrating the excellent collaboration we share with institutions and colleagues worldwide.
- "Right Through the Roof! The Wethersfield Meteorites" was a display of a truly unique combination of events, two meteorites which plummeted to earth several years apart to land in the same Connecticut town. It was presented within the context of the



Exhibit-of-the-Month program, supported generously by Trustee Arthur Ross. The annual Origami Holiday Tree, exhibited in the winter, is a major attraction for our large holiday crowds. It is also offered in the Arthur Ross Exhibit-of-the-Month Series, in which we feature new and timely information, science and attractions to visitors year-round.

One of the most challenging of our concerns is to recognize that changing times bring changing opportunities and needs in the sciences. That we are sensitive to this concern is illustrated by the establishment of the new curatorial position in economic mineralogy, mentioned above. We also provided for a number of new curatorial positions in the newly created staff title of curatorial fellow, intended to introduce recently trained post-doctoral scientists to curatorial work in term appointments of up to five years. Additional positions for post-doctoral fellows were also established this year, increasing the Museum's future role in training scientists in our fields, an essential process in which every scientific institution should participate. Support for these positions came from the income we are now earning in the Kalbfleisch Endowment Fund. Additionally, the Chapman Fund, the Theodore Roosevelt Memorial Fund, the Lerner-Gray Fund, the Leonhardt grant in anthropology, the Weatherhead Asian Fund, the Thorne Fund and the Boeschstein Fund also support training and research opportunities through grants and fellowships. A new Office of Grants and

Fellowships was established to supervise and administer the program, through which several hundred research grants and up to a dozen fellowships and curatorial fellows may be supported by the Museum each year.

Our gratitude must be expressed to the individuals and agencies whose generosity has made it possible to plan and carry out the programs I have described, some of whom are identified above. Others include the donors who have made possible the construction of the new facilities in the Charles A. Dana Education Wing, including the Linder and Kaufmann Theaters and the Blum Lecture Hall; the Hearst Foundation, Samuel and May Rudin Foundation and Evelyn Sharp for generous funding of programs in education and community service during the year; Trustee Arthur Ross for his support of major improvements in the Arthur Ross Hall of Meteorites; Trustee Donald C. Platten for leading us once again in a most successful corporate fund drive, the 245 corporate contributors, of which more than one-third increased the level of their gifts this year, and the 51 companies that matched contributions made by their employees; the many contributors, individual and institutional, who helped us meet the matching requirements this year in our three-and-one half year National Endowment for the Arts Challenge Grant; the Vincent Astor Foundation, whose one million dollar gift from last year supported improvements in visitor-related facilities, including our new Restaurant and Food Express in which superior standards of service have resulted in enthusiastic visitor response.

We are also grateful to the General Electric Foundation for its gift in support of the new Museum Guide series we are publishing; to Mobil for its generous subsidy for the late openings (till 9 p.m.) we offer to visitors without cost on Friday and Saturday; to the City of New York for its continuing support toward maintenance, renovation and improvement in our buildings, programs and services; to the State of New York for the substantial support grant we receive from the New York State Council on the Arts; and to the Federal agencies that see in our work the quality that merits their grant support, including the Institute for

Museum Services, the National Endowment for the Arts, the National Endowment for the Humanities, the National Science Foundation, the National Aeronautics and Space Administration, and the Department of Education.

Many others—corporations, foundations, public agencies and individuals—contribute their interest, their support and their work to the Museum's purposes and activities. A good many are named later in this report, but there are others without whose participation the Museum would be a lesser place. I am mindful of the hundreds of unsalaried employees who work for us as volunteers, adding 12 percent in full-time equivalents to our labor pool. Thousands of our neighbors and friends shared the entertainments at our benefit events: "Silk Roads" in Fall, 1983; the December gala disco and late dinner party, "A Night for All Creatures"; the contributors' behind-the-scenes evening, "Where Else But at the Museum," and the two family parties organized around Halloween and safari themes. Proceeds from these enjoyable events were genuinely significant in the programs to which they were applied.

Sadly, however, death claimed several whose benefactions and work on our behalf are written indelibly in our history. Gardner D. Stout, our beloved seventh President, lives on through his enduring accomplishments on the Museum's behalf. Frederick M. Eaton held significant positions of leadership as Trustee and Honorary Trustee for 35 years. George Gaylord Simpson led us to some of our proudest moments in science. Lila Acheson Wallace, through her generosity, made possible much of the style and quality to which we aim in our facilities.

The writing of the Annual Report, where so much is spread out in tableau before us, is an excellent time to review the effectiveness with which we carry out our mission and the scope of the mission itself. This year's record is impressive by every standard. One of the great privileges of my office is to present the year's activities in summary, but one of the limitations is that I cannot possibly acknowledge all in so vast an organization. I can only highlight what seems relevant

Solid ceramic male figurine in the Late Nazca style from the south coast of Peru. Standing 15 inches high, its painted features include a representation of a spondylus necklace. The piece has beige skin tone with additional details in black, white and maroon. The figurine was a gift to the Museum by Frederick Landmann, from the Landmann-Bird collection.

and significant in the context of the message I try to convey.

Much more, of course, is told in the summaries that follow in the main body of the Report, from our divisions, departments and offices. These are really an extension of what I select for the few pages that appear over my signature, and I hope they will also be seen as reflecting my recognition of a busy, productive, effective year. These summaries also identify some of the people who contributed to our successes, many more than I could possibly mention in my personal message.

I think you will enjoy every page and line of what follows, one chapter in a great history and a promising future.

Robert G Goelet

Robert G. Goelet,
President



GARDNER D. STOUT 1903-1984

Gardner D. Stout served the American Museum for more than 25 years as Trustee, Secretary, Vice President and finally as President for a seven-year period beginning in 1968.

Mr. Stout's presidency ushered the Museum into its second century with vigor and foresight. He instituted broad changes in policy which today are seen in a progressive approach to museum management.

More so than any of his predecessors, Mr. Stout involved the Board of Trustees directly in the work of the Museum. Under his direction, Trustees applied their special knowledge and resources to specific areas of activity. Today's Board reflects this commitment to Museum programs and needs.

Mr. Stout had strong interests in the natural world and in public service. He was the editor of the book, *Shorebirds of North*

America, and had been involved with such organizations as the Cornell University Department of Ornithology, the National Audubon Society and the Istel Fund. After retiring from the presidency of the American Museum in 1975, Mr. Stout continued to serve as President Emeritus, Honorary Trustee and Field Associate in the Department of Ornithology.

In 1980, the Gardner D. Stout Hall of Asian Peoples was opened. It is the American Museum's largest permanent anthropological exhibition and bears Mr. Stout's name in recognition of his special interest in Asian cultures, the guidance he provided in planning and designing the hall, and his many years of dedication to the Museum.

His legacy will be long remembered.

Director's Message

The recent exhibition "Ancestors: Four Million Years of Humanity" raised a question as to whether museums have a responsibility to exhibit controversial subjects. While the reasons for selecting exhibitions are many and complex, I feel that the only things we have a responsibility to exhibit are our collections. Museum managers may want to address controversy in their exhibitions, perhaps in response to pressures, but I don't think they have any great *responsibility* to do so. I do believe, however, that we should not withdraw from an exhibition or any other program because it may be controversial, provided it is selected and presented for other valid reasons.

"Ancestors: Four Million Years of Humanity," the special exhibition we presented from April 13 through Sept. 9, 1984, illustrates the point well. It was an exhibition chosen for many good reasons. It was an ideal subject on which to build a very strong program. It addressed a subject—evolution—that is controversial in society today, and it eventually got us embroiled in controversy (but not over evolution).

Exhibition in a museum is *not* a casual thing. It is an instrument of purpose and can be an instrument of policy. Its reflection of purpose stems from our commitment, as a museum, to preserve the world's material evidence. We collect to use, to acquire information and enlightenment from the objects, and to disseminate information and understanding through displays and in other ways. Hence comes our responsibility to exhibit the collections.

But we also see exhibition as an expression of policy. We wished "Ancestors" to make two statements. The first concerned evolution as a scientific theory, the Museum's commitment to this theory and the theory's crucial role in explaining the diversity of plants and animals. The second statement dealt with the Museum's continuing effort to present major temporary exhibitions which stress material objects with strong visual and humanistic appeal. These exhibitions are intended to supplement the permanent exhibition halls which display

the Museum's collections almost exclusively.

Planning for "Ancestors" began more than three years ago. We were fortunate that leading paleoanthropologists from North America agreed to join the advisory committee that helped our staff evaluate, plan and present the program for the exhibition. The consensus at the first meeting with the advisors was that "Ancestors" as we conceived it was probably impossible, but that it was important enough to try. There was general agreement that if such an exhibition were to succeed, the American Museum of Natural History was uniquely capable of presenting it.

The goal of "Ancestors" was to illustrate and explain the evolution of the human family from its primate ancestry by displaying the *original* fossil evidence. The emphasis was on the *original* fossils, that meager collection of remains that trace humans back through four million years. It had never been done before; the fossils we wanted had not been brought together at one time in one place. There were formidable barriers against the plan: the rarity and fragility of the fossils, the continually shifting controversies in human evolutionary theory, the political barriers among the countries where the fossils were found, the financial and logistical burdens that would fall on the Museum and its staff and on the lending institutions and scientists, and the heavy weight of security for the priceless objects.

From the beginning, the key to our plan was the original fossils. Casts would not do. There were important reasons for the distinction. First, there is a mystique about these fragile remains of our long dead forebears. Scientists have long recognized it, and we wanted to share this uniqueness with our visitors. The objects have an inherent beauty that is difficult to describe but is evident to most viewers. Most important, however, is that the original fossils illustrate details that are impossible to see in the casts, especially when viewed in comparison with other originals. Original specimens or nothing, we were determined.

An essential part of the plan to bring original fossils to New York was to provide an opportunity for a significant

scientific program to take place in association with them. We saw the gathering of fossils as a unique opportunity to bring together scientists for a productive scholarly purpose. At the same time the opportunity to participate with their colleagues in this scientific gathering encouraged curators and institutions to bring the fossils we needed. The first week was reserved for comparative analysis of the fossils, the second for a scientific symposium to present the results of these observations and other relevant contributors to a broader audience.

Thus, "Ancestors" became more than an exhibition. It became a vehicle to demonstrate that a museum could use an important collection of objects to carry out scholarly goals appropriate to its mission as a collection-oriented institution. The fossil collection was the medium from which "Ancestors" was created. During the comparative viewing session, we demonstrated that the study of the specimens could lead to insights and conclusions concerning what they were and what they could reveal of human biological history. During the symposium, these insights were presented for testing and analysis by others and were related to the broader sciences of which they are a part. And then the fossils were allowed to speak for themselves in the exhibition, to stand as the immutable physical evidence of human ancestry.

If the medium of "Ancestors" was relevant for a museum, its message was even more so for ours. Evolution is a concept central to our understanding of the diverse life forms that are found on earth, extant and extinct. The central idea relates all species of living and fossil organisms to common ancestors. While in evolutionary biology, as in all areas of science, there is active debate among scholars concerning the mechanisms through which the process takes place, the concept of evolution is universally accepted and unfailingly supported by the evidence.

We see in humans many characters and traits that are similar to those of other animals. We also see differences, both great and subtle. From their similarity and differences we con-

clude that the closest living relatives of humans are the great apes, and that we share a common ancestry with them. As new evidence is found and the old better understood, there will be continuing discussions of the details of these relationships, an exchange of ideas regarding the specializations that distinguish humans from their nearest ancestors.

These ideas are being challenged openly today under the guise of a doctrine called "scientific creationism," in which the name of science is used to lend credence to the discredited notion that past and present forms of life represent acts of unique and independent creation. Such an idea is a challenge to all our experience and all the evidence seen at the American Museum of Natural History and elsewhere which led to the evolutionary hypothesis. In "Ancestors" we made a bold and forceful statement in support of evolution.

We did not seek controversy when we planned "Ancestors" although we anticipated that the issues between evolution and creationism could provoke it. We did not relish the problems it might have brought us, but we were prepared to face them. Procedures for security, visitor reaction and community relations were worked out with this in mind. Controversy did surface, but not from the direction we expected.

Several weeks before "Ancestors" opened we were confronted with demands that participants from the Republic of South Africa be excluded from the scientific sessions and that fossils from South Africa be removed from the exhibition. The matter became a serious problem when it received the support of a few members of the New York City Council. They brought action to deny City funds to the Museum unless the demands were met or alternative steps taken to make "Ancestors" a vehicle for condemning the South African government. The demands were based on the view that the Museum was, by including participants and fossils from South Africa, implying endorsement of that country's racial policies.

Our view was different. We saw the invitations to South African participants and the loan of fossils from institutions in that country in the same

light as those involving persons and institutions of 20 other nations. The program was, we believed, in the spirit of the free exchange of knowledge among scientists that is encouraged by the scholarly communities of virtually every nation. The South African government was not involved in our negotiations in any way. Our relations were with institutions and individuals worldwide. The participants and specimens were chosen for scholarly and scientific merit, not for political or social purposes.

The City Council resolution to withhold the Museum's City support funds failed to pass, but that did not mitigate our very sincere concern that such a disagreement reached the floor of the City's distinguished forum of elected legislators. We are grateful for the support we received from those Council Members who voted against the resolution. We are especially grateful for the position taken by New York City's Mayor, Edward I. Koch, who stated: "The apartheid policies of the government of South Africa make it a pariah nation, and we must do all that is reasonable and responsible to foster change in this abhorrent system of governance. Censorship, political or scientific, is not, in my judgment, a reasonable or responsible remedy. Fossils have no nationality. They may be possessed by someone for a time, but human fossils belong to no one. They are the holy relics of humanity, and it is New York City's privilege and right, as a center of intellectual and artistic freedom, to host this exhibition."

Nevertheless, we are sorry that "Ancestors" caused such concern to some members of the City Council. We share their deep feelings regarding racial discrimination and segregation in South Africa. We respect their responsibility as elected representatives of the people to address such matters in ways of their choosing. But we insist that "Ancestors" was not about politics or racism; it was about evolution and human origins.

The aim of the Museum in "Ancestors" was to present as complete a picture of human evolution as possible. To exclude fossils from South Africa would have diminished the universally recognized significance of

Africa in the evolutionary story. They represent human life on that continent long before there was a political boundary delineating a nation called South Africa.

The strongest statement the Museum could make in opposition to racism or to any form of human injustice based on perceived differences between humans was in "Ancestors" itself. The irrationality of racism and of prejudice based on racial differences was implicit in the exhibition. *All* the fossils and *all* the participants gave evidence in their materials and in their statements of the common ancestry of *all* humans.



Thomas D. Nicholson,
Director

The landmark exhibition "Ancestors: Four Million Years of Humanity" not only enabled the public to see under one roof the tangible evidence for the evolution of mankind, it allowed the world's leading anthropologists and paleontologists to make side-by-side comparisons of the many fossils which had never before left their home institutions. During the study sessions before the exhibition opened, special tables were set up so that scientists could easily examine and compare the fossils sent by institutions from around the world. Photo by Robert Maas, Photo Reporters.



With its highest peak rising 9000 feet above the remote rain forests of southern Venezuela, Cerro de la Neblina, "The Mountain of the Mists," looks more like an impenetrable presidio than a natural wonder.

Surrounded by towering, dense vegetation, the tepui (sheer-sided table mountain) is a monolith of dense metamorphosed sandstone. Its 1600-foot cliffs are enshrouded in a dense cloud cover that makes the mountain almost imperceptible from a distance.

Since February, researchers from the American Museum have been part of an international expedition studying the rare flora and fauna of the tepui and its surrounding area.

Neblina is a resistant remnant of an extensive plateau of softer stone that has been eroded over the last 100 million years so that only stray tepuis remain. Like an island surrounded by water, a tepui surrounded by rain forest provides an isolated environment. In it, relic forms of wildlife may continue to thrive. Some, perhaps, date back to a time when the tepuis may have been one plateau.

While the tepui's base area may resemble a lush landscape out of a Rousseau painting, its table top looks more like a lunar setting from an Isaac Asimov novel. Chest-high plants with foliage that resembles open artichokes are scattered over the surface. Stray trees shoot into the sky, surrounded by stubby shrubs. Oversized tarantulas, anacondas, worms and birds make the terrain their home.

The Neblina expedition recalls a bygone era when large scientific excursions were almost commonplace. The Museum has sent more than 1000 expeditions to every region of the earth.

Experts in several scientific disciplines studied the biota of the higher altitudes of the tepui, and they will compare these with specimens found near the base, on neighboring tepuis, in the Andes, and at other locations.

Once a thorough biological inventory is made, scientists can begin to understand the ecological relationships of the plants and animals of the area. They can then start unraveling the evolutionary and geological events that gave rise to the biota and account for its distribution.

American Museum participation in the expedition was made possible through funding from the William H. Phelps Foundation and the National Science Foundation. Mr. Phelps, Research Associate in the Department of Ornithology, played a pivotal role in the planning of the expedition.

Journey to THE MOUNTAIN OF THE MISTS



Rising 9000 feet above the rain forest, the "Mountain of the Mists" is a monolith of metamorphosed sandstone. Cloud cover often renders the tepui almost invisible from a distance.

The expedition is sponsored by the Fundacion para el Desarrollo de las Ciencias Fisicas, Matematicas y Naturales (FDCFMN) in Caracas. Charles Brewer of the FDCFMN is the expedition leader.

The expedition could continue into 1985 if funding allows. The American Museum will send scientists to the site for the duration of the expedition.

Scientists had to be flown by helicopter, in groups of two or three, across nearly 60 miles of flood forest to their base camp at the foot of Neblina. Teams of scientists were transported by helicopter to several mountain camps on the tepui.

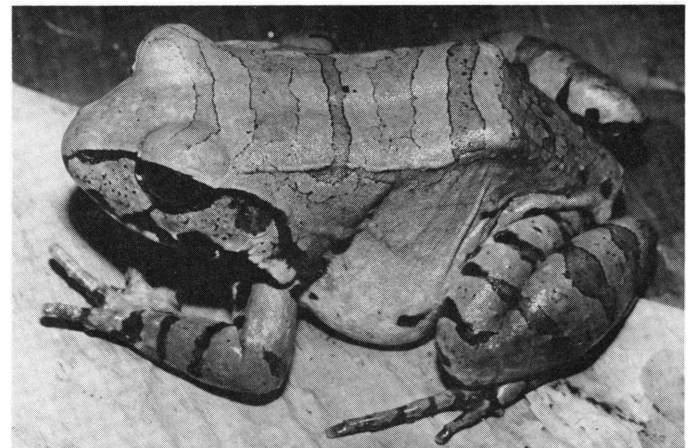
Despite the hardships associated with expedi-

tions of this size and scope, the esprit de corps helped pull the researchers through the tougher times. Twice, poor flying conditions and mechanical failure prevented helicopters from reaching parties atop the mountain. This meant an extended stay for scientists working at these higher elevations. At times, similar conditions prevented the delivery of supplies to expedition members and they had to rely on a menu of local fauna and flora.

The initial findings of American Museum researchers, reported by department, are:

Herpetology: The first herpetological team on the expedition included Curators Charles J. Cole and Richard G. Zweifel of the Museum, and Roy W. McDiarmid of the U.S. Fish and Wildlife Service.

In February and March, the party spent 36 days explor-



This large jungle frog, measuring six inches in length, was found at the base of Neblina.

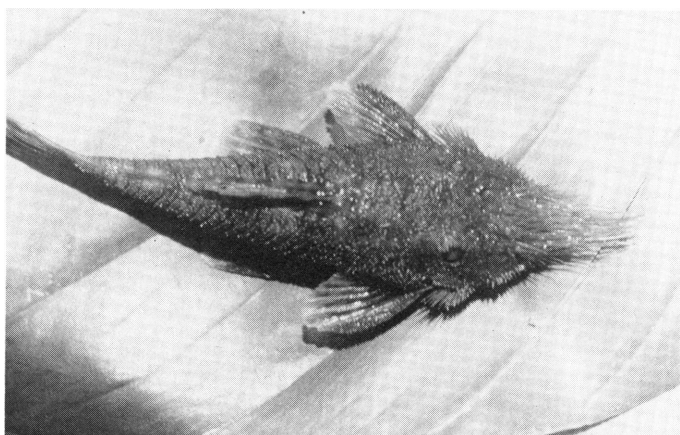


Scientists duck under the whirling blades of the helicopter that transported them to a mountain camp 6000 feet up on the tepui.

ing for amphibians and reptiles at a lowland base camp and at several high-elevation camps which were accessible only by helicopter. Preliminary assessment of the collections indicates that most of the species taken at the highland camps were previously unknown to science, and that some of those from the lowland camps were previously unknown in Venezuela. This survey of fauna is continuing as other department researchers visit Neblina.

Dr. Zweifel also began a study of external and skeletal morphology of a possibly undescribed genus of microhylid frog collected on Neblina.

Ichthyology: Department Chairman Gareth Nelson and Graduate Assistant Carl J. Ferraris participated in the



This new species of catfish also belongs to a new genus. The specimen was caught in the Rio Mawarinuma, which flows from Neblina.

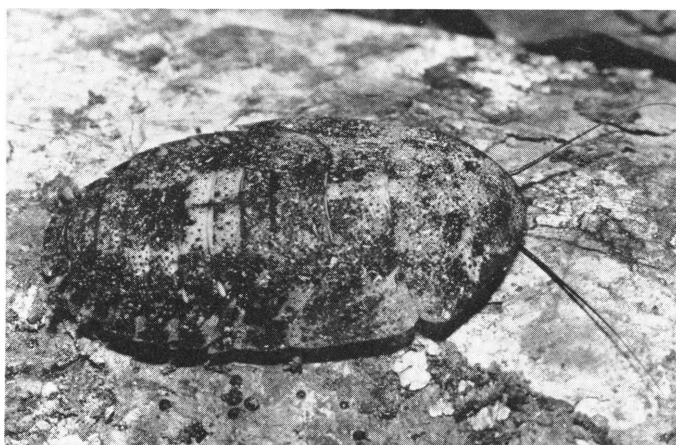
collection of fish from the Rio Mawarinuma, which flows from its source on Neblina into the swamp located beyond the expedition base camp. Although this river was teeming with fish, the waters atop the tepui were barren.

With the aid of Ramiro Royero of the Universidad Central de Venezuela, Mr. Ferraris collected several thousand specimens of more than 100 species of fish from the river, which was previously unexplored for aquatic resources. At present, Mr. Ferraris is studying several hundred specimens of catfish, 10 of which may be previously unknown.

Entomology: Jerome G. Rozen, Jr., Deputy Director for Research, and Volunteer Ian Stupakoff participated in the initial expedition. They returned with a substantial collection of bees as well as a sampling of the general insect

fauna. A preliminary analysis of the collection of bees shows that only one species found at the base camp also occurs on the mountain's table top. This species composition at the top is almost totally different from the species composition at the base.

One of the few non-indigenous species Dr. Rozen found on top of Neblina was the Africanized honeybee, also known as the "killer bee." This species was accidentally introduced into Brazil and has been steadily progressing northward. Oddly enough, no sign of the Africanized honeybee was found around Neblina's base.



A cryptic roach's camouflage makes it almost indistinguishable from the tree trunk it is resting on. The roach was among the numerous insects entomologists collected at Neblina.

Ornithology: Associate Sadie Coats and Research Associate Robert W. Dickerman served as members of the initial expedition teams. Nearly 350 specimens of 125 species of birds were collected, some of which are not represented in the Museum's collection. Few species of birds were found on top of the tepui. The base camp, however, had an abundance of species.

Specimens collected will provide important anatomical information. Drs. Coats and Dickerman noted that several types of birds may prove to be new subspecies, but further research is required before this can be determined.



The capybara, the world's largest rodent, was food when supplies ran low.

Department of Anthropology

The Department of Anthropology pursues projects with broad scientific and educational implications through research, exhibition and collection management. For example, the department brought together an unprecedented assembly of rare human fossils for study and display; accessioned several thousand artifacts from South America and the Pacific for two new halls now under construction; implemented new methods for storage and preservation of materials, making collections more accessible for research; and carried out anthropological and archeological investigations at sites in Peru, Georgia and Nevada. Additional research was conducted on topics as diverse as the impact of technological change on the Indian subcontinent, marriage customs in Korea and the role of children in Nigerian society.

Exhibitions The most visible event of the year was the exhibition, "Ancestors: Four Million Years of Humanity." The exhibition, organized by the Museum, brought together for the first time more than 40 human and pre-human fossils from all over the world. "Ancestors" was preceded by an extraordinary symposium and workshop in which world-renowned experts compared and discussed the assembled fossil evidence of human evolution. "Ancestors" was described by at least one publication as the most important exhibit in the Museum's history. The department was also involved in two other major special exhibitions, "African Textiles" and "Silk Roads/China Ships." Preparations are being made for the special exhibition, "Asante: Kingdom of Gold," and two permanent halls, the Hall of South American Peoples and the Margaret Mead Hall of Pacific Peoples.

Field Research Anthropological field research was conducted in many far-flung places on a variety of topics: Macaque monkeys in Mauritius, marriage customs in Korea, a 16th - Century Spanish mission in Georgia, a Shoshone village in Nevada and a kingdom that controlled sea trade on the coast of Peru. Research using library archive and computer data files dealt with the origins of complex human society, changes in village life in India and the economic role of children in Nigeria.

Many field research projects were conducted through the Lounsbery Research Program in Anthropology supported by the Richard Lounsbery Foundation. The Lounsbery program also awarded predoctoral and post-doctoral fellowships for research to outside scholars for projects to be conducted both at the museum and in the field.

The concluding monograph was completed on one of the department's most notable research projects, the excavation at Huaca Prieta, Peru, begun in 1946 by the late Junius B. Bird, former Curator and Curator Emeritus. The site produced some of the oldest textiles in the Americas and changed the way the origin of Andean civilization is perceived. After decades of painstaking study the materials will be published in the *Anthropological Papers* next year. This posthumous paper by Dr. Bird has been edited by Research Fellow John Hylsop.

Collection Maintenance Major advances were made in storage, management, and conservation of collections. Installation of mobile storage equipment and monitoring of climate-control systems are underway in a new facility for protection of ethnographic material. The African ethnographic collection will be the first group of artifacts transferred to the new facility. The conservation laboratory has been upgraded with installation of new worktables, water deionization equipment and a system for desalinization of ceramics. Several collections were included in plans for improved storage, documentation, conservation and accessibility of artifacts for research and exhibition purposes. Among them are the Kachina dolls, Navajo blankets and European bronzes. The trend toward increased use of collections was reflected in

the large number of exhibition and study loans made and the number of scholars visiting the department.

Anthropological collections grew, largely as a result of several important and generous gifts in kind. Many gifts were directly related to the new Hall of South American Peoples now in the early stages of installation. Margaret Bird donated 397 artifacts, most of them archeological pieces of great scientific and aesthetic importance. Twenty-nine fine archeological objects were donated by Frederick Landmann as part of a long series of acquisitions specifically aimed at improving the Andean archeological collection for permanent exhibition. A comprehensive and well-documented collection of the material culture of the Waorani peoples of Ecuador was donated by Grant Behrman and James A. Yost. South American gifts were also received from Eugene A. Schnell, Eric N. Netter and Susan and Byron Bell. Donations were received from Evelyn A. J. Hall and Yvonne Freund for the soon to open Margaret Mead Hall of Pacific Peoples. The African collections were enhanced by material from Herbert F. Weiss, J. Gordon Douglas III, Pascal Imperato and Meryl Silver. Gifts to the Asian ethnology collection came from Michael Bazinet, Nikit Ordjanian, Sara N. Bekker, Peter A. Farrenkopf and Evelyn McCune.

Peruvian Fieldwork Chairman and Associate Curator Craig Morris's major field research activity con-

Cynthia Weinstein, Assistant Textile Conservator in the Department of Anthropology, examines a Peruvian textile from the late Nazca period. The piece, an incomplete dove-tailed tapestry band with a plaited strap sewn to one edge, is being prepared for the Museum's Hall of South American Peoples, which will open in 1987. The Museum currently has 39 exhibition halls which were visited by more than 2.6 million people this year.



cerned the Chincha Valley Archeological-Historical Project in Peru. The study was initiated as a pilot project in 1983; the project proper began in June, 1984. The excavation was designed to investigate a small coastal kingdom that apparently held a near monopoly on sea trade. The kingdom linked the central and southern parts of the Andean heartland to resources in the warm water regions of the Pacific at least as far north as Ecuador.

Two grants were received to support the Chincha research. The first, for approximately \$78,000, was received from the Tinker Foundation; another, for approximately \$25,000, was received from the National Geographic Society. The research is being conducted in collaboration with Heather Lechtman of the Massachusetts Institute of Technology, who is directing fieldwork in adjoining Pisco Valley. The project has also received support from the Museum's Richard Lounsbery Fund.

Dr. Morris also completed work on a book dealing with the Huánuco "provenience" of the Inca empire in collaboration with Dr. Donald B. Thompson of the University of Wisconsin. The book deals with the archeology of the Inca capital of Huánuco Pampa and surrounding villages. It will be published in 1985 by Thames & Hudson in the series, "New Aspects of Antiquity."

Curator Robert L. Carneiro revised and expanded a manuscript on the evolution of complexity in human societies. He also began work on a manuscript about the "Kwarup," an intertribal feast of the dead in the upper Xingu of central Brazil.

Technology and Change The chief activity of Curator Stanley A. Freed, in collaboration with Research Associate Ruth S. Freed, was the analysis of data collected in 1977 and 1978 concerning life in the north Indian village, Shanti Nagar. These findings were then compared with data they had previously collected in 1958 and 1959. Each research effort examined urban influences on traditional village life. In their analysis, the Drs. Freed found that some areas of life had undergone substantial change, while other aspects of culture and society remained much as they had appeared

20 years before. The focus of the Freed's future research will be concerned with analysis of these changes to discover their causes and the manner in which society adjusts to specific innovations.

The earlier Indian research was sponsored by the Social Science Research Council and the National Science Foundation. The more recent work supported by a senior research fellowship from the American Institute of Indian Studies. Dr. Ruth Freed received financing from the Indo-American Fellowship Program of the Indo-U.S. Subcommittee of Education and Culture as a senior research scholar.

A major research project concerning the career of Clark Wissler, who headed the Department of Anthropology from 1906 to 1942 and was one of the most famous American cultural anthropologists of this century, resulted in a paper entitled "Clark Wissler and the Development of Anthropology in the United States." The paper was published in the *American Anthropologist*.

African Exhibitions Enid Schildkrout, Curator, was responsible for two major special exhibitions, "African Textiles" and "Asante: Kingdom of Gold." In conjunction with the "Asante" exhibition, Dr. Schildkrout organized a scholarly symposium to be held at the Museum in October, 1984. Two papers based on Dr. Schildkrout's Nigerian research—one on Hausa widows, and one on children as entrepreneurs—are in press. Other works in progress include a paper and a book-length manuscript on women and politics in northern Nigeria written with Barbara Callaway of Rutgers University. With the assistance of Carol Gelber, Research Assistant, Dr. Schildkrout is also developing a statistical profile of her Nigerian data.

Physical Anthropology Curator Ian Tattersall reports most of the year was occupied by final preparations for the exhibition, "Ancestors: Four Million Years of Humanity," which opened on April 13. This exhibit included more than 40 original human and prehuman fossils from 21 institutions in nine countries. This is the first time a significant proportion of

the most important and complete pieces in the human fossil record have been brought together in one place. Hundreds of scientists participated in a four-day scientific comparison session and a four-day symposium preceding the opening of the exhibition.

Dr. Tattersall also completed a manuscript, in collaboration with Dr. Jeffrey Schwartz, Research Associate. The monograph deals with the relationships among extant strepsirrhine primates and the potential links between these primate forms and the "adapid" primates of the Eocene.

American Indian Studies Curator David Hurst Thomas excavated at Alta Toquima Village in July. An archeological crew of 12 spent three weeks unearthing midden and house remains at this unusual Shoshone Indian campsite. The site is located at 11,000 feet in the Monitor Valley of central Nevada. Six stratigraphic zones were identified and 15 additional radiocarbon dates have been processed on these new samples.

Dr. Thomas also led archeological expeditions to St. Catherines Island, Georgia, where he worked on the long-term excavation of *Santa Catalina de Guale*, a 16th - Century Spanish mission. A soil resistivity survey revealed the presence of a large, sub-surface structure which was exposed in October. This building probably functioned as the mission *convento* (priests' quarters). During the spring, intensive remote sensing surveys using ground-penetrating radar revealed the presence of several fortifications and earthworks surrounding the mission site. Clark Spencer Larsen, Research Associate, conducted mortuary excavations inside the *iglesia*. To date, approximately 150 individuals have been unearthed and skeletal analysis is underway.

Dr. Thomas also edited a monograph describing excavations at Hidden Cave, Nevada. The lengthy manuscript will be published as an *Anthropological Paper of the American Museum of Natural History*. He also completed the third volume in the *Archaeology of Monitor Valley* series. This monograph discusses excavations at ten archeological sites and surface survey work at several hundred more localities in the valley.

Korean Marriage Customs

Assistant Curator Laurel Kendall spent the summer in Korea initiating a research project on contemporary marriage customs. She is translating and analyzing ritual manuals, popular writing and folklorists' accounts collected in Korea to supplement to her own observations and interviews. Dr. Kendall also dealt with the use of the life history in an ethnographic context. With co-editor Griffin Dix, she completed editing a conference volume on *Religion and Ritual in Korean Society*. Dr. Kendall was the local curator for the special exhibition, "Silk Roads/China Ships," which opened in February, and is responsible for the forthcoming special exhibition, "Ban Chiang: Discovery of a Lost Bronze Age," scheduled to open in November.

South Pacific Cultures

Paul Roscoe joined the Department of Anthropology in September as a Lounsbery Fellow. Dr. Roscoe's main research project drew on the Museum's extensive South Pacific library holdings through which he examined the effects of population density, resource pressure and terrain on political evolution in ancient Polynesia. Four manuscripts were produced in draft form. Dr. Roscoe also developed a microcomputer program to generate three-dimensional images from contour maps to assist in the analysis of the military implications of the terrain. The program will also aid in the illustration of future publications.

His other projects included analysis of field data gathered in the East Sepik Province of Papua New Guinea a paper on family planning and a paper on medical pluralism.

Scientific Publications:

Eldredge, Niles, and Ian Tattersall
1984. I miti dell'evoluzione umana. Editore Boringhieri, Rome, pp. 1-205.

Freed, Stanley A., and Ruth S. Freed
1983. Clark Wissler and the development of anthropology in the United States. *Amer. Anthropol.*, vol. 85, no. 4, pp. 800-825.

Notes:

1. In the bibliographies, the names and members of the staff and Fellows of the American Museum of Natural History appear in regular type.
2. In the bibliographies, an asterisk appears beside the names of graduate students whose work is being sponsored by members of the staff of the American Museum of Natural History.

Kendall, Laurel

1983. Korean ancestors: from the women's side. *In* Korean women: a view from the inner room, New Haven, East Rock Press, pp. 97-111.

1983. Giving rise to dancing spirits: Mugam in Korean shaman ritual. *In* Dance as cultural heritage: selected papers from the 1978 Hawaii conference, vol. 1, B. T. Jones, ed., CORD Dance Res. Ann. XIV, pp. 224-232.

1984. Korean shamanism: women's rites and a Chinese comparison. *In* Religion and the family in East Asia; Proc. of the Fifth Internat. Symposium of the Taniguchi Found., G. DeVos and T. Sofue, eds., *Senri Ethnol. Studies*, vol. 11, pp. 57-73.

1983. A *Kut* for the Chŏn family. *In* Traditional thoughts and practices in Korea. E. Yu and E. Phillips, eds., Center for Korean-American and Korean Studies, Calif. State Univ., Los Angeles, pp. 141-169.

1984. Dreaming up solutions: The interpretation of dreams in Korean shamanism. *In* Yi Tu-Hyŏn Paksa Hwan'gap Kinyŏm Nonmunjip (Essays in Honor of Professor Tu-Hyŏn Lee), Seoul, Haksosa, pp. 516-530.

Kendall, Laurel, and Mark Peterson

1983. Traditional Korean women: A reconsideration. *In* Korean women: view from the inner room. L. Kendall and M. Peterson, eds., East Rock Press, New Haven, pp. 5-21.

Kendall, Laurel, and Mark Peterson, eds.

1983. Korean women: A view from the inner room, East Rock Press, New Haven.

Morris, Craig

1984. Architecture and the structure of space at Huánuco Pampa. *In* Tecnología, urbanismo, y arquitectura de los Incas. Graciano Gasparini and Luise Margolies, eds. Ediciones Venezolanas de Antropología, Caracas, pp. 271-313.

Pendleton, Lorann S. A., and David Hurst Thomas

1983. The Fort Sage drift fence, Washoe County, Nevada. *Anthro. Papers of the Amer. Mus. of Nat. Hist.*, vol. 58, no. 2, pps. 1-38.

Schildkrout, Enid

1983. Comment on Kwame Arhin, peasants in nineteenth century Asante. *Curr. Anthropol.*, vol. 24, no. 4, p. 470.

1984. School and seclusion: choices for northern Nigerian women. *In* *Cult. Survival Quart.*, vol. 8, no. 2, pp. 46-48.

Schwartz, Jeffrey H., Ian Tattersall, and Hartmut Haubold

1983. A new genus and species of primate from the Geiseltal, Eocene of the German Democratic Republic. *Zeitschr. Geol. Wiss., Berlin*, vol. 11, pp. 911-914.

Tattersall, Ian

1983. Studies on the lemurs of the Comoro Archipelago. *Nat. Geogr. Soc. Res. Repts.*, vol. 15, pp. 641-654.

1983. Status of the Comoro lemurs: a reappraisal. *IUCN/SSC Primate Specialist Group Newslett.*, vol. 3, pp. 24-27.

Tattersall, Ian, and Jeffrey H. Schwartz

1983. A revision of the European Eocene primate genus *Protopithecus* and some allied forms. *Amer. Mus. Novitates*, no. 2762, pp. 1-16.

1983. A new genus and species of adapid primate from the middle Eocene of Alsace, and a new genus for "*Adapis*" *ruetimeyeri* Stehlin, 1912. *Folia Primat.*, vol. 41, pp. 231-239.

Thomas, David Hurst

1983. On Steward's models of Shoshonean sociopolitical organization: a great bias in the Basin? *In* The development of political organization in native North America. Elisabeth Tooker, ed., 1979 Proc. of the Amer. Ethnol. Soc., pp. 59-68.

1983. The archaeology of Monitor Valley: 2. Gatecliff Shelter. *Anthro. Papers of the Amer. Mus. of Nat. Hist.*, vol. 59, no. 1, pp. 1-552.

Abstracts and Popular Publications:

Carneiro, Robert L.

1984. [Review of] Jonathan Haas, the evolution of the prehistoric state. *Ethnohistory*, vol. 31, no. 3, pp. 213-214.

Freed, Stanley A.

1983. [Review of] Fieldwork, the human experience. Robert Lawless, Vincent H. Sutlive, Jr., and Mario D. Zamora, eds., *Rec. Publ. in Nat. Hist.*, vol. 1, no. 4, pp. 2-3.

Kendall, Laurel

1983. [Review of] Religions in Korea: beliefs and cultural values. Earl M. Phillips and Eui Young Yu, eds., *Jour. of Asian Studies*, vol. 43, no. 1, pp. 172-173.

1983. [Review of] Korean and Japanese women: an analytic bibliographical guide. *Jour. of Asian Studies*, vol. 42, no. 4, pp. 984-985.
1983. An Ainu approach to symbolic structures. *Reviews in Anthropol.*, vol. 10, no. 4, pp. 43-50.
- Tattersall, Ian
1983. Beyond the chariots of the gods. Review of F. Hoyle and C. Wickramasinghe. *Evolution from space: a theory of cosmic creationism*. *Rec. Publ. in Nat. Hist.*, vol. 1, pp. 6-7.
1984. The good, the bad, and the synthesis. Review article based on E. Mayr: *The growth of biological thought*, *Amer. Anthropol.*, vol. 86, pp. 86-90.
- Tattersall, Ian, and Eric Delson
1984. Ancestors: Four million years of humanity. *Amer. Mus. of Nat. Hist.*, New York, pp. 1-16.
- Thomas, David Hurst
1983. Finding a lost Spanish mission. *Close-Up*, vol. 14, no. 2, pps. 44-51.
1984. Forward to: *The Indians of Louisiana*, filmstrip and teacher guide, Gateway Productions, New Orleans.

Astronomy and the American Museum-Hayden Planetarium

The Museum's Department of Astronomy is the American Museum-Hayden Planetarium housed in a separate building with its main entrance in Margaret Mead Park on 81st Street. The Planetarium serves as an important educational and reference resource in astronomy and the space sciences for the general public, professional researchers and students. It also serves as a major entertainment attraction in the New York City area. During the year, 516,591 persons (18 percent of them school children) attended the Planetarium's various shows, courses, lectures, permanent and special exhibits, and the 15,000-volume library.

Sky Shows During the year five Sky Shows were presented under the great dome of the Sky Theater. "Is Anyone Out There? ... The Search for Life in Space" ran through the end of September, followed by "Cosmic Mysteries," a program that asks the following questions: is a black hole at the center of the Milky Way? what about UFOs? is there a cosmic explanation for the extinction of the dinosaurs? and what will be the fate of the universe?

In December, the Planetarium presented a new holiday offering, "The Spirit of Christmas," which discussed the night sky, the origins of many favorite holiday traditions, and possible explanations for the Star of Bethlehem. "Cosmic Mysteries" returned for January, February and March and was followed in April by "Star-Quest." "Star-Quest," narrated by Leonard Nimoy of "Star Trek" fame, takes a look at man's past, present and future exploration of space. "Star-Quest" makes extensive use of specially built spacecraft models, and incorporates a large number of special effects made possible by the Planetarium's advanced computer automation system.

On weekdays in July and August, the Planetarium presented a live Sky Show, "The Skies of Summer." Designed for children and adults, "The Skies of Summer" entertains while it instructs on how to identify satellites, planets, constellations, phases of the moon, and shooting stars. During the year, 344,633 visitors attended the five public Sky Show performances.

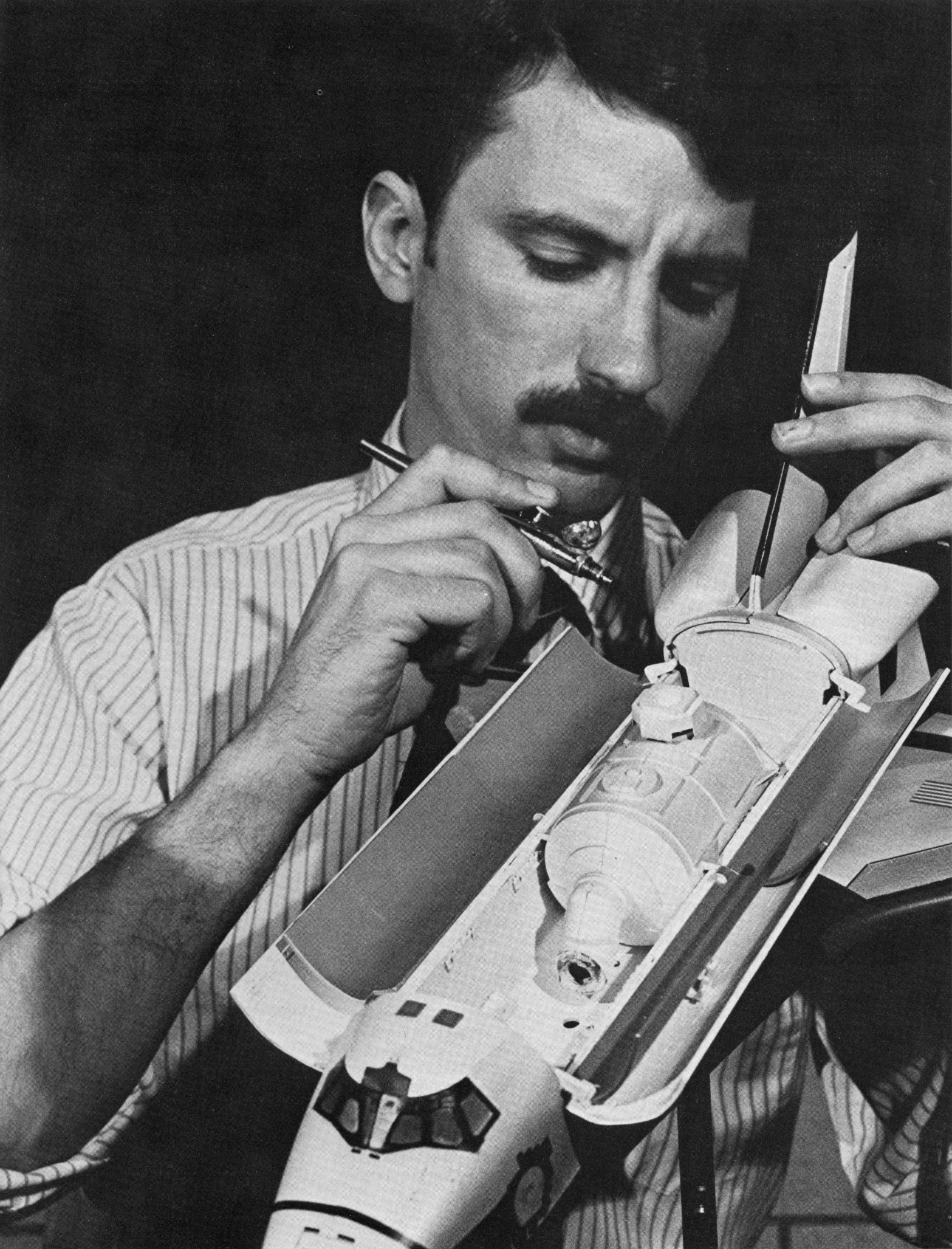
School and Eclipse Shows The year saw a further expansion of the Planetarium's offerings for school children. A live theater production, "Slim Goodbody's Voyage to the Stars" for children in grades two through five, plus "Wonderful Sky," a hit program for preschoolers featuring the "Sesame Street" Muppets,* were integrated into the regular school show calendar. Both shows were offered in pilot form during the 1983-84 school year. "Wonderful Sky," in particular, proved enormously successful with all performances selling out months in advance.

In January, a new school program, "Max's Flying Saucer," was introduced and integrated into the school show schedule. This program, designed for grades two through five, focused on the provocative theme of extraterrestrial life. Total school and preschool attendance at the Planetarium for the year was 95,587.

Several special programs in advance of the annular eclipse of the sun, May 30, were well received. The Planetarium presented a five-minute eclipse primer preceding the regular afternoon public Sky Shows May 14-

*© 1984 Children's Television Workshop; Muppets, Inc.

Brian Sullivan, American Museum-Hayden Planetarium Production Designer, airbrushes the finishing touches on a model of the space shuttle. The replica is used in the sky show "Star Quest," one of the Planetarium's most elaborate productions. All art work and models, as well as script and special effects, were created by the Planetarium staff. The script was narrated by "Star Trek's" Leonard Nimoy.



29, plus two 40-minute live Sky Theater shows ("Eclipse '84") on May 24 and 29. Production costs for these special programs, including eclipse materials distributed to the media, area schools and general public, were paid for with contributions made in the memory of Ms. Georgette Wagner-Saveth. Unfortunately, the planned public viewing of the eclipse from the Planetarium lawn was rained out.

Courses During the three academic terms of the year, the Planetarium again offered courses in such fields as astronomy, meteorology, aviation and navigation. Courses for children were completely restructured and three new courses for general students were added, including *Science* and *Science Fiction*. A total of 24 courses were taught with a combined enrollment of 654.

Laser Programs Throughout the year, laser programs, featuring the music of the rock groups Led Zepelin and Pink Floyd with spectacular audio-visual laser effects, were presented in the Sky Theater on Friday and Saturday evenings. The popular laser shows were produced for the Planetarium by Audio Visual Imaging, Inc., of Springfield, Va. Attendance continued strong, totaling 142,711 for the year.

Special Presentations This year the Planetarium held more specials than ever before. A wide range of special Planetarium events was created for the American Association of Physicians in Medicine, the Manhattan Guild, the Metropolitan Chapter of the Young Presidents Organization, Chemical Bank, IBM, the American Association of Aeronautics and Astronautics, the American Stock Exchange, Franklin Computer Company and the Gillette Company.

In addition, the Planetarium hosted three special series for members: a talk and film presentation by Space-lab/Shuttle Astronaut Robert Parker; three performances of "Wonderful Sky" and the "Sesame Street" Muppets; and two performances of "Star-Quest." After the "Star-Quest" shows, representatives of the production staff described how the Sky Shows are made; exhibited artwork, models and special effects materials;

and answered members' questions.

The Perkin Library Through the continuing generous support of the family of the late Planetarium Trustee Richard S. Perkin, the Perkin Library served a wide audience as one of the best astronomical libraries in the East. A large number of professional journals and several hundred books were added to the collection which already contains more than 15,000 volumes. Two hundred of the books were donated by Trudy E. Bell, Senior Associate Editor of *IEEE Spectrum* in New York City. Among the many local, national and international visitors during the year were the members of the Special Libraries Association who met in New York City in June.

Exhibitions and New Acquisitions The Artwall opposite the Perkin Library continued as a display area for space-inspired art. The year's shows included: a collection of weavings on astronomical themes by California artist April May; a series of oil paintings by a high school Applied Arts class in Flagstaff, Ariz.; and works in acrylic, pen-and-ink and mixed media by scientific illustrator Sally Bensusen, and NASA Art Team Member B. E. Johnson.

The Franklin Computer Company of Cherry Hill, N.J., donated ten Franklin ACE 1200 computers with video monitors to the Planetarium. Plans are underway to use these computers to streamline operations and support activities in education, public relations, shop inventory, exhibits, the Library and elsewhere.

Denise Harbin of New York City presented the Planetarium with an Arion 832 programmer, plus auxiliary power supplies and projector fader equipment. The new equipment will be used for off-line programming of special presentations in the Guggenheim Space Theater.

Funding for Technical Improvements The Prospect Hill Foundation contributed \$25,000; Chemical Bank, \$5000; and the Sidney, Milton and Leoma Simon Foundation, \$4000 toward the Planetarium's Special Technical Improvements Fund. So far, spending has been for additional special effects equipment to enhance the visual quality of Planetarium shows.

Future objectives include new audio equipment and the construction of a small but high-quality sound studio. Current contributions total \$89,000 toward a goal of \$250,000.

Staff Activities William A. Gutsch, Jr., Planetarium Chairman, wrote the Sky Shows, "Is Anyone Out There? ... The Search for Life in Space," "Cosmic Mysteries," and "Star-Quest." He represented the Planetarium at the meetings of the Southeast Planetarium Association and the Major Planetarium Executive's Conference where he gave papers. Dr. Gutsch was the keynote speaker at an annual meeting of the Southwestern Association of Planetariums. He was named to the Board of the Independent Space Research Group; he wrote and produced science features for WABC-TV, and he appeared on national television, including the Cable News Network and the NBC "Today" program.

Kenneth L. Franklin, Astronomer, lectured at Rockland Community College, Long Island's Custer Observatory, and the Columbia School of Journalism. He gave numerous media interviews and reprogrammed the Guggenheim Space Theater computer for several of the special corporate events presentations.

Allen Seltzer, Education Coordinator, supervised the Planetarium's educational program, assisted in daily business operations and taught courses in astronomy at Fordham University. He served as Science Coordinator for an expedition to observe the May 30 annular solar eclipse in Ciudad Victoria, Mexico.

Clarence A. Brown, Producer, presented a paper on the Planetarium's use of computers and audio-visual techniques at the Pratt Center for Computer Graphics and taught astronomy at the Scarsdale Adult School.

Internship Program Francine Jackson entered the Planetarium's internship in October. Her assignments included teaching the course, "Introduction to Astronomy"; presenting many school Sky Shows, and writing and producing the special mini-show, "Eclipse '84," on the May 30 eclipse. She completed the program and is now Director of the Plan-

etarium at the Children's Museum in Hartford, Conn. Joseph Kelch completed his internship and is now Education Coordinator at the Maryland Science Center's Davis Planetarium.

Abstracts and Popular Publications:

- Branley, Franklyn M.
1984. Shivers and goosebumps—How we keep warm. T. Y. Crowell. 96 pp.
1984. Rain and hail. Rev. edition. T. Y. Crowell. 32 pp.
1984. Mysteries of the universe. E. P. Dutton. 96 pp.
- Franklin, Kenneth L.
1984. World Almanac, Astronomy section. pp. 705-740.
- 1983-4. New York Times Almanac, daily historical index of sun, moon, planets and weather on weather page.
- 1983-4. Sunday New York Times. Skywatch, a weekly map and column.
1983. [Review of] Deep space, by Colin Ronan. American Scientist, vol. 72, p. 77.
1984. The discovery of Jupiter bursts. Serendipitous Discoveries in Radio Astronomy. Distributed by National Radio Astronomy Observatory. Workshop No. 7, pp. 252-258.
- Gutsch, William A., Jr.
1984. Planetarium script writing. Journal of the Southeast Planetarium Association. Reprinted by permission of the Journal of the Rocky Mountain Planetarium Association. Spring issue.
- Seltzer, Allen
1984. How to observe and photograph the annular solar eclipse. Astronomy, vol. 12, no. 5, pp. 50-55

Department of Entomology

The Department of Entomology increased its research collections by a total of 60,982 specimens of insects and spiders. Two particularly generous donations were involved: the Arthur Aiken collection of 8109 African butterflies; and the Joe Schuh collection of North American Coleoptera, of which 11,919 ground beetles were accessioned. The remaining specimens were the result of smaller gifts, purchases, and fieldwork by department staff members. A generous monetary donation from Bryant Mather has enabled the department to pursue actively the curation of large collections of North American noctuid moths.

Miridae Research Randall T. Schuh, Associate Curator and Chairman, saw his *Revision of Indo-Pacific Phylinae* published. This monograph treats in detail a group of small, primarily plant-feeding bugs which were last studied comprehensively in the Orient in 1904. Dr. Schuh's work on the phylinae Miridae is now focused on the North American fauna and is partially funded by the National Science Foundation.

In cooperation with NSF-supported Curatorial Assistant Michael D. Schwartz, Dr. Schuh brought to completion a revision of the New World genus *Rhinacloa*, a group of about 30 species, which finds its sister group in the Old World tropics. This study includes diagnoses and illustrations of male genitalia and other structures for all known *Rhinacloa* species. This basic information was used to prepare a species-level phylogenetic analysis, one of the first such undertakings in the Hemiptera, and the first for Dr. Schuh, who has in the past concentrated on the interrelationships of higher taxa within the Hemiptera.

Dr. Schuh and Mr. Schwartz collected Miridae for six weeks in the southwestern United States, accompanied part of the time by Research Associate Gary M. Stonedahl. This

effort resulted in the acquisition of between 20,000 and 30,000 specimens collected on nearly 100 host plant species. Mr. Schwartz dissected more than 500 male specimens of North American Phylinae in preparation for further revisionary work on the group. These dissections were particularly helpful in preparing a diagnosis for *Rhinacloa*, as well as in understanding the relationship of *Rhinacloa* to other genera.

With the cooperation of Curatorial Assistant Bella Galil and Associate John T. Polhemus, Dr. Schuh prepared a comprehensive bibliography and catalog of the Leptopodomorpha, or shore bugs. This project involved finding some 700 references, most of which were present in the American Museum's library. All citations were checked for accuracy, and information on the species, genera, and higher taxa of Leptopodomorpha mentioned was prepared from each reference. The catalog records were then transferred to the Museum's Wang Computer system, where they can be managed efficiently. The computer file will be used directly for photocomposition in preparing the publication. Drs. Schuh and Galil, using their cataloging experience with the Leptopodomorpha, have nearly completed the data-collection for a supplement to a catalog of the much larger family Miridae which was published in the late 1950s.

Dr. Schuh also prepared an analysis of distributional problems in the Indo-Pacific. This project involved comparison of interrelationships of areas of endemism for several groups, including the phylinae Miridae, blissine lygaeid bugs, cicadas, and swallowtail butterflies.

Bledius Research Lee H. Herman, Curator, conducting work on the fourth part of his monograph of the rove beetle genus *Bledius*, expanded his earlier classification of 10 species groups of the *Bledius* of North America to include all known species of the genus in the world. He has studied over 400 species and arranged them into 34 groups varying in size from one to about 60 species. Descriptions of and a key to the groups are complete, and the hundreds of illustrations and a cladogram are nearly finished. As part of this study, Dr. Herman spent

several months compiling a catalog of the names and literature for *Bledius*. More than 620 names were available, of which about 430 are valid. In completing the catalog, over 500 references were consulted, 97 percent of which were found in Dr. Herman's or the Museum's library.

Work has begun on describing some larval *Bledius*, and discussions were started on aspects of the natural history of the group. The literature on the natural history of *Bledius*, although fairly voluminous, leaves many basic questions unaddressed. Completion of Part IV of Dr. Herman's monograph should be a catalyst for a broad range of new morphological and biological studies of this large interesting genus.

Delimiting the geographical distribution of the species groups in the genus took Dr. Herman to Hawaii to search for *Bledius* from that state and to visit the Bishop Museum to sort their Staphylinidae to genus and borrow *Bledius* from the Pacific region. No *Bledius* were found on Hawaii. Available data from the Bishop Museum collection and elsewhere suggest that the genus, formerly thought to have a cosmopolitan distribution, occurs widely on continents and continental islands but has reached only a few oceanic islands that are near continents. The best collected region is North America, followed by Europe, then northern Africa; distributions for other parts of the world are patchy and moderately to exceedingly poorly known.

Dr. Herman prepared a preliminary catalog of the taxa recognized in the staphylinid subfamily Paederinae. This largely tropical group contains about 213 genera and 5300 species. This catalog represents the first step toward a generic revision of the subfamily for the world.

Dr. Herman also worked on a general bibliography of the Staphylinidae. To date about 12,000 references have been entered into the word processor by Departmental Secretary Bea Brewster. Some of them have been verified against the original references.

Spider Systematics Norman I. Platnick, Curator, conducted research on spider systematics and biogeography. As part of a long-term project of the family Gnaphosidae, he collabor-

ated with Associate John Murphy on a revision of the genera *Trachyzelotes* and *Urozelotes*. Five species found in various parts of the United States were discovered to be introduced rather than native. Originally Mediterranean, these spiders have been widely spread around the world by humans and have therefore been redescribed, by mistake, some 27 times from different parts of North and South America, Africa and Asia.

Together with Associate Walter Sedgwick, Dr. Platnick also completed a revision of the spider genus *Liphistius*, which includes the most primitive of all known spiders, based largely on Mr. Sedgwick's recent fieldwork in southeast Asia.

Research on Chilean spider biogeography was augmented by a three-year grant from the National Science Foundation. This grant will subsidize two future expeditions to Chile, supplementing the collecting Drs. Platnick and Schuh did there in 1981. In collaboration with Research Associate Raymond Forster, a review of the southern hemisphere spiders of the superfamily Palpimanoidea was completed (a similar review of the Dysderoidea is underway). This work showed that the family Mecysmaucheniidae, known only from southern South America and New Zealand, contains the closest relatives of the true Archaeidae of Madagascar, South Africa and Australia. Of special interest was the description of a new Chilean genus, first collected by Drs. Platnick and Schuh, whose characters allowed the recognition of two subfamilies of mecysmaucheniids, the fundamental division within each of which is between New Zealand and Chilean taxa. In both superfamilies, Drs. Forster and Platnick will increase the known American fauna by about five times at the generic and 10 times at the specific levels.

New World Moths Frederick H. Rindge, Curator, continued his long-range systematic studies of the New World moths of the family Geometridae, with emphasis on the tribe Lithini of the very large subfamily Ennominae. The section on the six genera that occur in North America is complete. Some descriptive work on those genera occurring in Chile and Argentina has been done, but further

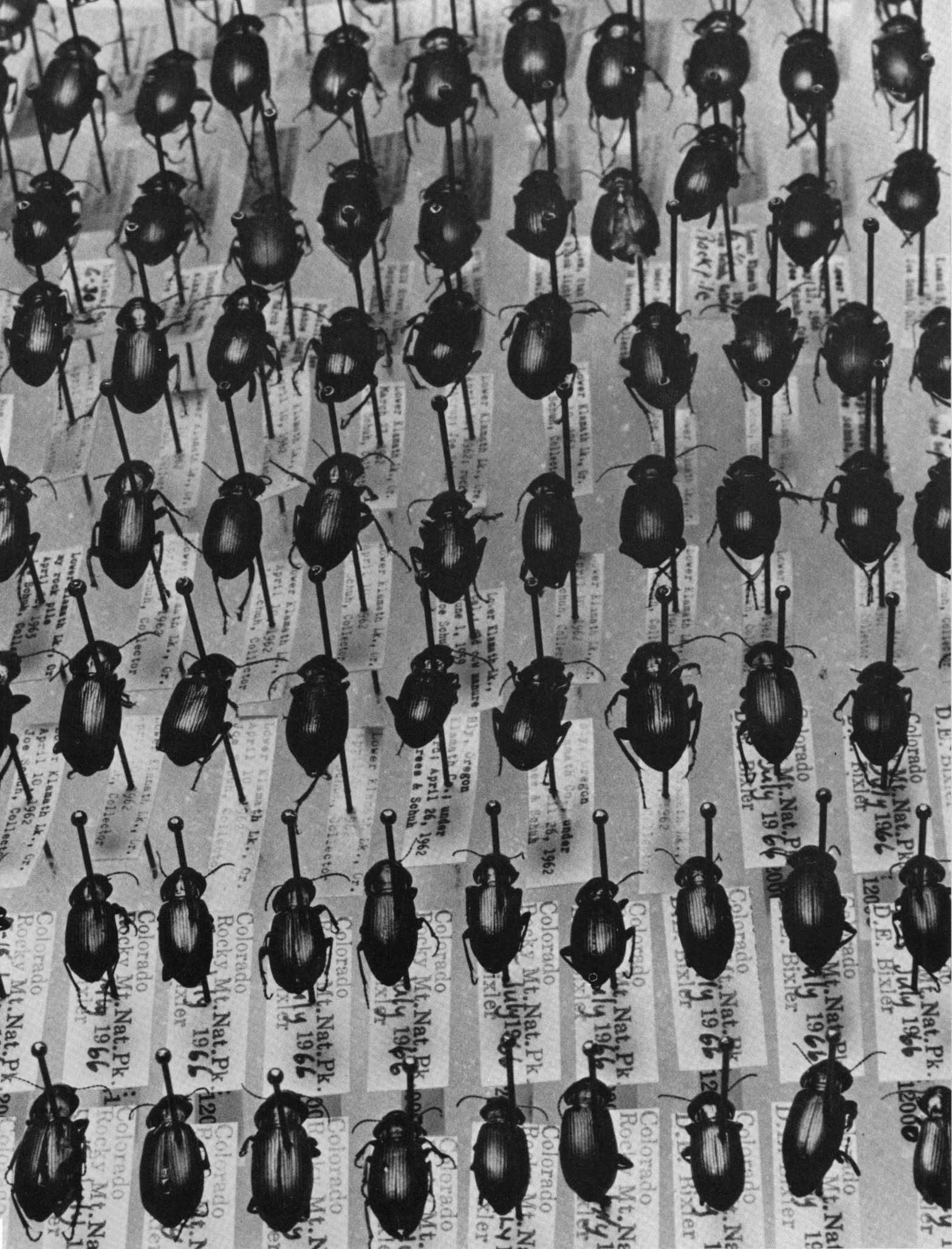
descriptive work and all illustrations must still be prepared.

A revision of *Acronyctodes*, a member of the Ennominae, was completed. The females of this genus have the under-surface of the last segment of the middle and hind tarsi covered with two types of sensory setae instead of the scales normally present. Similar modifications have been reported in some butterflies and a few moths, but not heretofore from the Geometridae. These setae are thought to be chemoreceptors which help females find the proper substrate for oviposition. *Acronyctodes* is placed in the Bistonini, thus extending the known distribution of that tribe as far south as Panama, and providing the first record of the tribe in tropical America.

Dr. Rindge also studied members of the genus *Eupithecia* from the western Gulf States. The large genus, which belongs to the Larentiinae, is worldwide in distribution. The taxonomy and distribution of the species in the Gulf area are very poorly known, and this study should clarify the situation.

Bee Nesting Jerome G. Rozen, Jr., Curator, participated in three field trips this year. The first, to southeastern Arizona, permitted him to complete two long-term studies on the nesting behavior and ecology of bees. The first study treated the large ground-nesting bees of the colletid family Diphaglossinae. These are the only bees that forage and mate very early in the morning, often before dawn. The second study treated the New World anthophorid tribe Exomalop-

These ground beetles are part of the Joe Schuh collection of North American coleoptera, a major gift to the Department of Entomology during 1983-84. The department's collection of more than 16 million insects and arachnids was increased by 60,982 specimens which were acquired through fieldwork, purchases, exchanges and gifts.



Colorado
Rocky Mt. Nat. Pk.
D.E. Bixler
July 1966
12000

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sini. This tribe is generally considered a primitive member of the family and a better understanding of its nesting biology may shed light on the relationships of the tribe to both the non-parasitic and parasitic anthophorids. These studies are currently in press.

During the second field venture, Dr. Rozen participated in the expedition to Cerro de la Neblina in southern Venezuela. (See pages 10-11)

Dr. Rozen's third field trip of the year was to Pakistan where he, Scientific Assistant Sarfraz Lodhi, volunteer Ian Stupakoff, and Ronald J. McGinley of the Smithsonian Institution, sampled the bee fauna. The only prior significant collections of bees from Pakistan were amassed at the turn of the century.

Research Associates Kurt Johnson, resident Research Associate, completed his analysis of the eumaeine lycaenid butterflies for inclusion in his monograph of the group. He spent one month in Europe analyzing characters of the Neotropical rain forest genus *Agrias* (Nymphalidae) in cooperation with Henri Descimon of the University of Marseilles, France.

Research Associate Robert J. Raven spent 1983 in the department, supported by an Australian post-doctoral fellowship, working on a generic-level revision of the world's mygalomorph (tarantula-like) spiders. His study, the broadest survey of these animals undertaken in this century, will revolutionize our understanding of their interrelationships.

Scientific Publications:

Ferris, Clifford D., Cyril F. dos Passos, James A. Ebner, and J. Donald Lafontaine
1983. An annotated list of the butterflies (Lepidoptera) of the Yukon Territory, Canada. *Canadian Ent.*, vol. 115, pp. 823-840, figs. 1-6.

Forster, Raymond R., and Norman I. Platnick
1984. A review of the archaoid spiders and their relatives, with notes on the limits of the superfamily Palpimanoidea (Arachnida, Araneae). *Bull. Amer. Mus. Nat. Hist.*, vol. 178, pp. 1-106, figs. 1-394.

Galil, Bella
1984. On a collection of Psocoptera from the Azores. *Bocagiana*, no. 71, pp. 1-9, figs. 1-8.

Gertsch, Willis J., and Franklin Ennik
1983. The spider genus *Loxosceles* in North America, Central America and the West Indies (Araneae, Loxoscelidae). *Bull. Amer. Mus. Nat. Hist.*, vol. 175, pp. 264-360, figs. 1-355, maps 1-13.

Herman, Lee H.
1983. *Eppelsheimius*: Revision, distribution, sister group relationship (Staphylinidae, Oxytelinae). *Amer. Mus. Novitates*, no. 2764, pp. 1-18, fig. 1-49, tables 1-3.

1983. Revision of *Bledius*, Part III. The *annularis* and *emarginatus* groups (Coleoptera, Staphylinidae, Oxytelinae). *Bull. Amer. Mus. Nat. Hist.*, vol. 175, pp. 1-146, figs. 1-414, tables 1, 2.

Johnson, Kurt
1983. The suitability of *Juniperus* (Cupressaceae) for larvae of *Callophrys hesseli* (Rawson and Ziegler) (Lycaenidae). *Jour. Lepidopt. Soc.*, vol. 37, pp. 78-79.

Johnson, Kurt, and Eric L. Quinter
1983. Commentary on Miller and Brown vs. Ehrlich and Murphy *et al.*: Pluralism in systematics and the worldwide nature of kinship groups. *Jour. Res. Lepidopt.*, vol. 21, pp. 255-269.

Krishna, Kumar, and Alfred E. Emerson
1983. A new fossil species of termite from Mexican amber, *Mastotermes electromexicus* (Isoptera, Mastotermitidae). *Amer. Mus. Novitates*, no. 2767, pp. 1-8, figs. 1-4, tables 1-3.

Platnick, Norman I.
1984. On the male of *Doliomalus* (Araneae, Gnaphosoidea). *Jour. Arachnol.*, vol. 11, pp. 451-452, figs. 1, 2.

1984. On the Gnaphosidae (Arachnida, Araneae) of the California Channel Islands. *Ibid.*, vol. 11, pp. 453-455, figs. 1-4.

1984. On yet another artificial spider classification: A review. *Ibid.*, vol. 11, pp. 459-461.

1984. Rock of ages or ages of rocks: [Review of] Scientists confront creationism, edited by Laurie R. Godfrey. *Rec. Publ. Nat. Hist.*, vol. 1, no. 4, pp. 8-10.

Platnick, Norman I., and Walter C. Sedgwick
1984. A revision of the spider genus *Liphistius* (Araneae, Mesothelae). *Amer. Mus. Novitates*, no. 2781, pp. 1-31, figs. 1-87.

Platnick, Norman I., and Mohammad U. Shadab

1984. A revision of the Neotropical spiders of the new genus *Apopyllus* (Araneae, Gnaphosidae). *Amer. Mus. Novitates*, no. 2788, pp. 1-9, figs. 1-22.

Rindge, Frederick H.
1983. A generic revision of the New World Nacophorini (Lepidoptera, Geometridae). *Bull. Amer. Mus. Nat. Hist.*, vol. 175, pp. 147-262, figs. 1-124, tables 1-9.

Rozen, Jerome G., Jr.
1983. Nesting biology of the bee *Svastra sabinensis* (Hymenoptera, Anthophoridae). *Jour. New York Ent. Soc.*, vol. 91, no. 3, pp. 264-268, 4 figs.

1984. Nesting biology of diphaglossine bees (Hymenoptera, Colletidae). *Amer. Mus. Novitates*, no. 2786, pp. 1-33, figs. 1-33.

Schuh, Randall T.
1984. Revision of the Phylinae (Hemiptera, Miridae) of the Indo-Pacific. *Bull. Amer. Mus. Nat. Hist.*, vol. 177, pp. 1-476, figs. 1-1499.

Schuh, Randall T., and Michael D. Schwartz
1984. *Carvalhoma* (Hemiptera, Miridae): Revised subfamily placement. *Jour. New York Ent. Soc.*, vol. 92, no. 1, pp. 48-52, figs. 1-9.

Schwartz, Michael D., and John D. Lattin
1983. *Irbisia knighti*, a new mirine plant bug (Heteroptera, Miridae) from the Pacific Northwest. *Jour. New York Ent. Soc.*, vol. 91, pp. 413-417, figs. 1-8.

Slater, James A.
1983. The *Ozophora* of Panama, with descriptions of thirteen new species (Hemiptera, Lygaeidae). *Amer. Mus. Novitates*, no. 2765, pp. 1-29, figs. 1-25.

Vaurie, Patricia
1983. A catalog of the Coleoptera of America north of Mexico. Family: Curculionidae. Subfamily: Rhynchophorinae. U. S. Dept. Agric. Handbook no. 529-143a, pp. 1-28.

Department of Herpetology

The Department was awarded a three-year curatorial support grant from the National Science Foundation for improvement of collection facilities and purchase of new microscopes and other instruments. Fieldwork and research are partially supported by new or continued funding from the National Science Foundation, the National Geographic Society, and Astra Läkemedel AB, Sweden. Staff members carried out field investigations in the United States, West Indies, Panama and Venezuela.

Grants Funding was received from several agencies in acknowledgment of the significance of departmental activities. The worldwide collection of preserved amphibians and reptiles is recognized by the National Science Foundation as a national resource for scientific research, as attested by the third consecutive curatorial support grant awarded to the department. The present three-year NSF grant of \$142,488 provides funds for microscopes and other instruments needed by visiting scholars. It also allows for the purchase of 70 three-door steel specimen cases that are being placed in new rooms to accommodate expansion of a growing collection. In the second and third grant years, salary is provided for a curatorial assistant to help move the amphibian collection and to help speed responses to loan requests.

NSF funding was received for the third year of Curator Charles J. Cole's five-year grant of \$140,000 for investigations on the genetics, origin and relationships of unisexual species of reptiles.

Chairman and Curator Charles W. Myers co-authored the Museum's two-year coordinating grant of \$36,307 in partial support of American zoologists who are participating in the Venezuelan Cerro de la Neblina Expedition.

Another proposal to NSF, written in collaboration with the Department of

Ornithology, was for the purchase of electronic sound-analyzers and audio-spectrogram printers to be used in the study of frog and bird vocalizations. This proposal received a favorable review; a \$55,000 grant was to be awarded.

Two grants were given by the National Geographic Society. Dr. Cole received \$3,950 for fieldwork in the West Indies, and Dr. Myers was awarded \$7,000 for an expedition to Cerro Fábrega in western Panama. Dr. Myers received a third annual award of \$4,000 from the Research and Development Laboratories of Astra Läkemedel AB, Sweden, for research on tropical poison frogs.

Cerro de la Neblina Expedition (See pages 10-11)

Frog and Snake Studies

Dr. Zweifel began study of external and skeletal morphology of a possibly undescribed genus of microhylid frog collected on the Cerro de la Neblina Expedition. Most of his research time during the year was spent on a systematic revision of the microhylid frogs of Australia, a project for which he did the fieldwork in 1980-1981.

Dr. Myers conducted two field trips to the mountains and Atlantic lowlands of western Panama in order to obtain skin toxins and blood and frozen tissue samples for collaborative biochemical investigations into the evolution of an extraordinarily variable complex of brightly colored poison frogs. He was accompanied in the field by Research Associates John W. Daly of the National Institutes of Health and Linda R. Maxson of the University of Illinois, and also by A. Stanley Rand, Senior Scientist at the Smithsonian Tropical Research Institute.

Dr. Myers's party also continued his faunal survey of a newly accessible cloud forest on the continental divide of western Panama. Lodging and meals were again provided in a cloud-forest camp of Constructora Urbana S.A., a road-construction company that since 1982 has contributed important aid to Dr. Myers's work in Panama.

Research Associate Janis A. Roze

conducted research on venomous coral snakes. His taxonomic and biological summary of this medically important group was published in Brazil by the Instituto Butantan.

Unisexual Lizards Dr. Cole spent the summer of 1983 in the southwest, using the Museum's Southwestern Research Station as a base of operations for field and laboratory research. Other staff members who assisted and collaborated in this work were Senior Scientific Assistant Carol R. Townsend and Research Associate Herbert C. Dessauer of the Louisiana State University Medical Center in New Orleans. The thrust of their work involved the biochemical genetics, origin and relationships of unisexual (all-female) species of whiptail lizards of the genus *Cnemidophorus*. Analysis of field samples, as well as of lizards of known genealogy reared at the Museum, is allowing detailed resolution of the basic genetics of unisexual and bisexual species. Studies of gene dosage in polyploid species, which have multiple copies of all genes, demonstrated that for each detectable genetic locus, all genes are equally functional at the level of the individual cell nucleus.

Dr. Cole and Ms. Townsend also conducted fieldwork for two weeks on the West Indian islands of Martinique, Trinidad and Chacachacare. They collected specimens of two bisexual species and one all-female species of lizards of the genus *Gymnophthalmus*. Data on ecology, morphology, chromosomes, reproduction and genetics are being used to test the hypothesis of a hybrid origin of the unisexual species.

Lizard Behavior Dr. Cole and Ms. Townsend published a paper demonstrating that, contrary to another published report, no special behavioral phenomena are required for reproduction by all-female species of whiptail lizards. Each female produces developing eggs in the absence of sperm and independently of behavioral stimulation from other females.

Research Associate Carol A. Simon spent much of the year on sabbatical leave in Arizona, where she conducted research on the effect of



habitat structure on territory size of the lizard *Sceloporus jarrovi*. She is also working on comparative studies of tongue-flicking behavior and chemoreception among several ecologically diverse species of *Sceloporus*.

Departmental Outreach The research collection and other departmental resources are heavily used by the scientific community. On average, the department received one professional visitor every three work days. Many visiting scientists stayed on to work for periods ranging from several days to several weeks. The department's important Chinese collections, for example, were studied on a month-long visit by Prof. Ermi Zhao from the Chengdu Institute of Biology, Peoples Republic of China.

A total of 3691 specimens were lent to or returned by 92 researchers at other institutions in this country and abroad. Specimens were accessioned from 14 countries on five continents and from the islands of Trinidad and New Guinea. About 80 percent of the 2066 new specimens was acquired through fieldwork by Museum staff, with the balance representing small gifts and exchanges.

Scientific Publications:

- Cole, Charles J.
1983. Specific status of the North American fence lizards, *Sceloporus undulatus* and *Sceloporus occidentalis*, with comments on chromosome variation. *Amer. Mus. Novitates*, no. 2768, pp. 1-13, figs. 1-6, table 1.
1984. Unisexual lizards. *Sci. Amer.*, vol. 250, no. 1, pp. 94-100.

Charles J. Cole, Curator in the Department of Herpetology, put on climbing irons to catch a frequently heard but rarely seen tree frog near the base camp of the Cerro de la Neblina expedition in southern Venezuela. Department members spent 36 days searching for specimens at Neblina. Initial findings indicate most species obtained from the higher elevation camps were never seen before by scientists, and that some of the species found in the lowlands were never recorded before in Venezuela.

- Cole, Charles J., and Carol R. Townsend
1983. Sexual behaviour in unisexual lizards. *Animal Behav.*, vol. 31, pp. 724-728, tables 1-2.

- Dessauer, Herbert C., and Charles J. Cole
1984. Influence of gene dosage on electrophoretic phenotypes of proteins from lizards of the genus *Cnemidophorus*. *Comp. Biochem. Physiol.*, vol. 77B, no. 1, pp. 181-189, figs. 1-4, tables 1-2.

- Klemens, Michael W., and James L. Warner
1983. The status of *Clemmys muhlenbergi* (Schoepff) in Connecticut. *Herp. Rev.*, vol. 14, no. 4, pp. 124-125.

- Lynch, John D., and Charles W. Myers
1983. Frogs of the *fitzingeri* group of *Eleutherodactylus* in eastern Panama and Chocoma South America (Leptodactylidae). *Bull. Amer. Mus. Nat. Hist.*, vol. 175, art. 5, pp. 481-568, frontis. + figs. 1-32, tables 1-2.

- Myers, Charles W.
1984. Subcircular pupil shape in the snake *Tantalophis* (Colubridae). *Copeia*, 1984, no. 1, pp. 215-216, fig. 1.

- Myers, Charles W., John W. Daly, and Víctor Martínez
1984. An arboreal poison frog (*Dendrobates*) from western Panama. *Amer. Mus. Novitates*, no. 2783, pp. 1-20, figs. 1-10, tables 1-2.

- Roze, Janis A.
"1982" [1983]. New World coral snakes (Elapidae): A taxonomic and biological summary. *Mem. Inst. Butantan*, vol. 46, pp. 305-338.

- Simon, Carol A., and Barbara E. Bissinger
1983. Paint marking lizards: Does the color affect survivorship? *Jour. Herp.*, vol. 17, no. 2, pp. 184-186, tables 1-2.

Department of Ichthyology

The principal objectives of the Department of Ichthyology are the study, growth and maintenance of its major resource—the vast collection of more than a million fishes, some parts of the collection dating from the last century, others only weeks old. The effort during the year to identify and catalog a backlog of specimens increased the permanent cataloged collection by more than a third. At this rate, the department's entire holdings will be curated and available for study by Museum researchers and the scientific community at large within two years.

The curation project on the uncataloged backlog has been made possible by grants from the National Science Foundation and the Hudson River Foundation. This year, the curation effort added some 350,000 specimens and 24,000 lots to the department's permanent, cataloged collection. The new material is about evenly divided between two major collections acquired in recent years: adult freshwater fishes from the southeastern United States, and the larval fishes from the Hudson River.

While many specimens entered the collection during the year, other new, uncataloged specimens continued to arrive. Last year, 30 accessions, totaling 31,000 specimens, were added to the uncataloged backlog. Nearly 50 loans were sent to investigators throughout the world.

Caribbean Biogeography At the Annual Systematics Symposium of the Missouri Botanical Garden, Curator Donn E. Rosen presented the results of many years spent studying the geology and biology of Middle America and the Caribbean Islands. Geologists are interested in the region because of its petroleum reserves; biologists regard it as a fascinating laboratory for the study of evolution. Only now are the complex secrets of the region's geology and biology beginning to unfold.

Dr. Rosen's work indicates that, despite minor problems, the geologic history can now be seen as a coherent whole. Still, the geologic history is complex with a wide diversity of biotic interrelationships among the many different islands and areas within the region. Dr. Rosen believes that, although the full story remains to be told, new developments in plate-tectonic theory and in cladistic theory explain a great deal.

Larval Fishes C. Lavett Smith, Curator, has completed his book, "The Inland Fishes of New York," which will be published in early 1985. In collaboration with James C. Tyler, Research Associate, Dr. Smith began a long-term study of the factors controlling recruitment of new individuals into coral-reef fish communities. Dr. Smith believes that many of these factors are operative only during early stages of development, when juvenile fishes first arrive on the reef.

With support from the National Oceanic Atmospheric Administration, Drs. Smith and Tyler collected in the Salt River Canyon off St. Croix in the U.S. Virgin Islands. They spent a week underwater collecting large numbers of many kinds of larval fishes, particularly during the night when planktonic larvae were abundant near the sea floor, 50 to 130 feet beneath the surface. Very little collecting of this sort has ever been done, and Dr. Smith anticipates a variety of interesting results.

Anchovies Gareth Nelson, Chairman and Curator, continued his systematic study of the world's anchovies, which number about 150 species. One interesting result stemmed from the discovery of a miniature anchovy, one of several new freshwater species collected in Brazil's Rio Negro by Michael Goulding of the Museu Goeldi in Belem.

Attempting to classify this species led to a review of the structure of the distinctive snout of all anchovies. The anchovy snout contains a remarkably complex rostral organ of still unknown function. Dr. Nelson believes that the organ might be electroreceptive, facilitating navigation of these schooling fishes. The Rio Negro anchovy lacks the usual anchovy snout, Dr. Nelson

discovered. Nevertheless, it has structures uniquely associated with the anchovy rostral organ. It is therefore identified as an anchovy, although an aberrant one.

Exploration Dr. Nelson, with Carl Ferraris, Graduate Student in the department, and Ramiro Royero, of the Instituto de Zoologia Tropical at the Universidad Central de Venezuela, participated in the international expedition to Cerro de la Neblina in southern Venezuela.

(See pages 10-11)

Electric Fishes Peter Moller, Research Associate, in collaboration with Jacques Serrier, Associate, continued their detailed study of the role of electric discharges in the behavior of the weakly electric fishes (family Mormyridae) of Africa. Dr. Serrier joined the department in September under a three-year joint grant from the National Science Foundation and the Centre National de la Recherche Scientifique.

Their research entered a new phase during the past year. Drs. Moller and Serrier developed a novel experimental device (LINEX, for Linear Movement Experiments) to measure the electric discharges from two fish at various distances. Two mormyrids are suspended opposite each other, each in its own clay shelter, into a 600-gallon, 12-foot-long tank. The small clay fish-housings hang from a track so that they can be moved closer or farther apart. The electric discharge behavior is analyzed directly with a micro-computer. The electric interactions between mormyrids are proving to be quite predictable and suggest some primitive, electric fish language.

Hakes and Cardinal Fishes

During his continuing study of hakes of the genus *Urophycis*, Joseph W. Rachlin, Research Associate, discovered that the red hake (*U. chuss*) grows remarkably rapidly, up to 14 inches, during its first year. In collaboration with K. A. Rivlin, Graduate Student, and George Dale of Fordham University, Dr. Rachlin studied the chromosomes of cardinal fishes (genus *Apogon*). They discovered what appear to be differentiated sex chromosomes, a condition known in fewer than 10 other fish species.

Scientific Publications:

- Dingerkus, Guido, and T. C. DeFino
1983. A revision of the orectolobiform shark family Hemiscyllidae (Chondrichthyes, Selachii). Bull. Amer. Mus. Nat. Hist., vol. 176, pp. 1-94.
- Gorner, P., Peter Moller, and Jacques Serrier
1984. Lateral-line input and stimulus localization in the African clawed toad *Xenopus* sp. Jour. Exp. Biol., vol. 108, pp. 315-328.
- Nelson, Gareth
1983. Status of a clupeid fish *Clupeoidon chanpole* Hamilton. Japan. Jour. Ichthyol., vol. 30, p. 196.
1984. Identity of the anchovy *Hildebrandichthys setiger* Schultz, with notes on the relationships and biogeography of the genera *Engraulis* and *Cetengraulis*. Copeia, 1984, pp. 422-427.
1984. Notes on the rostral organ of anchovies. Japan. Jour. Ichthyol., vol. 31, pp. 23-24.
- Nelson, Gareth, and Norman Platnick
1984. Systematics and evolution. M. W. Ho and P. T. Saunders (eds.), Beyond Neo-Darwinism: An Introduction to the New Evolutionary Paradigm. Acad. Press, London, pp. 143-158.

Carol G. Schleifer, Senior Scientific Assistant in the Department of Ichthyology, cleans the skeleton of a spiny-finned fish as part of a departmental project to catalog the vast collection of fish specimens. The curation project is funded by grants from the National Science Foundation and the Hudson River Foundation. During 1983-84, some 350,000 specimens were added to the department's permanent collection of more than a million specimens.



- Parenti, Lynne R.
1984. On the relationships of phallostethoid fishes (Atherinomorpha), with notes on the anatomy of *Phallostethus dunckeri* Regan, 1913. *Amer. Mus. Novitates*, no. 2779, pp. 1-12.
1984. A taxonomic revision of the Andean killifish genus *Orestias* (Cyprinodontiformes, Cyprinodontidae). *Bull. Amer. Mus. Nat. Hist.*, vol. 178, pp. 110-214.
- Rachlin, Joseph W., B. Warkentine, and T. E. Jensen
1983. The response of the marine diatom *Nitzschia closterium* to selected concentrations of the divalent cations, Cd, Cu, Pb and Zn. D. D. Hemphill (ed.), *Trace Substances in Environ. Health*, vol. XVII, pp. 72-81.
- Rachlin, Joseph W., T. E. Jensen, and B. Warkentine
1984. The toxicological response of the alga *Anabaena flos-aquae* (Cyanophyceae) to cadmium. *Arch. Environ. Contam. Toxicol.*, vol. 13, pp. 143-151.
- Rosen, Donn E.
1984. Zeiforms as primitive plectognath fishes. *Amer. Mus. Novitates*, no. 2782, pp. 1-45.
- Whitehead, Peter J. P., and Gareth Nelson
1984. *Pellonula bahiensis* Steindachner, 1879 (Pisces): proposed replacement of lectotype. *Bull. Zool. Nomen.*, vol. 41, pp. 65-66.

Abstracts and Popular Publications:

- Belbenoit, P.*, Peter Moller, and Jacques Serrier
1982. Do electric fish "sleep?" *Sleep*, Karger, Basel, pp. 240-242.
- Nelson, Gareth
1984. [Review of] *Biogéographie et technique des plaques*. *Syst. Zool.*, vol. 33, pp. 122-123.
1984. [Review] Just before the origin: Alfred Russell Wallace's theory of evolution, by J. L. Brooks. *Syst. Zool.*, vol. 33, pp. 248-249.
- Smith, C. Lavett
1983. Perilous pedagogy. *Environ. Biol. Fishes*, vol. 9 (2), pp. 191-192.

Department of Invertebrates

The department is committed to the study of the biology and diversity of fossil and Recent invertebrates. Its work centers on a tradition emphasizing both fieldwork and collections-oriented laboratory investigations. Members of the staff carry out original, basic research, communicate their findings to the scientific community and general public and accumulate and care for collections.

Expanding Resources The collection of Platyhelminthes was considerably enriched by a gift from Horace W. Stunkard, Research Associate, of some 6000 slide preparations of parasitic flatworms, representing numerous type specimens as well as complete life cycles of species. The department also received as gifts three outstanding collections of mollusks totaling more than 50,000 specimens: The Raymond Summer Collection is largely composed of Cypraea and Marginellidae, the Kay C. Vaught Collection is worldwide in scope with a major strength in eastern Pacific material, and the William E. Old Collection, also worldwide, includes large holdings of Conidae, Strombidae, Cypraea and Acmaeidae. In addition, some 30,000 specimens of marine and freshwater mollusks were received from the National Museum of Natural History in Washington.

Flatworms and Mollusks Ernst Kirsteuer, Chairman and Curator, concentrated research efforts on a systematic revision of the Family Ototyphlonemertidae, based on previous fieldwork. New information about geographic distribution and morphological variation has been added to the growing body of knowledge about this group of minute, sand-inhabiting marine worms. Dr. Kirsteuer also gathered data in preparation for a reclassification of the Phylum Nemertina, the ribbon worms. Roger L. Batten, Curator, reviewed three examples of living fossil mol-

lusk. He also completed studies of two advanced gastropod groups from the Permian of Malaysia and began an investigation of the early life history of the living sea hare, *Aplysia*, based on shell structure. This project will be conducted jointly with Ethel Tobach, Curator in the Department of Mammalogy. Dr. Batten attended meetings of the International Correlation Project in Beijing during early March, where he presented a paper on his study of the Permo-Triassic of eastern California. He also participated in fieldwork in China's northwestern Sichuan Province where he found silicified gastropod fauna of the uppermost Permian.

Evolutionary Concepts Niles Eldredge, Curator, wrote two books during the past year. "The Integration of Evolutionary Theory" analyzes the primary documents of the evolutionary synthesis. The text elaborates the need for a more complete theory that takes into account the hierarchical organization of genealogical and ecological entities. The second book, as yet untitled, is a general exposition of the theory of punctuated equilibria: what it is and how it came to be. Dr. Eldredge also wrote the introduction and a chapter for a book, "Living Fossils," he edited with Steven M. Stanley of Johns Hopkins University. Progress was made on descriptions of new trilobites from the Upper Silurian of Bolivia, and on a project investigating evolutionary patterns in deep-sea Radiolaria. The Radiolaria project is being conducted in conjunction with several colleagues at Lamont-Doherty Geological Observatory. With Michael Novacek, Chairman of the Department of Vertebrate Paleontology, Dr. Eldredge completed a manuscript on the connection between systematics and paleobiology.

El Niño's Influence William K. Emerson, Curator, studied the systematics, ecology and zoogeography of marine mollusks. Six new records of prosobranch gastropods for Pacific Panama were recently reported. Four of these are representatives of the Indo-Pacific faunal element. The discoveries bring to 50 the number of tropical prosobranch gastropods known to occur in eastern Pacific waters. Of these 50, only 11 have been

recorded in the vicinity of the New World mainland. The remainder (39 species) occur only around oceanic islands in the eastern Pacific, especially Clipperton. With the cooperation of field collectors in Panama and on Cocos Island, Costa Rica, Dr. Emerson will investigate the possible influence of El Niño, a cyclical climatic condition, on the zoogeographic composition of the marine molluscan faunas of Pacific Panama and other areas in the eastern Pacific Ocean.

Fossilized Ammonites Neil H. Landman, Assistant Curator, concentrated his research on ammonites, externally shelled cephalopods which are abundant in the fossil record. Dr. Landman is studying finds from Poland, Germany and the United States which preserve in minute detail the fine structure of the ammonite shell. Ammonites became extinct at the end of the Cretaceous Period, about 65 million years ago. This extinction is the subject of another study in cooperation with Karl M. Waage of the Yale Peabody Museum. The only extant relative of the ammonite is the pearly nautilus, a creature which lives in the Indo-Pacific. Working with J. Kirk Cochran of State University of New York at Stony Brook, Dr. Landman has determined the rate of growth and longevity using naturally occurring radionuclides.

Bryozoans Judith E. Winston, Assistant Curator, studied the systematics and ecology of Florida, Caribbean and Antarctic bryozoans. A two-year examination of the population biology of lunulitiform bryozoans from Florida has been funded by the National Geographic Society. While working on this project, Dr. Winston discovered some unusual bryozoans whose extremely small colonies encrust single grains of sand. A checklist of Antarctic bryozoan species was completed in September and a monograph on the systematics of shallow-water Antarctic species is in preparation. Dr. Winston has begun a major study of the distribution, functional morphology and evolution of avicularia, important taxonomic characters in cheilostome bryozoans. She has been awarded two grants for fieldwork in Antarctica and Belize. Dr. Winston also attended the Sixth Inter-

national Bryozoology Association Meetings in Vienna in July where she presented two papers.

Publications Dorothy E. Bliss, Curator Emerita, served as editor in chief of the treatise, "The Biology of Crustacea," published by Academic Press. During the year, volume eight, "Environmental Adaptations," was published. It contains a chapter, "Terrestrial Adaptations," by Lawrence W. Powers, former Research Associate, and Dr. Bliss. Volume nine, "Integument, Pigments, and Hormonal Processes," is in production. Dr. Bliss and Linda H. Mantel, Research Associate, are co-editors of this volume.

Fossil Bivalves Norman D. Newell, Curator Emeritus, and Donald W. Boyd, Research Associate, continued their monographic studies of fossil bivalves involved in the biological crisis which occurred at the close of the Paleozoic Era. The purpose of this work is twofold: first to make better known the evolutionary systematics of a major group of mollusks; second, to analyze the patterns of extinction and replacement in these marine organisms at a critical time in their history. In this work Drs. Newell and Boyd collaborated with Research Associate Leslie Marcus to make use of the computer and the scanning electron microscope. They also participated in an international conference in China in March dealing with Paleozoic terminal events.

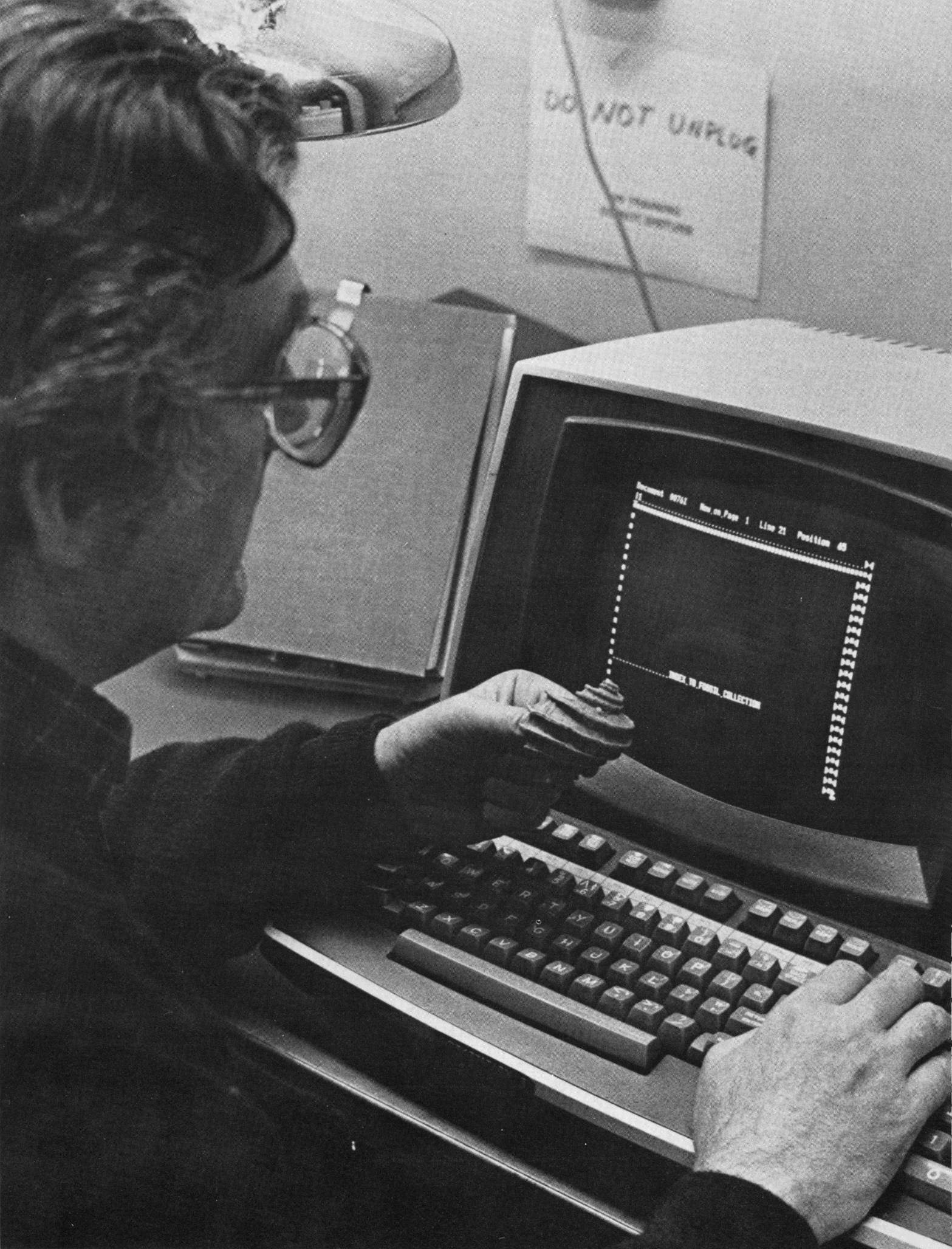
Brachiopods Howard R. Feldman, Research Associate, studied the systematics and biogeography of Jurassic Ethiopian Province brachiopods from Sinai. With support from the Explorers Club Exploration Fund, he will conduct fieldwork in the Sinai in collaboration with Francis Hirsch, Geological Survey of Israel, and Ellis F. Owen, British Museum (Natural History). Dr. Feldman expanded his systematic study of Devonian brachiopods in New York and has submitted a manuscript to the *Bulletin of the American Museum of Natural History* on the brachiopods of the Onondaga Limestone in central and southeastern New York.

Symbiosis in Invertebrates John J. Lee, Research Associate, and col-

laborators conducted research on the biology of larger Foraminifera and the various endosymbiotic algae associated with these giant, tropical, shallow-water protozoa. In one series of experiments the herbicide, DCMU, was used to rid a particular species of diatom-bearing Foraminifera hosts, from its protozoan symbionts. The ability of the diatoms to regain symbiosis could then be observed and measured. The resulting evidence suggests a preferential order of potential diatom endosymbionts. In another series of experiments foraminiferal host homogenates suppressed the formation of endosymbiont shells and promoted the release of metabolites by protozoan symbionts. Collaborative research aimed at studying the effects of algal symbiosis on the stable isotope fractions in the protozoan shells has been conducted in collaboration with investigators from Hebrew University. In addition, Dr. Lee was the senior editor of and a contributor to the "Illustrated Guide to the Protozoa," a major taxonomic and identification work.

Hormones and Crabs Linda H. Mantel, Research Associate, examined the effects of hormones produced by the central nervous system on salt and water balance in crabs. She has found evidence for a blood-borne factor that affects permeability and transport of salts. Dr. Mantel's research also indicates that chemical messengers can activate an important enzyme in the gills of the green crab, *Carcinus maenas*. In addition, she studied the effects of the pollutants benzene and naphthalene on growth, regeneration and metabolism in the commercially important blue crab, *Callinectes sapidus*.

Computer Programs Leslie F. Marcus, Research Associate, has developed a computer data acquisition system for monitoring mammal activity via radio telemetry. Dr. Marcus and Philippe Lampietti, a consultant, wrote computer programs for a revision of Simpson's "Classification of Mammals," a book being produced by Malcolm C. McKenna, Frick Curator in the Department of Vertebrate Paleontology. Dr. Marcus also studied Quaternary sea level modeling in col-



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laboration with Walter Newman of Queens College.

Parasitic Flatworms Horace W. Stunkard, Research Associate, conducted research on the life cycles, larval stages and systematics of parasitic flatworms. He submitted two papers, one to the *Journal of Helminthology* and the other to the *Proceedings of the Helminthological Society of Washington* and contributed a chapter to a book on the evolution and systematics of Eucestoda.

Micropaleontology Press John A. Van Couvering, Editor in Chief, Norman Hillman, Associate Editor, and Susan Carroll, Assistant Editor, reported that annual supplements, each more than 600 pages, were added to the *Catalogue of Foraminifera* and the *Catalogue of Ostracoda*; in addition, the first microfiche edition of these two catalogs, presenting more than 50,000 genera and species of microfossils with a computerized index, was also completed. One 450-page volume of the popular *Catalogue of Planktonic Foraminifera* was reprinted. Editing was begun on the first two 1,000-page books of the new *Catalogue of Diatoms*. The research quarterly *Micropaleontology* and the monthly information service *Bibliography and Index of Micropaleontology* were published on schedule in their 30th and 12th years, respectively. The first of nine volumes of the new *Handbook of Cenozoic Calcareous Nannoplankton* by Marie-Pierre Aubry was published late in the year.

Modernization of Micropaleontology Press, supported by its indus-

trial advisors, continued with the addition of two word processor microcomputers to complement three existing work stations. The Press also benefited from a generous bequest in the will of retired employee Arthur C. Dusenbury, who as former editor, was noted for his knowledge of the rules pertaining to zoological nomenclature.

Dr. Van Couvering, in collaboration with William A. Berggren, Research Associate, was co-editor of *Catastrophes in Earth History: The New Uniformitarianism* published by Princeton University Press. The book included contributions from Stephen Jay Gould, Research Associate, and Norman D. Newell, Curator Emeritus. Dr. Van Couvering and Dr. Berggren completed a revision of their time-scale for the Cenozoic period (65 million years ago to present). It will be published by the London Geological Society and in shorter form by the Geological Society of America. Dr. Van Couvering edited an international study examining the beginning of the Pleistocene ice age as seen in oceanic and continental deposits around the world. The work will be published as a book by Elsevier Publishing Company. He also taught undergraduate oceanography as an Adjunct in Geology at Rutgers University and conducted personal research on the age and the reconstructed history of African fossil mammals.

Departmental Outreach In the course of the year 62 loans of type and non-typological materials were made to researchers at other institutions in this country and abroad. More than 100 collection-related inquiries were processed. The department accommodated 101 visiting scientists who studied specimens from the collections. In addition, 34 appointments to use the reference collections were made by amateur collectors, artists and other interested parties. Behind-the-scenes tours were given to 35 members of the New York Shell Club, 21 members of the Long Island Shell Club and 18 members of the New York Paleontological Society. Six microfiche copies of the entire fossil invertebrate type collection catalog were sent to colleagues at other institutions.

Staff members held appointments

at the City University of New York and Columbia University and served on dissertation committees at other universities. They also gave lectures in connection with the Department of Education, participated in the Discovery Tour program, presented seminars and slide shows to amateur groups and appeared on television and radio programs.

The department sadly reports the deaths of two long-time Research Associates, Allan W. H. Bé in October and William J. Clench in February.

Scientific Publications:

Batten, Roger L.

1983. Shell Structure of the Galapagos Rift limpet *Neomphalus fretterae* McLean, 1981, with notes on muscle scars and insertions. *Amer. Mus. Novitates*, no. 2776, pp. 1-13, figs. 1-18.

Berggren, William A., and John A. Van Couvering, eds.

1984. *Catastrophes and Earth History: The New Uniformitarianism*. Princeton University Press, 464 pp.

Bliss, Dorothy E., editor in chief

1983. *The Biology of Crustacea*, vol. 8. Academic Press, Inc., New York.

Cochran, J. Kirk, and Neil H. Landman

1984. Radiometric determination of the growth rate of *Nautilus* in nature. *Nature*, vol. 308, pp. 725-727.

Eldredge, Niles

1983. A la recherche du M Pangloss. *The Brain and Behavioral Sciences*, vol. 6, pp. 361, 362.

Emerson, William K.

1983. New records of prosobranch gastropods from Pacific Panama. *The Nautilus*, vol. 96, no. 4, pp. 156-161, 16 figs.

1984. *Conus kintoki* Habe and Kosuge, 1970: A validly proposed taxon. *The Nautilus*, vol. 98, no. 2, pp. 58-60, 3 figs.

Gould, Stephen J., and Niles Eldredge

1983. Darwin's gradualism, *Syst. Zool.*, vol. 32, pp. 444-445.

Landman, Neil H.

1983. Barnacle attachment on live *Nautilus*: implications for *Nautilus* growth rate. *The Veliger*, vol. 26, no. 2, pp. 124-127.

1983. Ammonoid growth rhythms. *Lethaia*, vol. 16, p. 248.

Sidney E. Horenstein, Senior Scientific Assistant in the Department of Invertebrates, enters new information on the fossil snail *Ecphora* into the Museum's computer system. By maintaining a computerized index of the fossil collection, scientists are able to refer to and find specimens quickly.

- Landman, Neil H., Danny M. Rye, and Kevin L. Shelton
1983. Early ontogeny of *Eutrephoceras* compared to Recent *Nautilus* and Mesozoic ammonites: evidence from shell morphology and light stable isotopes. *Paleobiology*, vol. 9, no. 3, pp. 269-279.
- Lee, John J.
1983. Trichomonadida, Diplomonadida, Retortamonadida, Rhizomastigida, Kinetoplastida, Hypermastigida. In, *Illustrated Guide to the Protozoa*, J. J. Lee, S. H. Hutner and E. C. Brown, eds. Soc. of Protozoologists, Lawrence, Kansas, pp. 209-246.
- Lee, John J., and Wayne Bock, and William Hay
1983. Foraminiferida. *Ibid.*, pp. 335-357.
- Lee, John J., and John Dodge
1983. Dinoflagellida. *Ibid.*, pp. 23-42.
- Lee, John J., and Marie E. McEnery
1983. Symbiosis in Foraminifera. In *Algal Symbiosis*, L. J. Goff, ed. Cambridge University Press, pp. 37-68.
- Lee, John J., Marie E. McEnery, Robert J. Koestler, Monica J. Lee, Jason Reidy, and Moshe Shilo
1983. Experimental studies of symbiont persistence in *Amphistegina lessona*, a diatom-bearing species of larger Foraminifera from the Red Sea. In *Endocytobiology VII*. H.E.A. Schenk and W. Schwemmler, eds. Walter de Gruyter and Co., Berlin, pp. 487-514.
- Lee, John J., and Charles W. Reimer
1983. Isolation and identification of endosymbiotic diatoms from larger Foraminifera of the Great Barrier Reef, Australia, Makapuu tide pool, Oahu, Hawaii, and Gulf of Elat, Israel, with the description of three new species *Amphora roettgeri*, *Navicula hanseniana*, and *Nitzschia frustulum* variety *symsbiotica*. In *Proc. Seventh Symp. on Recent and fossil Diatoms*, Philadelphia, 1982. D. G. Mann, ed. Koeltz Scientific Books, West Germany pp. 327-343.
- 1982.
- Marcus, Leslie F.
1983. Automated measurement with portable microcomputers. In *Numerical Taxonomy*, J. Felsenstein, ed., W. Springer-Verlag, Berlin, pp. 620-624.
- Marcus, L. F., and W. S. Newman
1983. Hominid migrations and the eustatic sea level paradigm: a critique. In *Quaternary Coastlines*; P. M. Masters and N. C. Fleming, eds., Academic Press, London, pp. 64-65.
- Newell, Norman D.
1984. Why Scientists Believe in Evolution, *Amer. Geol. Inst.*, March, 13 pp.
1984. Mass Extinctions: Unique or Recurrent Causes. In *Catastrophes and Earth History: The New Uniformitarianism*. W. A. Berggren and J. A. Van Courvering, eds. Princeton University Press, pp. 115-127.
- Powers, Lawrence W., and Dorothy E. Bliss
1983. Terrestrial adaptations. In *Environmental Adaptations*, F. V. Vernberg, and W. B. Vernberg, eds., vol. 8 of *The Biology of Crustacea*, Bliss, Dorothy E., ed. in chief. Academic Press, New York, pp. 271-333.
- Stunkard, Horace W.
1983. Evolution and Systematics. In *Biology of the Eucestoda*, vol. 1. C. Arne and P. Pappas, eds. Academic Press, London, pp. 1-25.
- Winston, Judith E.
1983. Patterns of growth, reproduction and mortality in bryozoans from the Ross Sea, Antarctica. *Bull. Mar. Sci.*, vol. 33, pp. 688-702.
1984. Why bryozoans have avicularia—a review of the evidence. *Amer. Mus. Novitates*, no. 2789, pp. 1-26.
- Winston, Judith E., and Jeremy B. C. Jackson
1984. Ecology of cryptic coral reef communities. IV. Community development and life histories of encrusting cheilostome Bryozoa. *J. Exp. Mar. Biol. Ecol.*, vol. 76, pp. 1-21.
- Abstracts and Popular Publications:**
Cochran, J. Kirk, and Neil H. Landman
1983. Growth rate of *Nautilus belauensis* in nature. *Geol. Soc. America, Abstract with Program*, vol. 15, no. 6, p. 546.
- Eldredge, Niles
1983. Debunking Darwin. Review of *Algeny* by Jeremy Rifkin, *Psychology Today*, vol. 17, no. 6, pp. 12-13.
1983. Is evolution progress? *Science Digest*, vol. 91, no. 9, pp. 40, 106.
1983. At war in the fields of the Lord. (Review of two books on creationism). *Recent Publications in Natural History*, vol. 1, pp. 4-8.
- Emerson, William K.
1983. The amiable *Morum* from Asia. *Hawaiian Shell News*, vol. 31, no. 9, p. 2, 2 figs.
1984. *Philippia radiata*. *Hawaiian Shell News*, vol. 32, no. 1, p. 5, 2 figs.
- Horenstein, Sidney
1983. American Museum of Natural History Catalog of Fossil Invertebrates. *Journal of Paleontology*, vol. 57, no. 3, p. 514.
1984. A Page from Earth History New York State Marine Education Association, vol. 9, no. 3, p. 3, 12, 13.
- Mantel, Linda H.
1984. [Review of] *Shrimps, Lobsters, and Crabs*, by D. E. Bliss. *BioScience*, vol. 34, p. 331.
- Sage, Walter E. III
1983. News of New Species. *Hawaiian Shell News*, vol. 31, no. 6, p. 6; vol. 31, no. 9, p. 11; vol. 31, no. 12, p. 12.
1983. [Review of] *Sea Shells of Southern Africa* by Richard Kilburn and Elizabeth Rippey; *Seashells of Oman* by Donald and Eloise Bosch. *N.Y. Shell Club Notes*, no. 287, pp. 6, 7.
1983. [Review of] *Revision des Trophoninae d'Europe* by R. Houart; *Endodontoid Land Snails from Pacific Islands (Mollusca, Pulmonata, Sigmurethra)*. Part II. Families Punctidae and Charopidae. *Zoogeography* by Alan Solem. *The Littorina*, vol. 8, no. 3, pp. 6, 7.
1983. [Review of] *North American Freshwater Snails—Identification Keys, Generic Synonymy, Supplemental Notes, Glossary, References, Index* by J. B. Burch; *A Revision of the Recent Xenophoridae of the World and of the Australian Fossil Species (Mollusca, Gastropoda)* by W. F. Ponder. *The Littorina*, vol. 8, no. 4, p. 6.
1983. [Review of] *A Review of the Columbariinae (Gastropoda, Turbellinellidae) of the Western Atlantic with Notes on the Anatomy and Systematic Relationships of the Subfamily* by M. G. Harasewych. *Hawaiian Shell News*, vol. 31, no. 10, p. 10.
1983. [Review of] *Field Guide to the Non-marine Molluscs of South Eastern Australia* by Brian J. Smith and Ron C. Kershaw; *Living Seashells* by Scott Johnson; *Shell Carving: History and Techniques* by Carson I. A. Ritchie. *Hawaiian Shell News*, vol. 31, no. 12, p. 8.
1984. News of New Species. *Hawaiian Shell News*, vol. 32, no. 1, p. 5; vol. 32, no. 4, p. 12.

1984. [Review of] *The Systematic Classification of the Chitons (Mollusca: Polyplacophora)* by Richard A. Van Belle. *Hawaiian Shell News*, vol. 32, no. 4, p. 11.

Winston, Judith E.

1983. [Review of] *The Atlantic Barrier Reef System at Carrie Bow Cay, I.,* Klaus Rutzler and Ian G. MacIntyre, eds. *Ecol.*, vol. 64, p. 612.

Department of Mammalogy

Sections of the department's collection of 250,000 specimens have been expanded and upgraded to assure their safe storage and accessibility to Museum researchers and visiting scientists. Manuscripts on muroid rodents, the zoo-geography of bats and subfossil Asian rodents were published, reflecting the wide variety of research completed by staff members. In addition, fieldwork and long-term research on the fauna of regions as diverse as Bolivia, the Sudan and the State of New Jersey answered important questions about certain species and their distributions in these areas.

Curators and the collections they manage and use are at the heart of any good natural history museum. The American Museum's collection of mammals now contains 250,000 specimens consisting chiefly of study skins and skulls, skeletons and materials preserved in alcohol. It is perhaps the most broadly representative accumulation of its type—in worldwide scope and different kinds of species—in the western hemisphere. It contains the original sources of data used by researchers to answer questions about evolution and geographic distribution of mammals.

The staff's responsibilities are to use the specimens for research and to assure that they will be safely stored and accessible to other investigators. To that end members of the department have been reorganizing and

expanding different parts of the collection to provide safer and more efficient storage.

Work was concentrated on the alcohol-preserved collection, one of the largest in any institution. About 25,000 samples are preserved in fluid, either as entire specimens or anatomical parts. For the first time, because of an intensive recuration and expansion program, all specimens preserved in alcohol are identified, cataloged, carded, immersed in fresh alcohol in properly labeled containers and arranged in taxonomic order in one large area on the third floor. Samples preserved in fluid can now be retrieved and studied by both inside and outside researchers. The orderly arrangement and improved storage containers make the entire alcohol-preserved collection easier to maintain.

With funds provided by the National Science Foundation, the department began recurating and rehabilitating the more than 8000 specimens of primates. This segment is one of the most intensively used of the entire collection of mammals, which itself is heavily utilized by visitors and borrowers. By the end of May, the department had 89 loans outstanding, including 5396 specimens; and 135 visitors spent 701 days studying in the department.

Education and Research A book, "Orders and Families of Recent Mammals of the World," edited by Curator Sydney Anderson and J. Knox Jones, Jr., of Texas Tech University was published in April. In their preface, the editors write that the purpose of the book "is to provide a ready source of information about Recent mammals for persons interested in mammalogy from more than one viewpoint. The work is a synopsis of selected semitechnical material organized within the classical framework of systematics. It includes a concise summary of each of the 21 orders and 131 families of living or recently extinct mammals, enabling the user to locate needed information quickly." Nineteen chapters were contributed by 21 specialists in mammalogy, including Curators Karl Koopman and Guy Musser, and Research Associate Michael Carleton of the National Museum of Natural History, as well as

Dr. Anderson. This volume will prove useful to specialists and students in the scientific and academic communities with a wide range of interests.

Mammals of Bolivia Dr. Anderson is also conducting work in the laboratory and field on the mammals of Bolivia. This is a long-term survey of Bolivian fauna designed to answer questions about the number of species, their geographic and altitudinal distributions, their habitats and habits, as well as their taxonomy and phylogenetic relationships. During July and August Dr. Anderson led an expedition to Bolivia. Another trip took place during the summer of 1984.

The geographic ranges of North American vertebrates continues to fascinate Dr. Anderson. Just published as an *American Museum Novitates* was the "Geographic Ranges of North American Birds," a report in which Dr. Anderson describes the pattern of frequency distributions of areas of different sizes for North American birds, compares them with mammals, and suggests some hypotheses for further testing. The subject falls under the general topic of Areography. A study on "Areography of North American fish, amphibians, and reptiles" has been completed and is now being reviewed.

Systematic studies of muroid rodents also occupy Dr. Anderson's research time. He authored a chapter on "Taxonomy and Systematics" for a book entitled "The Genus *Microtus* in North America," which is to be a special publication of the American Society of Mammalogists. Dr. Anderson and Volunteer Nancy Olds have nearly completed a manuscript on the identities and systematic relationships among species of small-bodied mice in the genus *Oryzomys*. Identifying the morphological and geographical limits of the species occurring in Bolivia is the primary focus of the investigation, but the authors will also include results of their study of samples from all over South America. The published report bears on Dr. Anderson's final summation of the mammals of Bolivia, and will also contribute significant information to a long-needed systematic revision of *Oryzomys*, a genus containing about 50 species, most of which are found in the Latin American tropics.

Bats Several manuscripts were published dealing with Curator Karl F. Koopman's research into the taxonomy and zoogeography of bats. One of these contributions forms "Bats," chapter five of the book, "Orders and Families of Recent Mammals of the World," edited by Drs. Anderson and Jones. In the chapter are presented diagnoses of all orders, suborders, and families of Recent bats. For each family, general characteristics are given, information on habits and habitats is summarized, geographic distributions of Recent species are outlined, Recent genera are listed, the geologic range is provided and major fossil groups are discussed.

Dr. Koopman's report, "Taxonomic and Distributional Notes on Tropical Australian Bats," was published as an *American Museum Novitates*. There are about 51 species of bats known from the tropical parts of Australia. Dr. Koopman's study indicates that of the three areas adjacent to tropical Australia, New Guinea shares a large number of species, whereas temperate Australia and the Lesser Sunda Islands share relatively few. New Guinea has been an important source area for tropical Australian bats, particularly those confined to the Cape York Peninsula. The low level of endemism among Australian bats strongly implies that there were no bats in Australia prior to the Miocene, when Australia drifted far enough to the north to be able to receive species occurring on the extended Malay archipelago. Since then some low level endemism and adaptive radiation has developed in Australia.

Dr. Koopman also worked on a long-term study on the classification of bats which he is publishing in parts through the auspices of *Bat Research News*. Dr. Koopman's reputation for high-quality research and expertise on bats is respected worldwide, and partly for this reason the editors of *Bat Research News* invited him to contribute some of his ideas about the classification of bats for various issues.

Other research topics include new distributional information on the genus *Murina* and species of bats collected in the Sudan. One of the most interesting reports being prepared is about the zoogeography of bats

occurring in the Indo-Malayan region. There are 256 species of bats known to occur in Indochina and the Malayan subregions and their outliers. Dr. Koopman will report on: which species are endemic to certain mainland regions and islands; which species are shared between the Indochinese mainland and islands of the Sunda Shelf; and which species are shared between the archipelagos east (Philippines, Sulawesi, and Lesser Sunda Islands), south (Mentawai), and west (Andaman and Nicobar islands) of the shelf.

Subfossil Asian Rodents From 1973 to 1976, Curator Guy G. Musser lived in central Sulawesi, trapping and studying native rats and mice in primary forest. Several publications dealing with the taxonomy, phylogenetic relationships, habitats and habits of Sulawesi species have appeared since 1976. Not all of Dr. Musser's research has centered on samples of living species; some studies also incorporate samples of subfossil rodents. Dr. Musser is interested in finding out not only what the present fauna of rodents is in that vast region, but also what part of that evolutionary diversity has become extinct.

An example is a manuscript on the "Identities of Subfossil Rats from Caves in Southwestern Sulawesi," which will be published soon in the series, *Modern Quaternary Research in Southeast Asia*. In the introduction to that report, Dr. Musser wrote that during his work on Sulawesi, the "largest rat encountered and one common in all habitats was *Paruromys dominator*. Weighing up to 500 grams and easy to trap, *P. dominator* is a favorite forest food of the people living in mountain villages throughout central Sulawesi. On several occasions it formed the meat supplement to rice dinners in my forest camps. The cooked flesh is whitish and tender with a mild flavor, and very tasty. One evening my two helpers and I met several rattan gatherers camped on the bank of a wide river. A cavity in a huge section of a tree trunk laying on a nearby sandbar had been the home of a big *P. dominator* prior to its discovery by the men; then the rat became the meat course for the evening meal, to which we were invited. Waiting for the food to be prepared we sat around the

cooking fire with river on one side, tall and dark forest to our backs, the quiet murmur of men speaking in their mountain dialect counterpointing the soft sounds of river current and night wind. I felt framed in a scene from the long distant past. When the meal was ready the rat was divided among us and the rice served. A few long bones, some teeth, and fragments of skull were all that remained. The pieces from our meal resembled the subfossil chunks collected during the 1930s and 1940s by Dutch archeologists and their Indonesian helpers from caves in the southwestern peninsula of Sulawesi, remains probably also from cooking fires but left by ancient diners."

Dr. Musser identified eight species from the samples of subfossil rats. Most of these still live in the central part of Sulawesi, wherever primary forest occurs. They are now absent from the southwestern peninsula of the island, probably because of deforestation. However, the examples of species represented by the subfossil fragments indicate that good forest was present in southwestern Sulawesi during the last 1000 years and that the rodent fauna of the island was once more widespread than is indicated by samples of living rats and mice.

In 1981, Dr. Musser's report on the rodent fauna of Flores, an island in the chain of Lesser Sunda Islands, was published. In it he indicated that although one species of giant rat, *Papagomys armandvillei*, now lives on the island, subfossils indicate that at one time there were five species occurring there. For the past year, Dr.

The skull fragment, right, is a portion of the underside of the snout and palate of the extinct rodent Spelaeomys florensis from the island of Flores in Indonesia. An inch and three quarters in length, it is one of the largest and best preserved examples of the species. A closeup of the tooththrow, left, shows the complicated pattern formed by the many high cusps, indicating the rat was a herbivore. Dr. Guy G. Musser, Chairman and Curator of the Department of Mammalogy, has been studying rats and mice native to Flores and elsewhere in the Indo-Australian region to determine what the present rodent fauna is in the area as well as what species have become extinct.



Musser and Curatorial Research Intern Elizabeth Strasser have been studying a large collection of additional subfossils from Flores. The six known species are represented in the material and there are three new species as well. One of these is more closely related to rats now found on New Guinea and the Philippine island of Luzon than to anything known from the Lesser Sunda Islands, either living or extinct. Identification and description of these new specimens, coupled with analyses of the relationships among the Flores rodents and those found in New Guinea and Australia to the east, Sulawesi and the Philippines to the north, and the Sunda Shelf to the west, will help reveal patterns of phylogenetic relationships among species of Indo-Australian rats and mice.

Social/Emotional Behavior

Curator Ethel Tobach conducted research in the evolution and development of social/emotional behavior in a variety of species. In field studies on *Aplysia dactylomela* in Puerto Rico, ecological factors in the production of ink and its discharge from the ink cells were studied. Past findings from research done in Bimini of a relation between group social maintenance and inking were not supported. There were significant known differences between the treatment of the two populations, such as type of food and size of groups. It is also possible that there were species differences that were not suspected until now. There was, however, a confirmation of other studies which have found a relationship between the type of food eaten and the likelihood of inking upon aversive stimulation.

Dr. Tobach and her colleagues have continued to analyze data obtained in studying *Sarotherodon melanothron* and have found a distinct difference in the response of the fry to adults or other fry: they will approach the fry or the empty arm of a Y maze more readily than they will the adults of both sexes. In mosquito-control ditches, the only recorded observation of fry in a non-laboratory situation, the fry were usually located in shallow areas where the adults were not found.

The response of golden spiny mice (*Acomys russatus*) to substrate patterns and height was examined as

part of the program for studying the sensory capacities of this species. Elizabeth Pinkhasov, a graduate student in the Biopsychology doctoral program of the City University of New York; Julie Tharp from the University of Hawaii, Dr. Tobach and Senior Scientific Assistant Joseph DeSantis found that the mice seemed to jump more readily onto a patterned substrate from a height. However, they are hesitant to leave from a low platform. This behavior is not related to the presence or absence of a patterned substrate. In their natural habitat, these mice are excellent jumpers from considerable heights.

Until this year, the Fawnhooded stock and the inbred Fawnhooded strain developed from the original stock by W. Jean Dodds of the New York State Department of Health were considered to be the only known sources of rats with storage pool disease. This blood disease, in which the clotting is delayed or not present, is related to deficiencies in serotonin function. Serotonin, a neurotransmitter, is a ubiquitous substance found in many plants and animals, and in non-neural as well as neural tissues. Because of the ubiquity of this substance, knowledge about its function both neurally and non-neurally will help scientists understand its evolutionary significance. A new population of rats bred as food for other animals was found to have animals with many different coat colors; in this population the same correlation between Fawn coat color and prolonged bleeding was found. Population genetic studies are being carried out with a number of characteristics which may be related to this configuration of melanin and serotonin. The investigators are Volunteer Betty Silver, Betty Rosoff of the Stern College for Women of Yeshiva University, Hiroshi Yamashita of Kyoto University, and Dr. Tobach.

Mammals of New Jersey Curator Richard G. Van Gelder conducted research on the mammals of New Jersey, spending much of the year investigating the original status of some of the 116 species that have been said to occur in the state at one time or another. Although New Jersey is one of the smallest states (46th in area) it has the densest human popu-

lation of all the states. Nevertheless, with its miles of coastline, major rivers, great salt marshes, unique pine barrens and forested hills, New Jersey provides habitat for a surprising diversity of wildlife.

But because of its high population and small size, New Jersey also suffers from beach erosion, swamp drainage, deforestation, industrial pollution, and general loss of habitat to increasing urbanization. Thus, the state serves as an ecological bell-weather for what other entities may face in the future. How New Jersey copes with these problems may serve as a model for other states.

As a member of the State Council on Nongame and Endangered Species, Dr. Van Gelder's research provides background information for further research and for legislative decision-making. For example, to determine whether or not the rice rat, a salt-marsh species, should be put on the endangered species list, Dr. Van Gelder first determined from historical records that the animal seemed never to have been abundant. Then, with the cooperation of the State Division of Fish, Game and Wildlife, he enlisted the aid of muskrat trappers who provided material that led to the decision (subsequently confirmed by others) that the species was not endangered. Although three species of weasels are said to occur in the state, only one is actually documented. To determine whether or not the other two may occur, Dr. Van Gelder will try to examine weasels trapped in the state to see if one or both diminutive species—the ermine and/or weasel—are present.

A manuscript reporting Dr. Van Gelder's preliminary findings, the first comprehensive report on the state's mammals in more than 75 years, will be submitted for publication in 1984, and work will continue on this project toward a more definitive product.

Scientific Publications:

Abrahamson, W. G., A. F. Johnson, and James N. Layne
1984. Vegetation map of Archbold Biological Station. Archbold Biological Station, Lake Placid, Florida.

- Anderson, Sydney
1983. Clasificación y nomenclature de los camelidos sudamericanos. *Inst. Nac. Fomento Lanero, La Paz, Bolivia, Estudios Especializados*, no. 50, pp. 1-8.
1983. Estudio de los mamíferos bolivianos. *Inst. Nac. Fomento Lanero, La Paz, Bolivia, Estudios Especializados*, no. 51, pp. 1-8.
1984. Geographic ranges of North American birds. *Amer. Mus. Novitates*, no. 2785, pp. 1-17, figs. 1-9.
- Anderson, Sydney, and William David Webster
1983. Notes on Bolivian mammals. Additional records of bats. *Amer. Mus. Novitates*, no. 2766, pp. 1-3.
- Anderson, Sydney, and J. Knox Jones, Jr., eds.
1984. Orders and families of Recent mammals of the world. Wiley-Interscience, New York, 657 pp. (2nd ed. of Recent mammals of the World, 1967).
- See also Thorington and Anderson.
- Carleton, Michael D.
1984. Introduction to rodents. In *Orders and Families of Recent Mammals of the World*, S. Anderson and J. K. Jones, Jr., eds., Wiley-Interscience, New York, pp. 255-265.
- Carleton, Michael D., and Guy G. Musser
1984. Muroid rodents. In *Orders and Families of Recent Mammals of the World*, S. Anderson and J. K. Jones, Jr., eds., Wiley-Interscience, New York, pp. 289-379, figs. 51-60.
- DeSantis, Joseph L.
See Tobach, DeSantis, and Zucker.
- Givens, K. T., James N. Layne, W. G. Abrahamson, and S. C. White-Schuler
1984. Structural changes and successional relationships of five Florida Lake Wales Ridge Plant communities. *Bull. Torrey Bot. Club*, vol. 111, no. 1, pp. 8-18.
- Koopman, Karl F.
1983. Two general problems involved in systematics and zoogeography of bats. In *Advances in Herpetology and Evolutionary Biology*, G. J. Rhodin and K. Miyata, eds., *Mus. Comp. Zool.*, Cambridge, Massachusetts, pp. 412-415.
1983. A significant range extension for *Philetor* (Chiroptera, Vespertilionidae) with remarks on geographical variation. *Jour. Mammal.*, vol. 54, no. 3, pp. 525-526.
1984. Taxonomic and distributional notes on tropical Australian bats. *Amer. Mus. Novitates*, no. 2778, pp. 1-48, 1 fig.
1984. Bats. In *Orders and Families of Recent Mammals of the World*, S. Anderson and J. K. Jones, Jr., eds., Wiley-Interscience, New York, pp. 145-186, figs. 23-34.
1984. A synopsis of the families of bats—parts 3, 4 and 5. *Bat Research News*, no. 24, pp. 1-2, 17-18, and 36-38.
- Layne, James N.
See Abrahamson, Johnson, and Layne; and Givens, Layne, Abrahamson, and White-Schuler.
- Musser, Guy G.
See Carleton and Musser.
- Myers, Phil, and Ralph M. Wetzel
1983. Systematics and zoogeography of the bats of Chaco Boreal. *Misc. Publ. No. 165. Mus. Zool. Univ. Michigan*, pp. 1-59, figs. 1-3.
- Packer, David J., and Esteban E. Sarmiento
1984. External and middle ear characteristics of primates, with reference to Tarsier-Anthropoid affinities. *Amer. Mus. Novitates*, no. 2787, pp. 1-23, figs. 1-9.
- Patton, James L.
1984. Genetical process in the Galapagos. *Biol. Jour. Linnean Soc.*, vol. 21, pp. 97-111.
- Patton, James L., and Mark S. Hafner
1983. Biosystematics of the native rodents of the Galapagos Archipelago, Ecuador. In *Patterns of Evolution in Galapagos Organisms*, R. I. Bowman, M. Benson, and A. E. Leviton, eds., *Pacific Division Amer. Assoc. Adv. Sci.*, pp. 539-568, figs. 1-13.
- Patton, James L., and Mary Anne Rogers
1983. Systematic implications of non-geographic variation in the spiny rat genus *Proechimys* (Echimyidae). *Z. Saugetierkunde*, vol. 48, pp. 363-370, figs. 1-2.
- Patton, James L., and Steven W. Sherwood
1983. Chromosome evolution and speciation in rodents. *Ann. Rev. Ecol. Syst.*, vol. 14, pp. 139-158.
- See also Hafner, Hafner, Patton, and Smith; Smith, Patton, Hafner, and Hafner
- Schaller, George B.
1983. Mammals and their biomass on a Brazilian ranch. *Arquivos de Zoologia (Sao Paulo)*, vol. 31, fasc. 1, pp. 1-36, figs. 1-8.
- Scott, Kathy M.
1983. Prediction of body weight of fossil Artiodactyla. *Zool. Jour. Linnean Soc.*, vol. 77, pp. 199-215, figs. 1-5.
- Smith, Margaret F., James L. Patton, John C. Hafner, and David J. Hafner
1983. *Thomomys bottae* pocket gophers of the central Rio Grande Valley, New Mexico: local differentiation, gene flow, and historical biogeography. *Occ. Papers Mus. Southwestern Biol.*, no. 2, pp. 1-16, figs. 1-6.
- Thorington, Richard W., Jr., and Sydney Anderson
1984. Primates. In *Orders and Families of Recent Mammals of the World*, S. Anderson and J. K. Jones, Jr., eds., Wiley-Interscience, New York, pp. 187-212, figs. 35-38.
- Tobach, Ethel
1983. The relationship between Preyer's concept of psychogenesis and his views of Darwin's theory of evolution. *Zeit. f. Psych.*, vol. 191, no. 4, pp. 388-395.
1983. Genes and gender update. In *Genes and Gender IV: The Second X and Women's Health*, M. Fooden, S. Gordon, and B. Hughley, eds., Gordian Press, New York, pp. 7-28.
- Tobach, Ethel, and Betty Rosoff (series eds.)
1983. *Genes and Gender IV: The Second X and Women's Health*. M. Fooden, S. Gordon, B. Hughley, eds., Gordian Press, New York, pp. 1-226.
- Tobach, Ethel, J. L. DeSantis, and M. B. Zucker
1984. Platelet storage pool disease in F₁ hybrid rats derived from crosses of Fawnhooded rats with their primitive ancestors (*Rattus norvegicus*). *Jour. Heredity*, vol. 75, pp. 15-18.
- Wetzel, Ralph M.
1983. *Dasyus novemcinctus* (cusco, armadillos). In *Costa Rican Natural History*, D. H. Janzen, ed., Univ. of Chicago Press, pp. 465-467, 1 fig.
- See also Myers and Wetzel.

Abstracts and Popular Publications:

- Anderson, Sydney
1983. [Review of] M. A. Mares and H. H. Genoways, eds., *Mammalian biology of South America*. *Jour. Mammal.*, vol. 64, pp. 726-728.

1983. [Editor of U.S. edition of L. Boitani and S. Bartoli, *Mammiferi*, translated from Italian and published as] Simon and Schuster's Guide to Mammals. Simon and Schuster, New York, 512 pp.

Lawrence, Marie A.

1984. [Review of] Contributions to the History of North American Natural History, Alwyne Wheeler, ed. Recent Publications in Natural History, vol. 2, no. 1, pp. 3-4.

Layne, James N.

1983. [Review of] Mammalian Radiations: Analysis of trends and evolution, adaptation, and behavior by John F. Eisenberg. Bioscience, vol. 33, no. 3, p. 207.

Tobach, Ethel

1984. Comparative Psychology. The World Book Encyclopedia, vol. 4, p. 773.

Department of Mineral Sciences

Research in the department makes extensive use of the vast collections and produces knowledge about how minerals and rocks, on Earth or from outer space, record the history of past events. Use of the collections by Museum staff and by others increases their documentation and value as research materials. Research activities this year continued to make progress on projects as diverse as: asbestos minerals and their detailed structures; jadeite-ureyite assemblages and their mineralogic and petrologic relationships to major fault zones; the vibrational spectra of minerals and their use in characterizing atomic structures; classic pegmatite localities in Delaware Co., Pennsylvania; studies of new meteorites from the American and Japanese sectors of Antarctica; definitive studies of the new polymict eucrite meteorite group; recognition of a new enstatite chondrite group; and studies of meteorites representing a wide assortment of small planets.

Collections The mineral and gem collection increased by 4300 specimens. Of these, 3000 were a gift from the late Joseph Rothstein, a former Associate and lecturer on gems in the Adult Education Program. Rothstein's specimens were collected over the last 40 years from important localities in the tristate area, and his collections as well as his devotion to the department and Museum are greatly appreciated.

Of the 4300 specimens acquired, 4000 were gifts with a worth of \$885,866; 50 were acquired by exchange with a value of \$31,000; and 250 were purchased for \$11,500, giving a total of \$928,366.

Notable acquisitions included an opalized clam from New South Wales, Australia, donated by Mabel Lamb. Valued at \$100,000, it is considered

the finest known. A precious opal boulder with a gold base weighing 427 carats was donated by Mr. and Mrs. Jack C. Chou, with a value of \$298,900. In addition, many fine mineral and gem-quality crystals were added to the gem pegmatite suites from Afghanistan-Pakistan and San Diego Co., California. Departmental collections from these two areas are now considered to be among the best in the world.

The meteorite collections also acquired numerous important specimens through exchange. About 10 meteorites were exchanged with the Paris collections. The specimen Macibini was acquired from South Africa, and Guin from Alabama.

Loans of minerals and meteorites to other institutions were numerous. A total of 160 specimens were loaned from the mineral collections to institutions such as the Brookhaven National Laboratories, the Universities of Vienna and Kentucky, to the California Institute of Technology, and to Cartier's to promote the "Silk Roads" exhibition.

Joseph J. Peters, Senior Scientific Assistant, organized a large and dedicated corps of volunteers to continue work on labeling and entering into the computer catalog the 40,000 mineral specimens from the Columbia University collection acquired in 1981. Complete computerization of the gem collection, carried out with funds provided by the New York State Council of the Arts, was completed this year.

Exhibition and Education The department presented several exciting small exhibits at various localities in addition to upgrading and planning improvements for the meteorite, mineral and gem halls. A special exhibit in the J.P. Morgan Hall of Gems consisting of three peerless gems, two emeralds and one ruby, loaned by Allan Caplan, was enthusiastically received. This rare occasion enabled the public to view outstanding specimens from the private collection of a friend of the Museum. Associate Curator George E. Harlow arranged for the exhibit and presented the gems on the CBS "Morning News" show.

Another small, highly acclaimed exhibit featured the Wethersfield meteorites, presented in the Arthur Ross Hall of Meteorites. The exhibit

case was a new one, donated by Mr. Ross to allow for small timely exhibits in the meteorite hall, and was gratefully acknowledged. Wethersfield (1982) fell through the roof of the house of Mr. and Mrs. Robert Donahue in the Connecticut town it was named after. Only 11 years earlier Wethersfield (1971), classified as the same type of meteorite, fell onto the roof of a house less than two miles away. Martin Prinz, Chairman and Curator, arranged for the exhibit with the help of the Donahues and the Smithsonian Institution. Both meteorites, and photos of the houses were on display.

A fine display of the Museum's sapphire collection, including the Star of India, was exhibited at Rich's Department Store in Atlanta. Dr. Harlow presented a lecture on sapphires and appeared on Atlanta television.

A traveling exhibit of the department's collections was presented at the Tucson, Detroit and New Jersey gem and mineral shows. The exhibit, entitled "Classic U.S. Mineral Localities," proved to be popular. These shows give high visibility to departmental collections and stress the Museum's leading role in these scientific areas. Lectures, mainly by Mr. Peters, accompanied these exhibits. He also lectured at the Rochester mineral symposium. Dr. Harlow lectured on gems at the Natural Science Museum of Long Island (Stony Brook), and on gold at the Stamford Mineral Club.

Mr. Peters was named a review editor for the magazine *Rocks and Minerals*. He and his brother, Thomas A. Peters, Associate, received an honorable mention for the best article published in 1983 by the magazine *Mineralogical Record*. The article was entitled "Minerals of the Buckwheat Dolomite, Franklin, N.J." Joseph Peters also published an article on the classic pegmatite occurrences of Delaware Co., Pennsylvania. An article on the Triassic traprock minerals of New Jersey is in press with *Rocks and Minerals*.

Rutile and Mineral Spectra

Curatorial Fellow Eric Dowty has been carrying out a study of the atomic structure and chemical properties of the mineral rutile, which is well represented in the department's collec-

tions. Rutile is mainly titanium oxide, but natural rutiles always contain significant amounts of other elements which substitute for the titanium, including niobium, tantalum and rare earth elements. The chemical composition reflects the conditions of formation, or the environment, in which the mineral grew. It may indicate the temperature or the abundance of oxygen at the growing site, as well as the color, which ranges from white in pure TiO_2 , to red, blue, brown or black. Synthetic TiO_2 is the most common white pigment and found in almost all paints. Since rutiles in the collections come from a wide variety of environments, they represent a wide spectrum of chemical compositions. In addition to electron probe microanalyses, other techniques such as X-ray diffraction, and optical and Mossbauer spectroscopy are being used.

A second major project of Dr. Dowty involves the vibrational spectra of minerals using infrared and Raman spectra. A spectrum is a range of interactions over a specific wavelength or type of vibration. Spectra are used to interact with a mineral or crystal to help characterize its atomic structure, which is its most fundamental property in terms of behavior or characteristics. Spectra such as infrared or Raman (named after an Indian scientist) have been passed through known minerals of every type and their patterns were observed and interpreted. Dr. Dowty has written a complex computer program, carried out on the vastly upgraded departmental computer system, which enables him to calculate the spectra given the atomic arrangement. In this way, hypotheses about structure can be tested against observations. Application of these spectra to characterize natural glasses (frozen melts) is very important. Natural glasses contain the atomic structure of liquid (now frozen) just before a mineral or assemblage of minerals (a rock) forms. Their atoms are only somewhat systematically arranged and difficult to interpret. Comparing calculated spectra and observed spectra leads to a better understanding of what is actually present, which is still debatable. Dr. Dowty has submitted a series of three papers on the calculation techniques and initial results on the study of glasses to the *Journal of the*

Physics and Chemistry of Minerals. A systematic program of calculation of major mineral spectra is in progress.

Precious Jade and its Origins A continuing project concerns the rare rock called jadeitite, commonly known as precious jade. It consists almost entirely of the mineral jadeite and has been used extensively in carvings by the Chinese and ancient Mesoamerican natives. It is known from only eight or nine localities, including important sources in Burma and Guatemala. Serpentine rocks are always geologically associated, and jadeitite is bounded by major plates of the Earth's crust. Thus jadeitites record an important story about the interactions of ocean floor, mountain building and major Earth movements in addition to their mineralogical, archaeological and lapidary interest.

Emerald green varieties from the department's collections have been studied extensively by Dr. Harlow and E. Peter Olds, a graduate student at Princeton University, as have additional specimens from the Smithsonian Institution, Los Angeles County Museum and private sources. The coloring is due to major amounts of the chromium-bearing ureyite component, rare in nature. Ureyite jade has now been found in the Italian Alps and in the source areas of Olmec (and Mayan) jade, in addition to Burma. The origin of ureyite has now been determined to be the result of a sodium-rich fluid and the mineral chromite, associated with the serpentine host. Dr. Harlow and Mr. Olds will conduct field studies in Guatemala, California and Italy this coming year to do further collecting and gain a better understanding of the regional geologic setting.

Mineral Particles and Biological Interactions

A National Institute for Occupational Safety and Health (NIOSH) funded research project on the mineralogical properties of certain inorganic dusts that have been linked to or suspected of causing lung disease is continuing with coinvestigators Martha R. Kimball, Research Fellow; Arthur M. Langer, Research Associate; and Drs. Harlow and Dowty. Detailed studies have progressed on the amphibole mineral grunerite which occurs in the abesti-

form variety known as amosite, as well as in non-asbestiform varieties. Amosite exposure appears to be associated with excessive lung disease, particularly after it has been through various disaggregation processes. Miners exposed to non-asbestiform grunerite appear to be free of asbestos-related disease. Explanations for some of the disease experience differences are based on particle dimensions, with those of small cross section and much greater length being most dangerous because they can be inhaled to the deep lung and cannot be removed by biological defense mechanisms.

Extremely high magnification examination of crushed particles of both types of grunerite show that both the sizes of the particles and the surfaces exposed in crushing are different. This is particularly so for larger particles that can still be inhaled deep into the lung. These differences appear to be correlated with the abundance and type of "mistakes" in the crystal structures of the different varieties of grunerite. Further studies are in progress to better understand these data, and compare them with data for other amphibole minerals. The goal is to understand how mineralogical factors relate to biological and health data.

Polymict Eucrites Work was conducted this year on the polymict eucrite group of meteorites, which come mainly from the U.S. and Japanese sectors of Antarctica. Meteorite research is funded by NASA and is carried out mainly by Dr. Prinz, Jeremy S. Delaney, Research Fellow; C.E. Nehru, Research Associate; Carol O'Neill, Scientific Assistant; and two graduate students from Brooklyn College, Michael K. Weisberg and Christopher P. Stokes. During the past year the group collaborated with Keizo Yanai, Curator of meteorites at the National Institute of Polar Research in Tokyo, who visited the department for three weeks in January. Polymict eucrites consist of broken pieces of different types of basalt, from different regions of a small planetary body. A major review paper on the entire group was completed this year by Dr. Delaney, with help from Dr. Prinz and Hiroshi Takeda from the University of Tokyo, and sub-

mitted to the proceedings of the Fifteenth Lunar and Planetary Science Conference. It contained data on 45 specimens, representing 14 meteorites from Antarctica and elsewhere.

The study showed that these meteorites represent a vast continuum, which also includes two other groups called howardites and diogenites. They represent a complex solidified soil on the parent body from which they come. New data on specific samples indicates that some of the basalt lavas must have come from considerable depth, indicating that the planet had a diameter greater than 300 km (180 miles), larger than most asteroids. This planet must have been quite complex, with a very diverse crust, and more evolved than previously believed.

Enstatite Chondrites This group of meteorites represents samples formed under planetary conditions which are the most reduced (oxygen-depleted) in the entire solar system. The common minerals contain essentially no iron oxide, and nearly all iron is present as a separate metal mineral, which practically never occurs on Earth. Some of these meteorites are very uniform in composition (type 6), and others are somewhat uniform (type 4). Only one (a new Chinese meteorite) was recently found to be highly variable (type 3), with minerals containing some iron oxide. Dr. Prinz and co-workers studied selected enstatite chondrites recovered in recent years, and found that there are a significant number of unequilibrated (type 3) meteorites. These meteorites are especially important in that they can reveal more about processes occurring in the early solar nebula when the planets were forming than those meteorites which have been modified to be uniform in composition. These results were presented at the Lunar and Planetary Science Conference in Houston, Texas, in March.

Chondrules A long-term study on the origin of chondrules in meteorites was furthered this year, with the help of Michael Weisberg, who completed a Master's thesis. Chondrules are the tiny frozen droplets, about one millimeter across, which make up a large part of all primitive meteorites called chondrites. Mr. Weisberg studied 72

chondrules in the Khohar (India) chondrite using an approach somewhat different from that attempted by others. A special program available on the electron microprobe enabled him to classify textural types of chondrules better than the visual classification used by others. He then found that there is a continuum of chondrule compositions that is related to degree of reduction or oxygen depletion. This reduction process is an important part of their formational history and may help in determining the precursor materials which melted to form chondrules.

Scientific Publications:

Berkley, J.L., G.J. Taylor, K. Keil, G.E. Harlow, and M. Prinz
1983. The nature and origin of ureilites (reply to a comment by F. Begemann and U. Ott). *Geochimica et Cosmochimica Acta*, vol. 47, pp. 979-980.

Clayton, R.N., T.K. Mayeda, E.J. Olsen, and M. Prinz

1983. Oxygen isotope relationships in iron meteorites. *Earth and Planetary Science Letters*, vol. 65, pp. 229-232.

Delaney, J.S., H. Takeda, M. Prinz, C.E. Nehru, and G.E. Harlow

1983. The nomenclature of polymict basaltic achondrites. *Meteoritics*, vol. 18, pp. 103-111.

Delaney, J.S., M. Prinz, and H. Takeda

1983. Reply to B. Mason: 'Definition of a howardite.' *Meteoritics*, vol. 18, pp. 247-248.

Among the gifts made to the Department of Mineral Sciences this year are these two Australian opals. The Queensland boulder opal, bottom, has a golden body color and weighs 427 carats. It was donated by Mr. and Mrs. Jack C. Chou. The opalized clam, top, weighing 69 carats, is from New South Wales and was a gift from Mabel C. Lamb.

Financial Statements



Revenue

\$33,714,972

Expenses

\$33,709,517

Corp. & Individual Contributions

5%

Other Revenue

5%

7%

Auxiliary Activities

Visitor Contributions

6%

8%

Pension & Other Social Benefits

Grants & Other Restricted Funds

8%

10%

Administrative & General

Auxiliary Activities

10%

18%

Plant Operation & Maintenance

Endowment & Related Funds

15%

27%

Natural History
Magazine &
Membership

City of New York
(Appropriated Funds 15%
Value of Energy Services &
Contributions to Pension Costs 7%)

22%

30%

Scientific Research,
Education &
Exhibition

Natural History
Magazine &
Membership

29%

Per Cent

30

20

10

0

0

10

20

30



Treasurer's Report

The statements reflecting the financial condition of the American Museum of Natural History, consisting of the Balance Sheet, Statement of Revenue and Expenses of Current Funds and Statement of Changes in Fund Balances, appear on the following pages. These statements have been audited by Coopers & Lybrand and the notes related to these statements appear on pages A8 and A12.

In reviewing the Balance Sheet it should be noted that investments in marketable securities are recorded at cost and amount to \$97,312,458. These investments include General Fund of \$5,585,282; Special Funds of \$8,824,032; Endowment Funds of \$82,903,144. The total market value of these investments on June 30, 1984, amounts to \$101,363,250 as detailed in Note 1 to the financial statements. General Fund investments of \$5,585,282 consist largely of cash received from Museum members for benefits due them in future years and are generally offset by the liability for unearned membership which amounts to \$6,246,189. Special Funds investments of \$8,824,032 consist primarily of funds received for the completion of special programs and projects funded by grants from individuals, private foundations and government agencies, as well as Museum funds set aside for specific programs to be completed in future years. Endowment Funds investments of \$82,903,144 represent the balance of funds allocated by donors or by the Board of Trustees for endowment purposes since the organization of the Museum in 1869.

The revenue and expenses of the General Fund and Special Funds appear on page A6, in the Statement of Revenue and Expenses of Current Funds. The total revenue for these funds amounted to \$33,714,972; the total expenses amounted to \$33,709,517. After adjusting for the

support grant of \$625,000, the revenue exceeded expenses by \$630,455. It should be noted that while the combined operations of these funds showed an excess of revenue over expenses, the General Fund, which supports the ongoing activities of the Museum, had an excess of expenses over revenue of \$265,808; the Special Funds, which cover programs restricted in nature and which may take several years to complete, had an excess of revenue over expenses of \$896,263.

In fiscal 1983-1984, the General Fund revenue amounted to \$26,486,476, an increase of \$2,849,559 over the prior year. The major areas accounting for this increase were the appropriated funds contributed by the City of New York, value of energy services and contributions to pension costs provided by the City of New York, distribution from Endowment Funds, increased revenues from Natural History magazine and membership and auxiliary activities. Appropriated funds increased about \$679,000 and primarily represented negotiated salary increases and social benefits costs for current and prior years. The value of energy services and contributions to pension costs increased about \$250,000 and represented mainly the additional cost for providing heat, light and power for existing, improved and new Museum facilities. The increase in distribution from Endowment Funds of about \$400,000 resulted from the growth in the value of the Endowment Funds. The increase in Natural History magazine and membership revenue of \$1,486,000 represented a significant improvement in advertising revenue and a moderate increase in membership and advertising-related income. The revenue from auxiliary activities increased by about \$350,000 and is detailed in Note 8.

The General Fund expenses for the

year amounted to \$27,377,284, compared to \$24,766,698 of the previous year. The increase in General Fund expenses for scientific and educational activities, administrative and general, plant operation and maintenance, and pension and other social benefits included cost of living adjustments to the salaries of employees and the increased cost of personal services and supplies the Museum purchases from outside vendors. The increase in costs for Natural History magazine and membership and auxiliary activities included cost of living adjustments to salaries of employees and increased expenses incurred in generating additional revenues.

The support we receive from donors, members, the general public and government agencies has enabled us to construct new exhibition halls, renovate existing facilities, operate an extensive special exhibition program, and plan, develop and execute new educational programs, conduct extensive research projects and maintain a conservation program for the collections of the Museum.

To sustain these programs and projects the Museum must continue to rely heavily upon such support. It is in this spirit that we gratefully acknowledge past contributions and look forward to continuing help from our growing constituencies.



Charles H. Mott
Treasurer

Auditors' Report

To the Board of Trustees of
the American Museum of Natural History
New York, New York:

We have examined the balance sheets of the AMERICAN MUSEUM of NATURAL HISTORY as of June 30, 1984 and 1983, and the related statements of revenue and expenses of current funds and changes in fund balances for the years then ended. Our examinations were 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 financial statements referred to above present fairly the financial position of the American Museum of Natural History as of June 30, 1984 and 1983 and the results of its operations for the years then ended, in conformity with generally accepted accounting principles applied on a consistent basis.



1251 Avenue of the Americas
New York, New York 10020
September 24, 1984

American Museum of Natural History Balance Sheets, June 30, 1984 and 1983

Assets:

Cash
Receivable for securities sold
Accrued interest and dividends receivable
Accounts receivable, less allowance for doubtful accounts of \$149,000 in 1984 and \$209,000 in 1983
Investments in marketable securities (Note 1)
Planetarium Authority bonds (Note 2)
Inventories (Note 3)
Prepaid expenses and other assets

Liabilities and Funds:

Accounts payable and accrued liabilities
Accrued employee benefit costs
Payable for securities purchased
Unearned membership income
Funds:
 General Fund (deficit)
 Special Funds (Notes 4 and 5)
 Endowment Funds (Notes 6 and 7)

The accompanying statement of significant accounting policies and notes are an integral part of these financial statements.

1984

1983

Current Funds				Current Funds			
General Fund	Special Funds	Endowment Funds	Total	General Fund	Special Funds	Endowment Funds	Total
\$ 535,018	\$ 724	\$ 239,685	\$ 775,427	\$ 123,348	\$ 1,212	\$ 299,462	\$ 424,022
		238,019	238,019			292,129	292,129
149,170	235,668	726,757	1,111,595	89,090	110,631	538,949	738,670
1,611,821	88,129		1,699,950	1,342,349	594,904	55,861	1,993,114
5,585,282	8,824,032	82,903,144	97,312,458	6,160,607	7,650,364	71,989,361	85,800,332
	425,000		425,000		425,000		425,000
1,155,680			1,155,680	752,519			752,519
951,683	86,054		1,037,737	1,170,619	86,910		1,257,529
\$9,988,654	\$9,659,607	\$84,107,605	\$103,755,866	\$9,638,532	\$8,869,021	\$73,175,762	\$91,683,315
\$2,016,594	\$ 533,568	\$ 486,611	\$ 3,036,773	\$1,864,233	\$ 481,455	\$ 95,555	\$ 2,441,243
2,005,748			2,005,748	1,884,041			1,884,041
		1,120,832	1,120,832			118,025	118,025
6,246,189			6,246,189	6,187,270			6,187,270
(279,877)			(279,877)	(297,012)			(297,012)
	9,126,039		9,126,039		8,387,566		8,387,566
		82,500,162	82,500,162			72,962,182	72,962,182
\$9,988,654	\$9,659,607	\$84,107,605	\$103,755,866	\$9,638,532	\$8,869,021	\$73,175,762	\$91,683,315

Statements of Revenue and Expenses of Current Funds for the years ended June 30, 1984 and 1983

	General Fund		Special Funds		Total	
Revenue:	1984	1983	1984	1983	1984	1983
The City of New York:						
Appropriated funds	\$ 5,172,252	\$ 4,493,588			\$ 5,172,252	\$ 4,493,588
Value of energy services and contributions to pension costs (Notes 9 and 10)	2,296,141	2,041,175			2,296,141	2,041,175
Gifts, bequests and grants	1,534,070	1,741,696	\$2,667,336	\$3,405,415	4,201,406	5,147,111
Distribution from Endowment Funds (Note 7)	2,537,611	2,135,736	924,657	617,611	3,462,268	2,753,347
Income from investments, net—principally interest	1,019,163	930,741	442,689	342,733	1,461,852	1,273,474
Visitors' contributions			2,086,678	1,957,463	2,086,678	1,957,463
Natural History magazine and membership	9,793,342	8,306,915			9,793,342	8,306,915
Other revenue	630,439	835,499	1,107,136	1,292,336	1,737,575	2,127,835
Auxiliary activities (Note 8)	3,503,458	3,151,567			3,503,458	3,151,567
Total revenue	26,486,476	23,636,917	7,228,496	7,615,558	33,714,972	31,252,475
Expenses:						
Scientific and educational activities	4,576,841	4,191,602			4,576,841	4,191,602
Exhibition halls and exhibits			1,984,747	1,097,284	1,984,747	1,097,284
Other special purpose programs and projects			3,704,001	3,860,548	3,704,001	3,860,548
Administrative and general	2,794,623	2,576,887	398,202	322,880	3,192,825	2,899,767
Plant operating and maintenance (Note 9)	5,950,424	5,075,505			5,950,424	5,075,505
Pension and other social benefits (Note 10)	2,498,725	2,341,765	245,283	153,102	2,744,008	2,494,867
Natural History magazine and membership	9,078,333	8,234,063			9,078,333	8,234,063
Auxiliary activities (Note 8)	2,478,338	2,346,876			2,478,338	2,346,876
Total expenses	27,377,284	24,766,698	6,332,233	5,433,814	33,709,517	30,200,512
Excess of revenue over expenses (expenses over revenue) before support grant	(890,808)	(1,129,781)	896,263	2,181,744	5,455	1,051,963
Support grant (Note 11)	625,000	638,500			625,000	638,500
Excess of revenue over expenses (expenses over revenue)	(\$ 265,808)	(\$ 491,281)	\$ 896,263	\$2,181,744	\$ 630,455	\$ 1,690,463

The accompanying statement of significant accounting policies and notes are an integral part of these financial statements.

Statements of Changes in Fund Balances for the years ended June 30, 1984 and 1983

	Current Funds				Endowment Funds	
	General Fund		Special Funds			
	1984	1983	1984	1983	1984	1983
Balance (deficit), beginning of year	(\$297,012)	(\$266,404)	\$8,387,566	\$6,559,772	\$72,962,182	\$59,795,985
Additions:						
Gifts, bequests and grants					1,576,004	3,039,061
Interest and dividend income (Note 7)					1,591,682	2,109,756
Net gain on sale of investments					7,134,997	8,652,699
Excess of revenue over expenses			896,263	2,181,744		
Total additions			896,263	2,181,744	10,302,683	13,801,516
Deductions:						
Excess of expenses over revenue	265,808	491,281				
Administrative and general expenses					461,612	382,899
Prior service contributions to CIRS (Note 10)					177,938	145,697
Total deductions	265,808	491,281			639,550	528,596
Transfers between funds:						
Financing of:						
1983 and 1982 General Fund deficits	297,012	266,404	(200,000)	(197,004)	(97,012)	(69,400)
Special Funds activities	(14,069)	76,505	42,210	(39,182)	(28,141)	(37,323)
Other		117,764		(117,764)		
Total transfers	282,943	460,673	(157,790)	(353,950)	(125,153)	(106,723)
Balance (deficit), end of year	(\$279,877)	(\$297,012)	\$9,126,039	\$8,387,566	\$82,500,162	\$72,962,182

The accompanying statement of significant accounting policies and notes are an integral part of these financial statements.

Statement of Significant Accounting Policies

The American Museum of Natural History ("Museum") maintains its accounts principally on the accrual basis.

The land and buildings utilized by the Museum (most of which are owned by the City of New York), fixed assets (which are charged off at time of purchase), exhibits, collections and the Library are not reflected in the balance sheets.

To ensure observance of limitations and restrictions placed on the use of the resources available to the Museum, the accounts of the Museum are maintained in accordance with the principles of "fund accounting." This is the procedure by which resources for various purposes are classified for accounting and financial reporting purposes into funds that are in accordance with activities and objectives specified. Separate accounts are maintained for each fund; however, in the accompanying financial statements, funds that have similar characteristics have been combined into fund groups.

Within current funds, fund balances restricted by outside sources or by the Board of Trustees ("Trustees") are so indicated (Special Funds) and are segregated from the General Fund. These Special Funds may be utilized only in accordance with the purposes established for them as contrasted with the General Fund over which the Trustees retain full control to use for the general operation of the Museum.

Endowment Funds include (a) funds subject to restrictions established by the donor requiring that the original principal be invested in perpetuity, and (b) funds established by donors or Trustees (funds functioning as endowments) where the principal may be expended with the approval of the donor or the Trustees.

Interest and dividend income derived from investments of Endowment Funds is distributed to the current funds on a unit basis which reflects the ratio of the related funds invested in the pooled portfolio to total market value (see Note 7).

Investments are stated at cost (average cost method) or, if acquired by gift, at fair value at date of acquisition. Non-marketable securities are valued by the Finance Committee of the Museum and approved by the Trustees.

Inventories are stated at the lower of cost (first-in, first-out method) or market.

Membership income is recognized as income ratably over the membership term.

The Museum accrues and funds annually the normal cost for eligible employees participating in the Cultural Institutions Pension Plan ("CIRS Plan") administered by the Cultural Institutions Retirement System ("CIRS"). The unfunded prior service cost, with interest, is being funded over 30 years ending in fiscal 2004.

Notes to Financial Statements

1. Cost and market quotations of investments at June 30 are as follows:	1984		1983	
	Cost	Market	Cost	Market
General Fund	\$ 5,585,282	\$ 5,701,912	\$ 6,160,607	\$ 6,127,090
Special Funds	8,824,032	9,008,904	7,650,364	7,608,747
Endowment Funds	82,903,144	86,652,434	71,989,361	93,492,307
	\$97,312,458	\$101,363,250	\$85,800,332	\$107,228,144
The Museum's investments consist of the following:				
Short-term obligations	\$34,042,488	\$ 33,943,761	\$18,584,027	\$ 18,694,469
Bonds	17,715,683	17,113,684	17,992,377	19,024,757
Common stocks	45,154,287	49,905,805	49,223,928	69,508,918
Other investments	400,000	400,000		
	\$97,312,458	\$101,363,250	\$85,800,332	\$107,228,144

The Museum's investments in marketable securities include a capital contribution made in June 1984 of \$400,000 to a limited partnership; the total capital contribution will be \$2,000,000. The remaining \$1,600,000 is due in four equal installments within thirty (30) days after written demand by the General Partner.

The Museum participates in a securities lending program with United States Trust Company of New York (custodian), whereby certain Endowment Fund investments are temporarily loaned to brokerage firms. The Museum receives in return cash or securities as collateral in an amount equal to the value of securities loaned. Cash received is reinvested in short-term investments. The income derived from these investments is included in other revenue of the General Fund. The Museum retains all rights of ownership to the securities loaned and, accordingly, receives all related interest and dividend income. Periodically, the collateral received is adjusted to maintain approximately a 100 percent market value relationship to securities loaned. At June 30, 1984 and 1983, the market value of securities loaned amounted to approximately \$12,800,000 and \$10,542,000, respectively, and the market value of the related collateral amounted to approximately \$12,803,000 and \$10,540,000, respectively. Under the terms of the lending agreement, the custodian has agreed to indemnify the Museum against any loss resulting from the borrower's failure to return securities or a deficiency in collateral.

2. The American Museum of Natural History and the American Museum of Natural History Planetarium Authority ("Planetarium") are separate legal entities which share the same Board of Trustees and Officers. The Museum has an investment in bonds (\$570,000 principal amount) of the Planetarium and carries this investment at cost. For the years ended June 30, 1984 and 1983, interest income on these bonds (at 4½ %) of \$25,650 is included in the General Fund.

3. Inventories comprise:

	1984	1983
Natural History magazine paper	\$ 904,333	\$528,915
Museum shop merchandise	251,347	223,604
	\$1,155,680	\$752,519

4. Included at June 30, 1984 in Special Funds (funds which are received or appropriated for specific purposes) is approximately \$3,708,000 of funds restricted by the donor as to use.

5. The balances at June 30, 1984 and 1983 of Special Funds are net of overdrafts of certain of these funds of approximately \$1,332,000 and \$912,000, respectively. These overdrafts represent expenditures in anticipation of transfers from Endowment Funds and/or General Fund, or receipt of gifts and grants from government or private donors.

6. Endowment Funds (including funds functioning as endowment) are summarized as follows:

	June 30, 1984	June 30, 1983
Endowment Funds, income available for:		
Restricted purposes	\$37,407,497	\$32,950,399
Unrestricted purposes	11,948,287	10,805,799
Funds functioning as endowment, principal and income available for:		
Restricted purposes	14,637,207	12,295,872
Unrestricted purposes	18,507,171	16,910,112
	\$82,500,162	\$72,962,182

7. Total interest and dividend income for the Endowment Funds for fiscal 1984 and 1983 was \$5,053,950 and \$4,863,103, respectively. In accordance with the policy adopted by the Board of Trustees, distributions to the General Fund and Special Funds and funding of pension support were fixed at 5 percent of the average of the market value of the Endowment Funds for the three preceding years. The distributions were as follows:

	1984	1983
General Fund	\$2,537,611	\$2,135,736
Special Funds	924,657	617,611
	\$3,462,268	\$2,753,347

The excess of income over the distributions was retained in the Endowment Funds. This amount includes \$177,732 and \$144,653 for pension support in 1984 and 1983, respectively, which offsets in part prior service cost contributions to CIRS.

8. The revenue and expenses for auxiliary activities in fiscal 1984 and 1983 are as follows:

	1984		1983	
	Revenue	Expenses	Revenue	Expenses
Museum shops	\$1,530,386	\$1,229,650	\$1,229,690	\$1,052,399
Discovery tours	555,233	449,640	346,005	340,127
Naturemax	562,177	472,283	704,902	672,815
Other auxiliary activities	855,662	326,765	870,970	281,535
	\$3,503,458	\$2,478,338	\$3,151,567	\$2,346,876

9. Plant operating and maintenance expenses in fiscal 1984 and 1983 include the value of energy services supplied by the City of New York of \$1,858,079 and \$1,617,348, respectively.

10. The pension plan of the Museum is administered by the Cultural Institution Retirement System (CIRS). Total pension costs amounted to approximately \$1,253,000 in fiscal 1984 and \$1,187,000 in fiscal 1983. Of these costs, \$438,062 in

fiscal 1984 and \$423,827 in fiscal 1983 were paid directly by the City of New York (City) to CIRS. Approximately \$815,000 and \$763,000, respectively, were paid by the Museum, of which \$177,938 in fiscal 1984 and \$145,697 in fiscal 1983 were

funded through Pension Support Endowment Funds. The balance of approximately \$637,000 in fiscal 1984 and \$617,000 in fiscal 1983 (representing normal service cost and amortization of unfunded prior service cost over a 20-year period) was charged to current funds. The CIRS Plan is a multiemployer plan and, as such, its actuarial present value of vested and nonvested accumulated plan benefits and net assets available for plan benefits are not determinable on an individual institution basis.

11. In fiscal 1984 and 1983, support grants were received from New York State Council on the Arts and the Institute of Museum Services as follows:

	1984	1983
New York State Council on the Arts	\$575,000	\$603,500
Institute of Museum Services	50,000	35,000
	\$625,000	\$638,500

12. The Museum provides certain services, including accounting, security and maintenance services for which the Planetarium was charged an aggregate amount of \$188,360 in fiscal 1984 and \$188,235 in fiscal 1983.

13. The buildings occupied by the Museum are owned by the City and the City appropriates funds for their renovation, improvement and alteration. Funds committed by the City for these capital projects in fiscal 1984 and in fiscal 1983 amounted to \$2,002,000 and \$144,000, respectively.

14. Certain amounts in the fiscal 1983 financial statements have been reclassified to conform to the fiscal 1984 presentation.

15. The Museum is a nonprofit organization exempt from income tax under Section 501(c)(3) of the Internal Revenue Code.

Auditors' Report

To the Board of Directors of
the American Museum of
Natural History Planetarium Authority,
New York, New York:

We have examined the balance sheets of the AMERICAN MUSEUM of NATURAL HISTORY PLANETARIUM AUTHORITY as of June 30, 1984 and 1983 and the related statements of revenue and expenses of unrestricted funds and changes in fund balances for the years then ended. Our examinations were 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 financial statements referred to above present fairly the financial position of the American Museum of Natural History Planetarium Authority, as of June 30, 1984 and 1983 and the results of its operations for the years then ended, in conformity with generally accepted accounting principles applied on a consistent basis.

Coopers & Lybrand

1251 Avenue of the Americas
New York, New York 10020
September 21, 1984

American Museum of Natural History Planetarium Authority Balance Sheets, June 30, 1984 and 1983

Assets:

Cash
Short-term investments
Accounts receivable
Planetarium shop inventory

Equipment, fixtures, etc.:
 Zeiss planetarium instrument, at cost
 Building improvements, at cost

 Less, Allowance for depreciation (Note 5)

Furniture, fixtures and equipment

Buildings, at cost

Liabilities:

Accounts payable
Accrued employee benefit costs
4½% Refunding Serial Revenue bonds, past due (Note 1)
Accrued interest, past due

Contributed Capital and Funds:

Contributed capital:
 Charles Hayden
 Charles Hayden Foundation
 The Perkin Fund

Funds:
 Unrestricted fund (deficit)
 Restricted funds

The accompanying statement of significant accounting policies and notes are an integral part of these financial statements.

Statements of Revenue and Expenses of Unrestricted Funds for the years ended June 30, 1984 and 1983

1984	1983
\$ 24,691	\$ 165,297
500,000	200,000
12,350	7,970
42,548	39,894
579,589	413,161
221,928	221,928
662,289	662,289
884,217	884,217
(465,056)	(397,520)
419,161	486,697
1	1
419,162	486,698
1,019,210	1,019,210
\$2,017,961	\$1,919,069
\$ 31,784	\$ 37,794
93,724	93,316
570,000	570,000
315,450	315,450
1,010,958	1,016,560
156,869	156,869
429,455	429,455
400,000	400,000
986,324	986,324
(847,284)	(870,981)
867,963	787,166
1,007,003	902,509
\$2,017,961	\$1,919,069

	1984	1983
Revenue:		
Admission fees, less allowances and commissions	\$ 804,268	\$ 659,051
Auxiliary activity, sales booth	183,590	159,743
Special lectures and courses	44,840	48,606
Other revenue	31,072	29,382
Total revenue	1,063,770	896,782
Expenses:		
Preparation, presentation and promotional	470,371	411,802
Operation and maintenance	194,656	208,406
Auxiliary activity, sales booth	153,159	139,622
Administrative and general	88,996	62,793
Pension and other social benefits (Note 3)	92,587	90,738
Special lectures and courses	27,548	30,835
Interest on past-due 4½% Refunding Serial Revenue bonds	25,650	25,650
Provision for depreciation	67,536	62,379
Total expenses	1,120,503	1,032,225
Deficiency from operations	(56,733)	(135,443)
Contributions	24,000	5,500
Net loss	(\$32,733)	(\$129,943)

The accompanying statement of significant accounting policies and notes are an integral part of these financial statements.

Statements of Changes in Fund Balances for the years ended June 30, 1984 and 1983

	Unrestricted Fund		Restricted Funds	
	1984	1983	1984	1983
Balance (deficit), beginning of year	(\$870,981)	(\$792,311)	\$787,166	\$654,212
Additions:				
Contributions			57,232	165,349
Proceeds from special presentations (Note 2)			234,556	108,540
Income from investments			35,081	23,690
Expenditures:				
Special purpose programs and projects			(26,340)	(31,299)
Special presentation expenses (Note 2)			(163,302)	(82,053)
Transfers between funds (Note 5)	56,430	51,273	(56,430)	(51,273)
Net loss, as annexed	(32,733)	(129,943)		
Balance (deficit), end of year	(\$847,284)	(\$870,981)	\$867,963	\$787,166

The accompanying statement of significant accounting policies and notes are an integral part of these financial statements.

Statement of Significant Accounting Policies

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

The policy of the Planetarium is to capitalize only major plant additions and replacements of equipment, machinery and other items and to depreciate such items on the straight-line method over their useful lives. Fully depreciated assets are carried at nominal value. Because of the nature of the ownership of the property, provision for depreciation of the buildings is considered unnecessary.

Short-term investments are stated at cost, which approximates market value.

Inventories are stated at the lower of

cost (first-in, first-out method) or market.

Fund balances restricted by outside sources or by the Board of Trustees are so indicated (restricted funds). These restricted funds may only be utilized in accordance with the purposes established by the source of such funds.

The Planetarium and its employees participate in the Cultural Institutions Pension Plan ("CIRS Plan") administered by the Cultural Institutions Retirement System ("CIRS"). The Planetarium's policy is to fund pension expense accrued.

Notes to Financial Statements

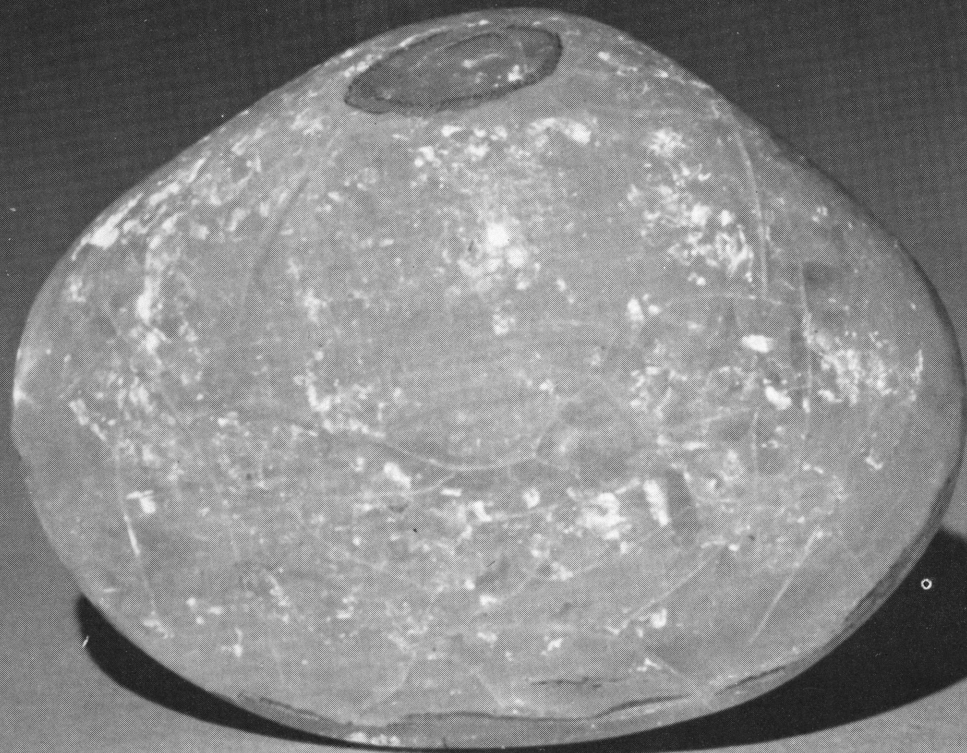
1. The Planetarium Authority bonds were purchased by the Museum in 1948. The Charles Hayden Foundation contributed \$200,000 to the Museum toward the purchase of such bonds.
2. The Board of Trustees of the Planetarium has designated that the net income from special presentations be set aside in a board designated restricted fund to finance current and future improvements and renovations.
3. Pension expense for fiscal 1984 and

1983 was \$42,395 and \$34,947, respectively. The CIRS Plan is a multi-employer plan and as such its actuarial present value of vested and nonvested accumulated plan benefits and net assets available for benefits are not determinable on an individual institution basis.

4. The Planetarium receives certain services, including accounting, security and maintenance services, from the Museum. The aggregate charges for

such services in fiscal 1984 and 1983 aggregated \$188,360 and \$188,235, respectively.

5. Depreciation on major plant additions and replacements which have been financed from cash generated by restricted funds is being funded by transfers from restricted funds.
6. Certain amounts in the fiscal 1983 financial statements have been reclassified to conform to the fiscal 1984 presentation.



- Delaney, J.S., *H. Takeda*, and M. Prinz
1983. Modal comparison of Yamato and Allan Hills polymict eucrites. *Memoirs of National Institute of Polar Research, Special Issue no. 30*, Tokyo, Japan, pp. 206-223.
- Delaney, J.S.
1984. Why did so many polymict eucrites land and survive only in Antarctica? *Lunar and Planetary Science XV*, Houston, Texas, pp. 206-207.
- Delaney, J.S., C. O'Neill, and M. Prinz
1984. Two magma types in the eucrite Bouvante. *Lunar and Planetary Science XV*, Houston, Texas, pp. 210-211.
1984. Phosphate minerals in eucrites. *Lunar and Planetary Science XV*, Houston, Texas, pp. 208-209.
- Delaney, J.S., C. O'Neill, C.E. Nehru, M. Prinz, *C.P. Stokes*,* *H. Kojima*, and *K. Yanai* (Sponsor: M. Prinz)
1984. Basaltic achondrites from the Yamato Mountains 1979 collection including pigeonite cumulate eucrites, a new group. *Ninth Symposium on Antarctic Meteorites*, National Institute of Polar Research, Tokyo, Japan, pp. 16-1 to 16-6.
- Delaney, J.S., M. Prinz, C.E. Nehru, and *C.P. Stokes** (Sponsor: M. Prinz)
1984. Allan Hills A81001, cumulate eucrites and black clasts from polymict eucrites. *Lunar and Planetary Science XV*, Houston, Texas, pp. 212-213.
- Delaney, J.S., M. Prinz, and *C.P. Stokes** (Sponsor: M. Prinz)
1984. The Allan Hills 81-series of polymict eucrites. *Lunar and Planetary Science XV*, Houston, Texas, pp. 214-215.
- Mori H.*, *H. Takeda*, M. Prinz, and G.E. Harlow
1984. Mineralogical and crystallographic studies of lodranite and primitive achondrite groups bearing on their genetic link. *Lunar and Planetary Science XV*, Houston, Texas, pp. 567-568.
- Nehru, C.E., M. Prinz, and J.S. Delaney
1983. Brachina: A new type of meteorite, not a chassignite. *Proceedings Fourteenth Lunar and Planetary Science Conference, Part 1*, Journal of Geophysical Research, vol. 88, pp. B237-B244.
- Nehru, C.E., M. Prinz, *M.K. Weisberg*,* and J.S. Delaney (Sponsor: M. Prinz)
1984. Parsa: An unequilibrated enstatite chondrite (UEC) with an aubritic-like impact melt clast. *Lunar and Planetary Science XV*, Houston, Texas, pp. 597-598.
- Prinz, M., C.E. Nehru, *M.K. Weisberg*,* and J.S. Delaney (Sponsor: M. Prinz)
1984. Type 3 enstatite chondrites: A newly recognized group of unequilibrated enstatite chondrites (UECs). *Lunar and Planetary Science XV*, Houston, Texas, pp. 653-654.
- Prinz, M., C.E. Nehru, *M.K. Weisberg*,* J.S. Delaney, and *K. Yanai* (Sponsor: M. Prinz)
1984. Yamato 691, a type 3 enstatite chondrite: Relationship with other unequilibrated enstatite chondrites (UECs). *Ninth Symposium on Antarctic Meteorites*, National Institute of Polar Research, Tokyo, Japan, pp. 7-1 to 7-4.
- Takeda, H.*, *H. Mori*, J.S. Delaney, M. Prinz, G.E. Harlow, and *T. Ishii*
1983. Mineralogical comparison of Antarctic and non-Antarctic HED (Howardites-Eucrites-Diogenites) achondrites. *Memoirs of National Institute of Polar Research, Special Issue No. 30*, Tokyo, Japan, pp. 181-205.
- Takeda, H.*, *J.L. Wooden*, *H. Mori*, J.S. Delaney, M. Prinz, and *L.E. Nyquist*
1983. Comparison of Yamato and Victoria Land polymict eucrites: A view from mineralogical and isotopic studies. *Proceedings Fourteenth Lunar and Planetary Science Conference, Part 1*, Journal of Geophysical Research, vol. 88, pp. B245-B256.
- Takeda, H.*, *T. Ishii*, *H. Mori*, *J.L. Wooden*, M. Prinz, J.S. Delaney, and *L.E. Nyquist*
1984. Consortium studies on Yamato-74, 75 and 79 eucrites and their relationship. *Ninth Symposium on Antarctic Meteorites*, National Institute of Polar Research, Tokyo, Japan, pp. 9-1 to 9-2.
- Yanai, K.*, *H. Kojima*, M. Prinz, C.E. Nehru, *M.K. Weisberg*,* and J.S. Delaney (Sponsor: M. Prinz)
1984. Petrologic studies of three primitive achondrites from the Yamato Mountains, Antarctica. *Ninth Symposium of Antarctic Meteorites*, National Institute of Polar Research, Tokyo, Japan, pp. 12-1 to 12-5.
- Abstracts and Popular Publications:**
Bild, R.W., *K.L. Robinson*, *E.R.D. Scott*, and M. Prinz
1983. Origins of mesosiderites as inferred from neutron activation analysis of their metallic Fe,Ni. *Meteoritics*, vol. 18, pp. 266-267.
- Harlow, G.E.
1982. [Review of] *Gemstones and Mineral Data Book*, by John Sinkankas. Van Nostrand Reinhold, New York, 1981. *American Mineralogist*, vol. 69, p. 1084.
1984. [Review of] *Geology in the Nineteenth Century*, by Mott T. Greene. Cornell University Press, 1982. *Recent Publications in Natural History*, vol. 2.
- Harlow, G.E., M.R. Kimball, E. Dowty, and *A.M. Langer*
1984. Observations on Amosite/Grunerite Dust, 2nd International Congress on Applied Mineralogy (ICAM '84), Abstract Volume, p. 212.
- Kimball, M. R., and *B. A. Wallace*
1982. The effects of monovalent cations on the conformation of Gramicidin A in organic solvents. *Biophysical Journal*, vol. 37, p. 318.
1983. Crystalline ion complexes of Gramicidin A. *New York Academy of Sciences, Meeting on Membrane Proteins*, p. 307.
- Nehru, C.E., M. Prinz, *M.K. Weisberg*,* and J.S. Delaney (Sponsor: M. Prinz)
1983. The Kakangari chondrite and its relationship to carbonaceous chondrite. *Meteoritics*, vol. 18, pp. 361-362.
- Peters, J.J.
1984. Classic pegmatite occurrences in Delaware County, Pennsylvania. *Rocks and Minerals*, vol. 59, pp. 109-119.
- Prinz, M., J.S. Delaney, C.E. Nehru, and *M.K. Weisberg** (Sponsor: M. Prinz)
1983. Enclaves in the Nilpena ureilite. *Meteoritics*, vol. 18, pp. 376-377.

Department of Ornithology

Years of preparation finally culminated in the Centennial Meeting of the American Ornithologists' Union which was held in the Museum during the last week of September. The efforts of the department staff, of the Museum generally and of other sponsoring organizations were richly rewarded by an unprecedented gathering of some 1200 ornithologists. Museum bird exhibits were renovated and updated in conjunction with this event and many scientists visited the department to study its unrivaled collections. Despite preparations for the centennial, the meeting did not halt departmental research endeavors both in the Museum and in the field. In a major undertaking, three Department of Ornithology staff persons joined scientists from other disciplines and institutions in a large-scale international expedition to Neblina in southern Venezuela.

Historic Meeting The American Ornithologists' Union, the distinguished professional organization which seeks to advance ornithological science through publications, meetings and membership, was founded at the Museum in September 1883. Exactly 100 years later nearly 1200 ornithologists, the largest meeting of professional "bird watchers" ever assembled, gathered at the same location to celebrate AOU's Centennial. Among the many participants was Research Associate Jean Delacour, the elder statesman of world ornithologists, whose ninety-third birthday coincided with the event. Other activities included a demonstration of modern equipment used in ornithological studies, special symposia, a major address by Research Associate Ernst Mayr and a personal welcome from New York City Mayor Edward I. Koch. A series of field trips to important bird habitats in the north-

east concluded the six-day event.

The department mounted three major exhibitions in conjunction with the centennial: "Francis Lee Jaques: Artist and Naturalist" included 50 sketches and scratchboard drawings by Jaques, who painted many of the dioramas in the Museum; "A Celebration of Birds: Louis Agassiz Fuertes and His Art" displayed 100 of the artist's watercolors, oils and pencil sketches; and "South of Winter: Scenes from Aransas National Wildlife Refuge," funded by Conoco, brought together some 60 photos taken at this important Texas sanctuary.

Expeditions The department has acquired many new specimens as a result of a large-scale international expedition to the Cerro de la Neblina, the "Mountain of the Mists," in the extreme south of Venezuela. Research Associate William H. Phelps, Jr., Assistant Curator George Barrowclough, Research Associate Robert Dickerman and Associate Sadie Coats participated in the expedition on behalf of the department.

(See pages 10-11)

Barbet Nesting Lester L. Short, Chairman and Curator, conducted field studies in Africa between October and January with Jennifer F. M. Horne, Research Associate, at the National Museums of Kenya. In Zambia they found the first nests ever discovered of Anchieta's Barbets (*Stactolaema anchietae*). One barbet nest contained a single chick of the nest-parasitic Lesser Honeyguide, (*Indicator minor*). Dr. Short and Ms. Horne watched as the chick fledged. At the last moment the fledgling was recognized as a "honeyguide" by its foster parents and attacked before disappearing into the forest. Much information on little-known barbets was gathered. In Kenya as many as four species of honeyguides were studied at close range when provided with the beeswax they utilize as food. The data will be compiled in two major reports, as well as the honeyguide and barbet sections of the "Birds of Africa" being written by Dr. Short and Ms. Horne (that book is edited by Scientific Assistant G. Stuart Keith). African fieldwork was supported by the L. C. Sanford and Ritter-Eisenmann funds, and by Marianna Collins.

Check-list Revisions Dr. Short was one of eight persons who prepared the authoritative sixth edition of the "Check-list of Birds of North America," culminating several decades of effort. Lamont Curator Emeritus Dean Amadon and the late Eugene Eisenmann, Research Associate, had also been involved in the project.

Important papers appeared on five-way hybridization in Australian sittellas (*Daphoenositta*) coauthored with Ms. Horne, Richard Schodde of the Australian Commonwealth Scientific and Industrial Research Organization and R. A. Noske of the University of New England in Australia. Dr. Short and Ms. Horne lectured in Bonn at an international symposium on the systematics, phylogeny and evolutionary ecology of African vertebrates. They also lectured on honeyguide behavior at the Cooper Ornithological Society annual meeting in Arcata, California.

Flycatcher Named Lamont Curator Wesley E. Lanyon studied the systematics of the New World flycatchers (*Tyrannidae*), concentrating upon the nasal capsule of the skull, and the sound-producing organ, the syrinx. Dr. Lanyon completed a paper on the evolutionary development of this group of kingbirds and their allies. In it he indicated that the common ancestry of the group is based upon two shared, derived character states of the skull. The data established relationships based primarily on the morphology of the syrinx, and secondarily on nesting behavior and external morphology. Among the three new genera recognized from this work is *Phelpsia*, a Venezuelan endemic flycatcher. *Phelpsia* was named for the Phelps family in recognition of their contribution to the study of Venezuela birdlife and for the family's long association with the Museum.

Curator François Vuilleumier collaborated with Dr. Mayr in evaluating the classification of birds described between 1976 and 1980 to determine if their taxonomic assignments were correct. Years of study of montane avifaunas resulted in completion of a book, "Adaptations and Evolution in Biota of High Tropical Mountains," co-edited with M. Monasterio of Venezuela's Universidad de los Andes.

Another work was published on the status of evolutionary biology in France. Dr. Vuilleumier also presented a paper at the second Ibero-American Congress of Ornithology. It dealt with zoogeography in the neotropics, describing a hierarchical method for relating habitat and avian distribution.

Juncos and Genes Assistant Curator George F. Barrowclough collected specimens of juncos in Mexico during November. As a result of this fieldwork, Dr. Barrowclough brought to the Museum skins, skeletons and tissue samples from two subspecies, and one species, of *Junco*. The specimens are being used to study geographic variation in this genus. With Robert Rockwell of The City College of New York, Dr. Barrowclough analyzed the genetic structure of the blue and white forms of Lesser Snow Goose populations. Using computer simulations and genetic models he will predict changes in the ratio of one polymorphic form to another for many thousands of generations. These projections will help test theories about gene flow and the stability of bird populations in general.

Dr. Barrowclough, with Ned K. Johnson of the University of California at Berkeley and Robert Zink, Chapman Research Fellow, completed a project creating a theoretical model for interspecific genetic variation in birds. They are testing this model against data from electrophoretic variation. Support for Dr. Barrowclough's studies came from the Eppley Fund and the L. C. Sanford Fund.

Other Research Lamont Curator Emeritus Dean Amadon conducted research at the Museum and at the Archbold Biological Station. He studied birds of prey, analyzing the productivity of ground-nesting hawks and owls, examining the significance of color morphs in Falconiformes and preparing a reference list of raptors of the world with Field Associate John Bull. Dr. Amadon also completed a paper evaluating recent studies of Hawaiian honeycreepers and their many adaptations.

Chapman Research Fellow Robert Bleiweiss concentrated on hummingbirds, studying mechanisms of evolutionary change and the adaptive

significance of plumage coloration in Andean species. He focused on the speciose genera *Heliangelus*, *Eriocnionis*, and *Oreotrochilus* with Dr. Vuilleumier. Chapman Research Fellow Robert M. Zink conducted biochemical and morphological studies of North American thrashers (*Toxostoma*) and towhees (*Pipilo*). He did fieldwork in the southwest during November and December. Electrophoretic studies of proteins in these two groups of unrelated species will yield information about genetic variation. These data will then be compared with morphological research. The investigation may help show how similar geological events affect two unrelated genera.

Research Associate Walter Bock studied the anatomy and systematics of passerine birds. In addition to working with Dr. Amadon, Field Associate John Bull prepared a reference collection to birds of the world and updated his book, "Birds of New York State," emphasizing breeding distribution. Associate Ruth DeLynn prepared many specimens and incorporated them into the collections. Scientific Assistant Mary LeCroy conducted field studies in Papua New Guinea during October and lectured on a Discovery Tour to that country. Research Associate James C. Greenway annotated the list of the department's type specimens with the assistance of Richard Sloss, a volunteer.

Research Associate Jared Diamond pursued studies in five isolated mountain ranges of Irian Barat (or Indonesian New Guinea) from July to November, especially in the formerly biologically unexplored Kumawa Mountains, and has described four new subspecies. The Kumawa Mountains have a very distinctive avifauna. The region supports a peculiar population of the bowerbird, *Amblyornis inornatus*, which constructs very different nests than other groups of the same species.

Research Associate Cheryl Harding focused on the role of hormone metabolism in the control of male social behavior in Red-winged Blackbirds and Zebra Finches. She was assisted by several graduate students and support from the National Institutes of Health. Research Associate H. Philip Zeigler, analyzed neural and behavioral mechanisms

mediating the control of grasping in domestic pigeons. His research featured a microprocessor-controlled monitoring system using tracing techniques which delineated brain pathways involved in jaw movements. The National Institute of Mental Health and National Science Foundation funded the project.

The large volume "Neotropical Ornithology," a book being produced as a memorial to the late Eugene Eisenmann, Research Associate, is in the final stages of preparation. It contains some 60 papers, including those of Drs. Bock, Coats, Lanyon, Short and Vuilleumier.

The Frank M. Chapman Memorial Fund Committee awarded 62 grants totaling \$32,576, mostly to younger researchers, and a fellowship for the study of Asian bird species in the department to David Wells of the University of Malaya.

Acquisitions Significant acquisitions included Mexican collections of more than 200 specimens by Dr. Barrowclough, southwestern North American collections of 150 specimens by Dr. Zink, 200 warblers taken by Jay Pitocchelli, some 300 specimens of redpolls from Alaska by Declan Troy of the University of Alaska, 200 finches and parrots from Novak's Aviary, 23 pheasants from Charles Sivelle, and 33 specimens from the New York Zoological Society.

These three tail feathers are from a male Great Argus Pheasant, indigenous to the Malay Peninsula. It is extremely rare for a single specimen to have feathers with such distinctly different patterns. These are part of the Department of Ornithology's collection of more than a million specimens of birds representing some 96 percent of the approximately 9200 known species.



Scientific Publications:

- Amadon, Dean
1983. *Crax rubra* (Great Curassow). In Costa Rican natural history, D.H. Janzen, ed. Univ. of Chicago Press, Chicago, pp. 569-570.
1984. The Bald Eagle and its relatives. In Ecology and management of Bald Eagles and Ospreys, D. Bird, ed. McGill Univ., Quebec (Macdonald Branch), pp. 1-4.
- Barrowclough, G. F.
1983. Biochemical studies of micro-evolutionary processes. In Perspectives in ornithology, A.H. Brush and G.A. Clark, Jr., eds. Cambridge Univ. Press, New York, pp. 223-261.
- Barrowclough, G.F., and G.F. Shields
1984. Karyotypic evolution and long-term effective population sizes of birds. Auk, vol. 101, pp. 99-102.
- Bleiweiss, R., and M. Olalla
1983. Notes on the ecology of the Black-breasted Puffleg on Volcán Pichincha, Ecuador. Wilson Bull., vol. 95, no. 4, pp. 656-661, figs. 1, tables 1-2.
- Cannell, P.F.*
(Sponsor: Wesley E. Lanyon)
1984. A revised age / sex key for Mourning Doves, with comments on the definition of molt. J. of Field Ornithology, vol. 55, no. 1, pp. 112-114.
- Cannell, P.F., J.D. Cherry, and K. C. Parkes
1983. Variation and migration overlap in flight feather molt of the Rose-breasted Grosbeak. Wilson Bull., vol. 95, pp. 621-627.
- Deich, J., B.G. Klein, and H.P. Zeigler
1983. Grasping in the pigeon: analysis of a visuomotor behavior. Soc. Neuroscience Abstr., vol. 9, p. 1089.
- Diamond, Jared
1983. Survival of bird populations stranded on land-bridge islands. National Geographic Society Research Reports, vol. 15, pp. 127-141, figs. 1-4, table 1.
1983. Taxonomy by nucleotides. Nature, vol. 305, pp. 17-18.
1983. Extinctions, catastrophic and gradual. Nature, vol. 304, pp. 396-397.
1983. Biogeographic umbilici and the evolution of the Philippine avifauna. Oikos, vol. 41, pp. 307-321, figs. 1-5, tables 1-2.
- Diamond, Jared, and M.E. Gilpin
1983. Laboratory, field, and natural experiments. Nature, vol. 304, pp. 586-587.
- Eisenmann, E., B.L. Monroe, Jr., K.C. Parkes, L. L. Short, R.C. Banks, T.R. Howell, N.K. Johnson, and R.W. Storer
1983. The AOU check-list of North American birds. Sixth ed. Amer. Ornithol. Union, Washington, D.C., pp. xxix + 877.
- Hays, Helen
1984. Common Terns raise young in successive broods. Auk, vol. 101, pp. 274-280.
- Johnson, N.K., and R.M. Zink
1983. Speciation in sapsuckers (*Sphyrapicus*): I. Genetic differentiation. Auk, vol. 100, pp. 871-884.
- Klein, B.G., B. LaMon, and H.P. Zeigler
1983. Drinking in the pigeon: response topography and spatio-temporal organization. Jour. of Comp. Psychology, vol. 97, pp. 178-181.
- Lanyon, Wesley E.
1984. The systematic position of the Cocos Flycatcher. Condor, vol. 86, pp. 42-47.
- LeCroy, Mary
1983. The spelling of *Semioptera wallacii* (Paradisaeidae). Bull. Brit. Orn. Club., vol. 103, pp. 144-145.
- LeCroy, Mary, and W.S. Peckover
1983. Birds of the Kimbe Bay area, West New Britain, Papua New Guinea. Condor, vol. 85, pp. 297-304.
- Luine, V.N., C.F. Harding, and W.V. Bleisch
1983. Specificity of gonadal hormone modulation of cholinergic enzymes in the avian syrinx. Brain Research, vol. 279, pp. 339-344, fig. 1, tables 1-2.
- Short, L.L.
1983. *Campephilus guatemalensis* (Hartlaub) (Flint-billed Woodpecker). In Costa Rican natural history, D.H. Janzen, ed. Univ. Chicago Press, pp. 557-558.
1983. Status and conservation of woodpeckers. In Bird conservation 1, S. A. Temple, ed. Internat. Council for Bird Preservation, Univ. Wisconsin Press, Madison, Wisc., p. 125.
- Short, L.L., and J.F.M. Horne
1983. A review of duetting, sociality and speciation in some African barbets (Capitonidae). Condor, vol. 85, pp. 323-332.
1984. Behavioural notes on the White-eared Barbet *Stactolaema leucotis* in Kenya. Bull. Brit. Orn. Club, vol. 104, pp. 47-53.
- Short, L.L., R. Schodde, and J.F.M. Horne
1983. Five-way hybridization of Varied Sittellas *Daphoenositta chrysoptera* (Aves, Neosittidae) in central Queensland. Austral. Jour. Zool., vol. 31, pp. 499-516.
- Short, L.L., R. Schodde, R.A. Noske, and J.F.M. Horne
1983. Hybridization of "White-headed" and "Orange-winged" Varied Sittellas *Daphoenositta chrysoptera leucocephala* and *D. c. chrysoptera* (Aves, Neosittidae) in eastern Australia. Austral. Jour. Zool., vol. 31, pp. 517-531.
- Vuilleumier, François
1984. Patchy distribution and systematics of *Oreomanes fraseri* (Aves, Coerebidae) of Andean *Polylepis* woodlands. Amer. Mus. Novitates, no. 2777, pp. 1-17, figs. 1-3, tables 1-6.
1984. Evolutionary biology in France: a review of some recent books. Quart. Rev. Biol., vol. 59, pp. 139-159.
1984. Zoogeography of Andean birds: two major barriers; and speciation and taxonomy of the *Diglossa carbonaria* superspecies. National Geographic Research Reports, vol. 16, pp. 713-731.
- Zink, R.M.
1983. Evolutionary and systematic significance of temporal variation in the Fox Sparrow. Syst. Zool., vol. 32, pp. 223-238.
- Zink, R.M., and G.F. Barrowclough
1984. Allozymes and song dialects: a reassessment. Evolution, vol. 38, pp. 444-448.
- Zink, R.M., and N.K. Johnson
1984. Evolutionary genetics of flycatchers. I. Sibling species in the genera *Empidonax* and *Contopus*. Syst. Zool., vol. 33, pp. 205-216.
- Zink, R.M., and D.W. Winkler
1983. Genetic and morphologic similarity of two California Gull populations with different life history traits. Biochem. Syst. Ecol., vol. 11, pp. 397-403.

Abstracts and Popular Publications:

- Amadon, Dean
1983. Introduction to The migration of birds of prey in the northern Red Sea Area, Bertel Bruun, ed. Holy Land Conservation Fund, New York, p. 5.

1983. The Everglade Kite. Florida Field Nat., vol. 11, pp. 69-72.
1983. Foreword to Vulture biology and management, S. R. Wilbur and J. A. Jackson, eds. Univ. of California Press, Los Angeles. pp. ix-xi.
1984. Bare-headed Vulture of California. Living Bird Quarterly, vol. 3, pp. 4-7.
- Barrowclough, G.F.
1983. Dark-eyed Junco, Yellow-eyed Junco. In Audubon Society Master Guide to Birding, vol. 3, J. Farrand, Jr., ed. Alfred A. Knopf, New York, pp. 272-275.
1984. [Review of] Evolution and development. Auk, vol. 101, pp. 207-208.
- Cannell, P.F.*
(Sponsor: Wesley E. Lanyon)
1983. An annotated bibliography of the founding of the American Ornithologists' Union. American Birds, vol. 37, pp. 355-357.
1984. [Review of] The Birdwatcher's activity book, by Donald S. Heintzelman. Wilson Bull., vol. 96, no. 1, pp. 158-159.
- Hays, Helen
1984. The vole that soared. Nat. Hist., vol. 93, no. 5, pp. 7-16.
- Keith, G. Stuart
1983. The 1982 Linnaean awards. Linnaean Newsletter, vol. 37, no. 2, pp. 3-4.
- Lanyon, Wesley E.
1983. Ornithological observations during the American Museum of Natural History's first Scandinavian Saga, 29 July to 15 August 1983. Amer. Mus. Nat. History, 7-page xeroxed report.
1983. Audubon Society Master Guide to Birding, J. Farrand, Jr., ed. Alfred A. Knopf, New York. (Contributed species accounts for Eastern Wood Pewee, Western Wood Pewee, Dusky-capped Flycatcher, Ash-throated Flycatcher, Great Crested Flycatcher, Brown-crested Flycatcher, Eastern Meadowlark, and Western Meadowlark.)
- LeCroy, Mary
1983. [Review of] Feathers to brush: the Victorian bird artist John Garrard Keulemans 1842-1912, by Tony Keulemans and Jan Coldeway. Recent Publ. in Nat. Hist., vol. 1, no. 2, pp. 4-5.
1983. [Review of] George Edward Lodge: the unpublished New Zealand bird paintings, by C. A. Fleming. Recent Publ. in Nat. Hist., vol. 1, no. 3, p. 6.
- Pitocchelli, J.*
(Sponsor: Wesley E. Lanyon)
1984. A brief review of some field guides. Linnaean Newsletter, vol. 38, no. 2, pp. 1-3.
- Short, L.L.
1983. [Review of] Bird migration in Africa. Movements between six continents. Emu, vol. 83, pp. 204-205.
1983. [Review of] A celebration of birds: the life and art of Louis Agassiz Fuertes. Recent Publ. in Nat. Hist., vol. 1, no. 3, pp. 7-8.
1983. Woodpeckers. In Audubon Society Master Guide to Birding, vol. 2, J. Farrand, Jr., ed. Alfred A. Knopf, New York, pp. 220-249.
- Short, L.L., and J.F.M. Horne
1984. Bird studies in Zambia. East Afr. Nat. Hist. Soc. Bull., pp. 23-24.
- Vuilleumier, Francois
1983. [Review of] The emergence of ornithology as a scientific discipline, by P.L. Farber. Recent Publ. in Nat. Hist., vol. 1, no. 3, pp. 2-5.
1984. [Review of] Les sociétés animales, by R. Chauvin. Auk, vol. 101, p. 420.

Department of Vertebrate Paleontology

The department's varied research program is founded on its spectacularly diverse collections of fossil vertebrates. Constant efforts improve the state of these collections, which are used by department curators, research associates and large numbers of visiting scientists. Field exploration augments these efforts; recent discoveries fill serious gaps in the collections or represent a more balanced sampling of fossil faunas derived through modern techniques. The collection is also seen as a valuable resource for the planned improvements to the Museum's exhibitions on vertebrate paleontology.

This was the final year of a three-year project, sponsored by the National Science Foundation, to improve storage and curation of dinosaurs and synapsid reptiles. Over the past six years the foundation has supported renovation of more than 90 percent of the collections of fossil reptiles, amphibians and birds. Interest has now shifted to improvement of the fossil fish and mammal collections.

The current catalog of fossil fishes has been successfully integrated with earlier records. Through the efforts of John Alexander, a Collections Manager in the department, plans were made for relocation of major portions of the fossil mammal collections to areas more accessible to research. Plans were also made for a computer-based data retrieval system for the vast fossil mammal holdings and other collections in the department.

New Programs A major impetus to the department's research and exhibition activity is the new support provided by the James Carter Memorial Endowment. This year marked the beginning of several programs sponsored by the Carter fund. The department's first Carter post-doctoral research fellow, Lawrence J. Flynn, is

an internationally recognized authority on fossil rodent history and middle Cenozoic vertebrate faunas of Pakistan and China.

The department also took steps to support, through the Carter endowment, extended visits by vertebrate paleontologists from the Peoples Republic of China. Such visits represent the first phase of a long-term exchange program between scientists from Asia and the American Museum that echoes the collaborative achievements of earlier decades.

Another aspect of the Carter-supported activity concerns improvement of the fossil mammal exhibition halls. Plans were made to recruit personnel to assist the mammal curators in the scientific renovation of these exhibits.

Horned Turtles The culmination of extensive field and laboratory research conducted by Curator Eugene S. Gaffney on the horned turtles of the southern hemisphere was represented by publication of a large, well-illustrated monograph on the *Meiolania* skull. The work includes a summary of Dr. Gaffney's fieldwork and earlier expeditions to Lord Howe Island in search of remains of *Meiolania*. Dr. Gaffney studied *Meiolania* skeletal morphology and turtle systematics as part of an extensive project, funded by the National Science Foundation.

North American Faunas

Exploration conducted by Michael Novacek, Chairman and Assistant Curator, and John J. Flynn, Assistant Professor at Rutgers University, in the remote deserts of Baja California yielded new discoveries of fossil vertebrates. A published study of these finds provided, for the first time, a more precise age estimate of the Baja fauna and a more complete biogeographic picture of vertebrate life in North America 50 million years ago. With the cooperation of the Instituto de Geologia, Mexico City, fieldwork in Baja was resumed in the spring.

Frick Curator Malcolm C. McKenna conducted large-scale field operations on the Upper Cretaceous Lance Formation. This rich assemblage provides samples of some of the key mammalian faunas that thrived during the period of dinosaur extinctions.

48 Dr. McKenna also explored fossil-

bearing rocks of various ages in western Wyoming and southern Montana, and reviewed results of collections made in the Late Cretaceous Mesaverde sites of Wyoming.

Other American Museum field crews were active in the Rocky Mountain regions. Dr. Novacek prospected lower Eocene beds near Rock Springs, Wyoming. Discoveries of fossil turtle skeletons from the middle Eocene Bridger Basin were made by Dr. Gaffney. Curator Richard H. Tedford conducted detailed stratigraphic studies of later Cenozoic strata in northern New Mexico.

Australian Fossil History

Dr. Tedford identified new Pliocene and Pleistocene mammal faunas from Australia that aided in documenting the persistence of arid conditions in interior Australia throughout the Pleistocene glacial episodes. This result counters the popular notion that conditions were relatively more humid during this time. These discoveries resulted from extensive fieldwork conducted by Dr. Tedford and several scientists from Australia. Funding was provided by the National Geographic Society and the Australian Research Grants Council.

Enigmatic Sharks Relationships among Mesozoic sharks was clarified by Assistant Curator John G. Maisey in two recently completed papers. Work on Mesozoic hybodont sharks, a problematic group of variably preserved fossils, continues with support from the National Science Foundation. Dr. Maisey has also contributed much needed systematic revisions to the number of species of *Ctenacanthus*. This considerable achievement in taxonomic clean-up reduced 100 named taxa to 15.

Mammalian Phylogeny

The challenging problem of higher-level relationships among mammals was attacked this year on several fronts. A large portion of the mammal classification developed by Dr. McKenna was entered on the Museum's Wang word-processing system. A computer program permits the sorting of various categorical fields and allows necessary revision to the classification. Both Dr. McKenna and Dr. Novacek complemented these

efforts with collaborative and independent works on insectivoran phylogeny, primate origins and higher level mammalian systematics.

From Fish to Man Contributions to departmental programs by emeritus curators and research associates were representative of the sweep of vertebrate phylogenetic history from early fishes to hominid relationships. Curator Emeritus Bobb Schaeffer completed three major works, one with Colin Patterson of the British Museum (Natural History), on Triassic and Jurassic fishes. He also initiated a project in collaboration with Brian Gardiner of Queen Elizabeth College on relationships of lower actinopterygian fishes.

Other curators emeriti report an active year in research, writing and lecturing. Edwin H. Colbert was honored at the American Museum on the publication of his new book, "Dinosaurs: An Illustrated History." George G. Simpson embarked on a grand tour of the Far East. Morris Skinner, Frick Curator Emeritus, and F. Walker Johnson, a volunteer, completed a study of Tertiary stratigraphy of Nebraska, and researched horse systematics and paleontology.

Research Associate Eric Delson devoted most of his time to the prodigious challenge of organizing the scientific aspects of the Museum's widely acclaimed exhibition "Ancestors: Four Million Years of Humanity." His efforts were aided by support from the National Science, Wenner-Gren and L. S. B. Leaky Foundations. Dr. Delson also conducted studies of Old

Maurice M. Feldman, a volunteer employee in the Vertebrate Paleontology Laboratory, operates a simplified mold turner used in making reproductions of small fossils. He made the device from salvageable material found around the lab, including leftover plywood, an old skateboard and a grinder motor. The device rotates while the plastic in the mold is setting, the motion providing a consistent thickness in the walls of a hollow cast. Some volunteer employees work behind the scenes in many areas of the Museum, including the scientific departments and the administrative offices.



World anthropoids.

We sadly report the death of a long-term Research Associate, David H. Dunkle on Jan. 3. Dr. Dunkle was on the staff of the Cleveland Museum of Natural History and the National Museum of Natural History. He wrote several papers on the Devonian arthrodire fishes in the American Museum collection and collaborated with Bobb Schaeffer on a number of publications about Paleozoic and Triassic fishes.

Scientific Publications:

Cheema, I.U., S. Sen, and L.J. Flynn

1983. Early Vallesian small mammals from the Siwaliks of northern Pakistan. *Bull. Mus. Natl. Hist. Nat.*, ser. 4, no. 3, pp. 267-280.

Cifelli, R.L.*

(Sponsor: Malcolm C. McKenna)

1983. Systematics of the Adiantidae (Litopterna, Mammalia). *Amer. Mus. Novitates*, no. 2771, pp. 1-25.
1983. The origin and affinities of the South American Condylarthra and early Tertiary Litopterna (Mammalia). *Amer. Mus. Novitates*, no. 2772, pp. 1-49.

Colbert, E.H.

1984. The Jurassic dinosaurs of North America. I.G.C.P. Project No. 171, Circum-Pacific Report no. 2, special paper no. 4, pp. 1-4.

Delson, E.

1983. Evolutionary tempos in catarrhine primates. In: J. Chaline, ed., *Modalites, Rythmes, Mecanismes de l'Evolution Biologique: Gradualisme phyletique ou equilibres ponctues?* C.I.R.S., no. 330, pp. 101-106.

Emry, R.J., and H.P. Schultze

1984. Worldwide vertebrate paleontology reviewed. *Geotimes*, vol. 29, no. 2, pp. 14-16.

Flynn, J.J., and M.J. Novacek

1984. Early Eocene vertebrates from Baja California: evidence for intracontinental age-correlations. *Science*, vol. 224, pp. 151-153.

Flynn, L.J.

1983. Sur l'âge de la faune de vertébrés du Bassin de Bamian, Afghanistan. *C.R. Acad. Sci.*, vol. 297, pp. 687-690.

Flynn, L.J., L.L. Jacobs, and S. Sen

1983. La diversité de *Paraulacodus* (Thryonomyidae, Rodentia) et des groupes apparentés pendant le Miocène. *Ann. Paleont.*, vol. 69, pp. 355-366.

Flynn, L.J., and M. Sabatier

1984. A murid rodent of Asian affinity from the Miocene of Kenya. *Jour. Vert. Paleo.*, vol. 3, no. 3, pp. 160-165.

Gaffney, E.S.

1983. The cranial morphology of the extinct horned turtle, *Meiolania platyceps*, from the Pleistocene of Lord Howe Island, Australia. *Bull. Amer. Mus. Nat. Hist.*, vol. 175, art. 4, pp. 362-479.

Galusha, T., N.M. Johnson, E.H. Lindsay, N.D. Opdyke, and R.H. Tedford.

1984. Biostratigraphy and magnetostratigraphy, late Pliocene rocks, 111 Ranch, Arizona. *Bull. Geol. Soc. Amer.*, vol. 95, no. 6, pp. 714-722.

Hecht, M.K.

1983. Microevolution, developmental processes, paleontology and the origin of vertebrate higher categories. In: J. Chaline, ed., *Modalites, Rythmes, Mecanismes de l'Evolution Biologique: Gradualisme phyletique ou equilibres ponctues?* C.I.R.S., no. 330, pp. 289-294.

Hecht, M.K., B. Wallace, and G. Prance (eds.)

1983. *Evolutionary biology*, vol. 16. Plenum Press, New York, 499 pp.

Hecht, M.K., and S. Tarsitano

1983. The phylogeny and paleobiology of *Archaeopteryx*. *Geobios*, spec. mem. no. 6, pp. 28-35.
1983. *Archaeopteryx* and its paleoecology. *Acta Paleont. Polonica*, vol. 28, nos. 1-2, pp. 133-136.
1983. Observations on the cranial morphology of the Protosuchia, Notosuchia and Eusuchia. *Neues Jahrb. Geol. Paläont.*, vol. 11, pp. 657-668.

Hunt, R.M., X.X. Xue, and J. Kaufman

1983. Miocene burrows of extinct bearded dogs: indication of early denning behavior of large mammalian carnivores. *Science*, vol. 221, pp. 365-366.

Kent, D.V., M.C. McKenna, N.D. Opdyke, J.J. Flynn, and B.J. MacFadden

1984. Arctic biostratigraphic heterochroneity. *Science*, vol. 224, pp. 173-174.

Maisey, J.G.

1983. Some Pennsylvanian chondrichthyan spines from Nebraska. *Trans. Nebraska Acad. Sci.*, vol. 11, pp. 81-84.

1984. Studies on the Paleozoic selachian genus *Ctenacanthus* Ag. No. 3. Nominal species referred to *Ctenacanthus*. *Amer. Mus. Novitates*, no. 2774, pp. 1-20.

McKenna, M.C., X. Xiangxu, and Z. Mingzhen

1984. *Prosarcodon lonanensis*, a new Paleocene micropternodontid palaeoryctoid insectivore from Asia. *Amer. Mus. Novitates*, no. 2780, pp. 1-17.

Nelson, M.E., B.J. MacFadden, J.H. Madsen, and W.L. Stoke.

1984. Late Miocene horse from north-central Utah and comments on the Salt Lake Group. *Trans. Kansas Acad. Sci.*, vol. 87, pp. 53-58.

Novacek, M.J., M.C. McKenna, N. A. Neff, and R. L. Cifelli

1983. Evidence from earliest known erinaceomorph basicranium that insectivorans and primates are not closely related. *Nature*, vol. 306, no. 5944, pp. 683-684.

Radinsky, L.

1983. Allometry and reorganization in horse skull evolution. *Science*, vol. 221, pp. 1189-1191.
1984. Ontogeny and phylogeny in horse skull evolution. *Evolution*, vol. 38, pp. 1-15.

Radinsky, L., and S.Y. Ting

1984. The skull of *Ernanodon*, an unusual fossil mammal. *Jour. Mammalogy*, vol. 65, pp. 155-158.

Rapp, S.D., B.J. MacFadden, and J. A. Schiebout

1983. Magnetic polarity stratigraphy of the early Tertiary Black Peaks Formation, Big Bend National Park, Texas. *Jour. Geol.*, vol. 91, pp. 555-572.

Szalay, F.S.

1983. An eco-ethological reassessment of the living mammals. *Evol. Theory*, vol. 6, pp. 219-222.

Wahlert, J.H.

1983. Relationships of the Florentiomyidae (Rodentia, Geomyoidea) based on cranial and dental morphology. *Amer. Mus. Novitates*, no. 2769, pp. 1-23.
1984. Relationships of the extinct rodent *Cricetops* to *Lophiomy*s and the Cricetinae (Rodentia, Cricetidae). *Amer. Mus. Novitates*, no. 2784, pp. 1-15.

Abstracts and Popular Publications:

Colbert, E.H.

1983. *Dinosaurs: an illustrated history*. Hammond Inc., Maplewood, New Jersey, 224 pp.

1983. An outline of vertebrate evolution. *Carolina Biol. Readers*, no. 131; 32 pp.

1983. *Dinosaurs of the Colorado Plateau*. Plateau, vol. 54, nos. 2, 3; 48 pp.

Delson, E.

1983. The fossil record of human evolution. In, H. C. Kraft and G. DeCicco, eds., *The Search for Humanity's Roots: A symposium and exhibition*, pp. 8-9. Seton Hall Univ. Museum, South Orange, New Jersey.

1983. [Review of] *New Interpretations of Ape and Human Ancestry*, R. L. Ciochon and R. S. Corruccini, eds. *Science*, vol. 222, pp. 1320-1321.

Emry, R.J.

1984. [Review of] *Mammalian paleofaunas of the world*, by D. E. Savage and D. E. Russell. *Jour. Vert. Paleo.*, vol. 3, no. 3, pp. 183-185.

MacFadden, B.J.

1984. A glimpse of Florida's past: 20 million-year-old fossils from Thomas Farm. *Fla. State Mus. Notes*, vol. 12, pp. 1-2.

McKenna, M.C.

1983. [Review of] *Mammalian paleofaunas of the world*, by D. E. Savage and D. E. Russell. *Science*, vol. 221, p. 1281.

Novacek, M.J.

1983. (Abstract) Comparative morphology of the bat auditory region. *Internatl. Symp. Vert. Morphol.*, Program and Abstracts, p. 71.

1983. [Review of] *Carnivorous marsupials*, M. Archer, ed. *Syst. Zool.*, vol. 32, no. 4, pp. 463-465.

Ostrom, J.H.

1983. Vertebrate paleontology collections take a new track—compactors! *Discovery*, vol. 16, no. 2, pp. 26-28.

1983. *Deinonychus*. The killer! *Anima* 9, no. 127, pp. 26-30.

1984. Mr. Peale's missing mastodon. *Discovery*, vol. 17, no. 1, pp. 3-9.

Radinsky, L.

1983. (Abstract) *Hyrachyus*, tapiroid not rhinocerotoid. *Evol. Theory*, vol. 6, p. 296.

Strasser, E., A.L. Rosenberger, and E. Delson

1984. (Abstract) The anterior dentition of *Notharctus*; its implications for anthropoid origins. *Amer. Jour. Phys. Anthro.*, vol. 63, p. 170.

Szalay, F.

1983. [Review of] *Phylogenetic patterns and the evolutionary process*, by N. Eldredge and J. Cracraft. *Amer. Jour. Phys. Anthro.*, vol. 61, pp. 509-510.

Tattersall, I., and E. Delson

1984. *Ancestors: Four million years of humanity (guide to the exhibition)*, 16 pp. *Amer. Mus. Nat. Hist.*, New York.

Research Stations

The Museum operates or is affiliated with a number of field stations at which scientists investigate the behavior, ecology and ontogeny of animals in their natural habitats. Several of these stations also provide significant opportunities for archeological and geologic research. Because each station is found in a different part of North America and has a distinctive physical and biological environment, collectively these stations offer a broad array of ecological habitats for researchers. Most stations include laboratory and library facilities as well as living accommodations, and are available not only to staff scientists but also to scientists and students from other institutions.

St. Catherines Island

The St. Catherines Island Research Program, supported by the Edward J. Noble Foundation, is administered through the Office of the Deputy Director for Research. A wide variety of research projects are conducted on St. Catherines Island, one of the barrier islands off the coast of Georgia, which is owned by the St. Catherines Island Foundation.

Samuel Jones and Nancy Coile, from the University of Georgia Herbarium, led a series of field trips as part

of a floristic study of the island. This survey will add specimens to the University of Georgia Herbarium, establish on the island a synoptic collection of the plants occurring there and help train graduate and undergraduate students in field procedures.

Adam Messer, a graduate student in the Department of Entomology at the University of Georgia, began a study of sex discrimination by predatory wasps found on the island. Mr. Messer is working under the supervision of Robert W. Matthews, a professor at the university. The study examines how and why predatory wasps belonging to the genus *Oxybelus* collect far more male than female flies as food for their offspring, despite the fact that the flies have a nearly 50-50 sex ratio.

Kent Sprague, a graduate student in the Geology Department of the University of Georgia, analyzed the amino acids in late and early Holocene sediments. This analysis will be integrated with the studies of the other geologists who work on the island to produce a comprehensive evaluation of geological and geochemical processes in a salt marsh environment.

James H. Oliver, Jr., Director of the Institute of Arthropodology and Parasitology, Georgia Southern College, completed the second year of his research pertaining to ticks. His study attempts to fill large gaps in scientific knowledge about species composition and the natural history of ticks, particularly those species known to be disease vectors, found along coastal Georgia.

The first decade of archeological fieldwork on St. Catherines Island under the leadership of David Hurst Thomas, Curator in the Department of Anthropology, closed with an exploration of the protohistoric and early historic adaptations of the area from A.D. 1500 to 1700. The discovery of the Spanish mission site, Santa Catalina de Guale, has resulted recently from this effort. Dr. Thomas's work now is directed toward further systematic excavation of the mission, and is providing insight into the customs of the Guale Indians and early European missionaries in the New World.

Southwestern Research Station

Founded in 1955, the Southwestern Research Station is one of the oldest

terrestrial field stations in the United States. It is located in the Chiricahua Mountains near the juncture of the Sonoran and Chiricahuan deserts.

The station had a total of 863 guests, including 139 researchers representing 51 institutions located in countries as widely dispersed as Australia, West Germany, England and Canada. Two hundred and twelve science students in 13 classes visited the station.

Orientation lectures were given to 214 persons in 17 tour groups. Other presentations included slide programs and lectures about taxonomy and the research being conducted at the station. One such talk about the appendotomy of spiders and other arachnids was presented to the western section of the American Arachnological Society.

Investigators visiting the station worked in some 15 disciplines including entomology, ornithology, herpetology, mammalogy, arachnology, ecology, geology and botany.

Fred Eisele and Jeff Johnson, from the Georgia Institute of Technology at Atlanta, used a mobile laboratory for sampling and mass identification of ions present in the lower atmosphere (troposphere). The measurements taken at the station are the first values obtained for the mass identity of these ions in the lower atmosphere. They will help make monitoring methods more accurate for certain neutral particles.

George Barrowclough, Assistant Curator in the Department of Ornithology, collected an anatomical series of birds for study of the development of size and shape during ontogeny. Dr. Barrowclough assembled a complete series of Western Kingbirds, Loggerhead Shrikes, Barn Swallows, Curved-billed Thrashers, Cactus Wrens, Scott's Orioles and Yellow-eyed Juncos. They will be measured and analyzed with computer programs to determine how size and shape trajectories differ in passerine birds.

Douglas Whitman, from the University of Georgia at Athens, and Larry Orsak, from the University of California at Berkeley, conducted studies on the chemical ecology and life history of the lubber grasshopper, *Taeniopoda*. Their research indicates that these grasshoppers obtain their

defensive secretions from the plants upon which they feed. The potency of these secretions depends upon the weight, size, age, sex and dietary history of the individual grasshopper, and the interval between secretion releases. When lubber secretions were applied to other edible grasshoppers (*Brachystola*, in particular), they elicited rejection and avoidance responses from the predatory grasshopper mouse, *Onychomys*.

Richard Tinsley, Helen Jackson and Celia Earle, from the University of London, studied the biology of polystomatid flatworm parasites (monogenean trematode) found in association with spadefoot toads (*Scaphiopus*). Flatworm larvae are transmitted in water by ciliated locomotion. Since the toads spawn only a few nights each year after limited summer rain, the opportunity for the transmission of flatworm parasites from one toad to another is less than 24 hours annually. This is the briefest host-to-host transfer period known for any helminth parasite. Although each worm produces only 100 to 200 offspring each year, a remarkably low output for a parasite, transmission in small bodies of water, where large numbers of hosts congregate to spawn can result in the infection of every toad in the local population.

Resident Director Vincent D. Roth was reappointed Research Associate in Ecology and Evolutionary Biology at the University of Arizona at Tucson. He has two manuscripts in press: "A review of appendotomy in spiders and other arachnids" and "The spider family, Homalonychidae." A highlight of the year was his discovery of a new species of troglobitic spider belonging to the genus *Thyomites* from a cave near Bisbee, Arizona. This is one of the few cases of cave-adapted spiders from Arizona and is characterized by its more elongated legs, paler color, and more reduced eyes compared with its close relatives that do not live in caves.

Mounting and labeling of 1300 specimens for the insect collection by volunteer Christina Swartz brought the collection up to some 14,000 specimens.

Archbold Biological Station The primary mission of the Archbold Biological Station is to conduct research

on the rich and diversified native flora and fauna at the southern end of the Lake Wales Ridge. The ridge, situated in south-central Florida, is one of the most distinctive biotic regions in the state. The 4200-acre station property, and its eight-acre Price Memorial Tract on nearby Lake Placid, contain examples of all of the major geological and topographic features and characteristic vegetation types of the southern Lake Wales Ridge region. Research at the station is conducted by permanent staff and visiting investigators. The station's program also involves education, natural area preservation and public service. Its facilities include well-equipped laboratories, a library and darkroom, shops, outdoor cages, reference collections of plants and animals, field vehicles and boats, a wide variety of modern research equipment, and dining and housing accommodations for visiting investigators.

During the past year staff members, their students and associates conducted 37 research projects. Many of these projects involve long-term monitoring of species or environmental parameters that would not be possible without the large, diverse and fully protected natural area provided by the station. A total of 53 visiting investigators and 26 assistants worked at the station during the year, and 42 groups totaling 695 persons visited. Several university and college classes conducted formal studies at the station.

James N. Layne, Executive Director and Museum Research Associate, investigated a broad spectrum of questions concerning local distribution, habitat relationships, population dynamics and other aspects of the life history and ecology of vertebrates at the station, with emphasis on mammals. Dr. Layne also studied the Crested Caracara and American Kestrel with assistance from University of South Florida graduate student David R. Smith. Emphasis in the caracara study was placed on analysis of molt patterns in order to develop better criteria for aging individuals in the field. The study was also designed to determine the degree of similarity between molt patterns of caracaras and the typical falcons. Dr. Layne was elected President of the Florida Academy of Sciences, Vice President of the Orga-

nization of Biological Field stations and was appointed to the Florida Non-game Wildlife Advisory Council.

Mark A. Deyrup, Assistant Research Biologist, investigated the species composition and ecological relationships of the station's rich ant fauna. He collaborated with James Trager, a University of Florida graduate student, and Research Assistant Nancy Deyrup. Dr. Deyrup also monitored flight activity and the seasonal abundance of insects in mature sand pine scrub habitat using flight traps. Data were gathered on more than 200 species. Other research projects conducted by Dr. Deyrup included a survey of the arthropods associated with the Florida rosemary, a characteristic plant of sand pine scrub habitats; an inventory of bark and ambrosia beetles; and an investigation, in association with Don Manley of Clemson University, into the distribution and biology of the velvet ants.

Ronald L. Myers, Assistant Research Biologist, studied the dynamics of sandhill and sand pine communities. The investigation is designed to elucidate the population dynamics of the two pine species (sand pine and slash pine) occurring on station grounds and the historical relationship between the two community types to which the pines belong. Dr. Myers also studied factors influencing the abundance and distribution of the endemic hardwood, scrub hickory. He also analyzed soil seed banks in a eutrophic pond in north-central Florida and monitored changes in the structure of a cabbage palm forest located in the National Audubon Society's Corkscrew Swamp Sanctuary.

Lawrence E. Battoe was appointed Archbold Postdoctoral Research Fellow in aquatic ecology. After his arrival in September, he initiated a program of studies of Lake Annie. Dr. Battoe's major objective is to provide a basis for management of this recently acquired lake.

Station Research Associates Warren G. Abrahamson, Thomas Eisner and Glen E. Woolfenden continued their research at the Archbold facility. Dr. Abrahamson obtained data on the comparative demography of saw and scrub palmettos, which are important components of the station's plant communities, and investigated

the relationships of insects to fruit production by the two species of palmettos. Dr. Eisner and David Dussourd, a doctoral student at Cornell University, investigated the courtship behavior and chemical defenses of the moth, *Utetheisa ornatrix*. Dr. Woolfenden and his co-worker, John W. Fitzpatrick, Curator of Ornithology at the Field Museum of Natural History, obtained data for their long-term study of the demography of the Florida scrub jay.

The station acquired two additional tracts of land, totaling 112 acres. The acquisitions contain certain habitats that had been poorly represented.

Great Gull Island An inaccessible, rocky outcropping covered by poison ivy, beach plum and other seaside vegetation, Great Gull Island is located eight miles northeast of Orient Point, Long Island, and 100 miles from New York City. The one-half-mile-long island is owned by the Museum and operated as a sanctuary for birds, especially Common and Roseate Terns which have been reestablished as breeding colonies. During the summer, staff ornithologists, volunteers and students conduct research on the island and manage its habitats for the benefit of the terns and other birdlife.

Foraging by *Microtus pennsylvanicus*, the introduced Meadow Vole on Great Gull Island, expanded further the areas available for nesting Common Terns. Nesting Common Terns increased in number and, correspondingly, the number of young surpassed those in any preceding year. By the end of the season the field team had trapped 2769 pairs of Common Terns and banded more than 5000 young. A report on the reintroduction of *Microtus* appeared in the May issue of *Natural History*.

Volunteers Matthew Male and Joan Walsh built three observation towers in early spring, bringing the total number of towers to 30. These towers are invaluable for observing the marked individuals in the colony. During the season Mr. Male continued an off-island banding program to determine the rate of colony exchange and the relative reproductive success in nearby colonies.

Over the winter, Joseph DiCostanzo, Project Assistant and a graduate stu-

dent at City College, wrote a computer program which can retrieve the band number of any bird in the colony when the color code is entered into the computer. Parker Cane, a volunteer, and Mr. DiCostanzo have generated other computer programs for entering nest and adult data.

Department of Education

Nineteen eighty-four marks the official centennial of the Museum's Department of Education, originally known as the Department of Public Instruction. By 1924 ground had been broken for a school service building. This structure is the main base of operations for today's Department of Education. Two of the floors of this building are designated as the Charles A. Dana Education Wing. The Dana Wing houses the department's teaching collections, the Alexander M. White Natural Science Center, the Frederick H. Leonhardt People Center, the Louis Calder Laboratory, the Harold F. Linder Theater and the Henry Kaufmann Theater. A two-story addition, now under construction, will contain a studio classroom on the second floor and the Edith Blum Lecture Room on the first.

Children's Programs As was the case during the department's formative years, many programs still are designed for young people, particularly classes from the city's schools. Decades of experience have resulted in many modifications and additions to programs, but the intent remains the same: to make each child's visit to the Museum an *exciting* learning experience. During the past year nearly 23,000 pupils registered for programs scheduled and taught by department staff. An additional 58,000 visited the Museum as class groups escorted by their own teachers; approximately half of this

number were met by a corps of trained teaching volunteers, who gave them informal instruction in exhibition halls.

A gift from the Charles E. Culpeper Foundation enabled the department to retain the services of an instructor to work with handicapped groups. One hundred fifty-four such groups, totaling more than 2000 students, took advantage of special topics offered.

A weekend program for individual children was entitled "Workshops for Young People." Some workshops were in the form of several weekly sessions making up a short course; others were single sessions lasting a half day. Topics included were microscope use, amphibians and reptiles, origami, mask-making and insect study. Sessions were held in the Louis Calder Laboratory, which is supported by gifts from the Louis Calder Foundation. Approximately one-fifth of the 460 registrants in these weekend workshops were promising youngsters who received free places.

Although the present size of the department's teaching staff makes it difficult to assign instructors to visit schools and make presentations there, one such program has been offered for well over a decade. The presentation consists of a short film and lecture on ecology for junior high schools. More than 2000 students benefited from this program last year.

During the summer, many day camp groups visited the Museum with their counselors and leaders. Education staff conducted film programs and short teaching demonstrations for nearly 3700 of these youngsters in a three-week period.

Adult Programs Over the years, the department has greatly increased its services and programs for adults. Today special lectures, film festivals, symposiums and field trips attract thousands of people. The first series of lectures for school teachers, given in 1880 by Albert S. Bickmore, the department's first Curator, paved the way for the current program of college classes for teachers. These 15-session courses on anthropology and the biological sciences are offered in cooperation with the Graduate School of Education of the College of the City of New York. Classes are given at the

Museum by Education Department personnel, but credit is awarded by City College. Attendance and examination requirements are the same as for courses offered at the college. In the past school year 433 teachers were enrolled in 15 courses.

Thirty-two ticketed lecture series were presented for the lay public. Of these, six were offered in the afternoon. Topics included evolution, Islam, marine mammals, art of the Indians of the Northwest Coast, weaving, anthropological film, ethnobotany and exploring wilderness areas. Lecturers in these series are drawn from the Museum's scientific and education departments, as well as from universities and other museums. Some 3500 adults enrolled in ticketed lecture series and weekend field study trips in ornithology, geology, archeology and whale watching.

A geology boat trip and several ecology-oriented boat trips on the Hudson River took place during the summer, with more than 1000 persons enrolled. These popular sailing programs may become a regular feature of future summer programming.

A wide range of non-ticketed programs also took place. Many were aimed primarily at adult audiences. Most of these programs were made possible by funding from the Helena Rubinstein Foundation, the Vincent Astor Foundation, the Sidney, Milton and Leoma Simon Foundation and the New York State Council on the Arts. These included film programs offered in cooperation with the Audubon Society, the Museum of the American Indian and the New York Folklore Society. A piano concert, a children's concert by the Bloomingdale Chamber Orchestra, a guitar concert, a symposium on ice-age hunters, a dance performance by the High School of the Performing Arts and several programs centered around the Museum's special exhibition "Ancestors" drew a total of more than 10,000 persons.

Interpretive Facilities Although utilized for teaching classes on weekdays, the Frederick H. Leonhardt People Center, the Alexander M. White Natural Science Center and the Discovery Room facilities are all open

to the public on weekends. With income from a generous endowment by the family of Frederick H. Leonhardt, the People Center presented monthly programs dealing with different cultures. These lectures and demonstrations reached an estimated audience of 60,000 weekend visitors. During these same weekend periods more than 36,000 people, most in family groups, visited the Alexander M. White Natural Science Center. The Discovery Room provided another thousand youngsters the chance to learn about natural history objects through "discovery boxes" filled with touchable materials.

Community Programming The William Randolph Hearst Foundation, the Henry Nias Foundation, the Evelyn Sharp Foundation and the Avon Products Foundation supported a range of programs particularly appealing to African-American, Caribbean and Latin-American groups. Among the activities were several related to the Museum's special exhibition on African textiles. These included lectures, classes for school groups, and hands-on-workshops on African batik and tie-dye techniques. Other programs included three fall lectures, a music and dance tribute to the late Dr. Martin Luther King, Jr., a film festival, and a host of other activities celebrating Black History Month. More than 26,000 people attended these community events.

Programs that reflected the customs and folklore of people in the Caribbean and Latin America drew audiences of nearly 28,000. Among the offerings were presentations of

Juanita Munoz, Instructor in the Department of Education, explains the workings of a microscope to a group of junior high school students participating in one of the Museum's many programs for New York City schools. By examining familiar structures and organisms found in pond water, students are introduced to the microscope and laboratory procedures. During the past year, some 23,000 students registered for programs taught by the Education Department's staff.



musical fantasies for children (including one on ecology); a Caribbean Festival of weekend demonstrations, lectures, music and dance; a Peruvian folklore spectacular; a Cuban film festival; a series of programs exploring the creative expressions of women in Central America and the Caribbean; and a steel band symphonic concert.

The Department of Education completes its centennial year dedicated to the same goal of public service with which it began.

Publications:

Arth, Malcolm

1983. American International Exchange in Museum Education, Roundtable Reports, vol. 8, no. 4, Summer issue.

1984. The Public Trust: No Longer a Non-Issue, *Muse*, vol. 1, no. 4, Winter/January.

1984. A Century of Education at the American Museum of Natural History, Roundtable Reports, vol. 9, nos. 2 and 3, Spring/Summer issue.

Ransom, Marjorie

1983. Planning a Museum Field Trip. *Nature Study*, vol. 36, nos. 3, 4, March, 1983.

Department of Exhibition and Graphics

A landmark exhibition on paleoanthropology mounted in a new gallery; the U.S. debut of a major exhibition from Canada; and a variety of unique, smaller exhibitions combined with work on future shows to produce one of the busiest years in the history of the Exhibition and Graphics Department. Behind the scenes, finishing touches were put on a major new permanent hall set to open in December, 1984; exhibits were readied for installation in another big new permanent hall, and planning advanced for a third new permanent hall. Meanwhile, extensive renovations and refurbishing work concentrated on the ornithological and mammal exhibits.

Special Exhibitions When "Ancestors: Four Million Years of Humanity" was proposed in 1980, the department saw it as a historic challenge. From a new gallery space itself to each fossil's mount, everything about the exhibition was custom designed and one-of-a-kind. Not only were the ancient "Ancestors" fossils extremely rare, they were extremely fragile and most had never before been on public exhibition anywhere. And "Ancestors" marked the debut of an important new Museum exhibition area, Gallery 1, just west of the Seventy-seventh Street Foyer on the first floor.

The contributing institutions sent casts of their fossils to the Museum well ahead of the April opening of "Ancestors" so individual mounts could be designed to exhibit each piece to advantage and to distribute its weight safely and evenly. Just before opening, the casts were removed and the original fossil treasures were fitted into their precision, jewellike mounts. The mounts were fixed onto chest-high, faceted exhibit cases that themselves suggested huge jewels.

The cases, each lighted by its own ceiling spots, were laid out in rough

chronological order, beginning with one of the oldest known prehuman fossils (30 million years old), and progressing down Gallery 1 to the 9000-year-old skull representing the earliest inhabitants of the Americas. Support information on the cases was limited to brief identifications and illustrations of the early human family tree, with more details, drawings and photos displayed along the walls, all carefully coordinated with the nearest specimens.

Upstairs in Gallery 3, "Silk Roads / China Ships," with more than 400 pieces illustrating some 2000 years of trade between East and West, began its two-year tour of the U.S. and Canada in February. Originating at the Royal Ontario Museum in Toronto, the North American tour was made possible in part by the American Express Foundation.

The Arthur Ross Exhibit-of-the-Month program, partially funded by the Arthur Ross Foundation, presented five special exhibitions: "Bicycles and Dragons" in the Akeley Gallery (a photographic companion exhibit to "Silk Road / China Ships") with archival photos of old China contrasted with pictures from China as it is today; the "Origami Holiday Tree"; the Natural History Photo Contest Winners; an exhibit in honor of Theodore Roosevelt's 125th birthday; and the Wethersfield Meteorites in an exhibit called "Right Through the Roof," in the Arthur Ross Hall of Meteorites.

"Peonies of Greece: Myth, Science and Art," featuring original watercolors and lithographic prints by Niki

Dating to the late 7th or early 8th century, these glazed earthenware figurines of two Chinese civil officials painted in shades of brown, green and yellow. They are part of "Silk Roads / China Ships," an exhibition of some 400 artifacts illustrating 2000 years of commerce in goods, technologies, art and ideas from the major trade routes between Europe and the Orient. Organized by the Royal Ontario Museum in Toronto and funded by the American Express Foundation, the exhibition began its tour of the United States at the American Museum in February. During its three months here, a quarter of a million people saw it.



Goulandris, of the Goulandris Natural History Museum in Greece, opened in the Naturemax Gallery in May.

Permanent Halls During the year, finishing touches were put on the exhibition cases in the Margaret Mead Hall of Pacific Peoples, scheduled to open to the public at the end of 1984. Through the joint efforts of Exhibition and Graphics, and the Department of Anthropology's Conservation Laboratory, many fragile wood and textile artifacts have been remounted for this Hall.

Installation of exhibits is about to begin on a new hall, tentatively called the Hall of Peoples of South America, and planning is underway on a new Hall of Human Biology and Evolution to be located in the space adjoining Gallery 1.

The department redesigned and refurbished a major portion of the Sanford Memorial Hall of the Biology of Birds. It cleaned and refurbished habitat groups in three other bird halls in time for the 100th anniversary of the American Ornithologists' Union held at the Museum in September. Three special ornithology exhibitions were staged to coincide with the AOU meeting: "A Celebration of Birds: Louis Agassiz Fuertes and His Art" in the Naturemax Gallery; "Francis Lee Jaques: Artist and Naturalist" in the Akeley Gallery; and "South of Winter," a photographic story of the Aransas National Wildlife Refuge, winter home of the endangered Whooping Crane in the Hall of Birds of the World.

Diorama renovating and refurbishing were completed on the ostrich group in the Akeley Memorial Hall of African Mammals, and on the jaguar and gray squirrel groups in the Hall of North American Mammals.

Several modifications were made during the year on exhibits in the Morgan Memorial Hall of Gems and the Harry Frank Guggenheim Hall of Minerals. The Spectrum Collection was removed and "Exceptional Gems," a display of two emeralds and a ruby, was installed.

A gradual upgrading of audio-visual technology in the Museum has been underway for the past several years. In 1984-85 the Museum will install several new videodisc players and a coaxial network to link the equipment to a central control point.

Department of Library Services

The Library's unsurpassed collections of scientific monographs and serials, archives, manuscripts, rare books, photographs, films and Museum memorabilia serve the Museum staff in research, publication, exhibition and educational programs. The Library similarly serves the international scientific community, the lay public, other museums, libraries and academic institutions.

RPINH Launched The biggest single project of the year was the launching of *Recent Publications in Natural History (RPINH)* and the completion of its first full year as a separate publication of the Library. *RPINH* is a quarterly bibliographic publication providing full citations including prices and addresses of obscure publishers of recently published monographs in natural history, and reviews of selected books. Born in the March, 1979 issue of *Curator* as a regular quarterly feature, *RPINH* was first published as a Library publication in March, 1983. *RPINH* was created to help libraries and individuals keep up with the burgeoning body of natural history literature which is published throughout the world by many diverse interests.

The first issue of *RPINH* in *Curator* contained 313 citations arranged alphabetically by author under 20 broad subject headings with one review. The early *Curator* issues were produced manually: citations were typed, alphabetized and subject-sorted by hand, and a "manuscript" was delivered to *Curator* for typesetting.

Today, some 450 citations per issue, with typesetting codes, are typed into the Museum's Wang VS-80 word/data processing system, edited on-line, and the information directly transmitted to a computer typesetter. Typeset galleys are laid out by the Division of Graphics and offset by a commercial printer. A recently acquired software program will further simplify and reduce the cost of production.

As its size grew and *RPINH* began

to take up valuable *Curator* pages, it was decided in the spring of 1983 to try to publish it as a separate publication of the Library on the condition that *RPINH* become self-supporting by the end of the year. This required 300 subscribers. In March, 1983, Volume 1, Number 1 was published for 93 subscribers, and with a one-third page advertisement in *Scientific American* donated by Publisher Gerard Piel, *RPINH* took off dramatically by itself.

RPINH now has more than 500 subscribers throughout the world. In addition to subscribers in the U.S., Canada, and Western Europe, *RPINH* is read in China, Japan, Thailand, New Zealand, Australia, Papua New Guinea, Mauritius, Zimbabwe, Egypt, Nigeria, Israel, Botswana, Faroe Islands, Peru, Argentina, and Surinam, and the subscriber lists are growing every week.

Literature cited in *RPINH* is obtained in three ways: purchased by the Library; received on exchange; and sent in by more than 150 publishers from all over the world. All natural history monographic literature is included. Books suitable for amateurs and children are noted, and ambiguous titles are annotated. Publishers whose books are cited receive complementary copies of *RPINH*.

Two or three books of particular interest are reviewed in each issue. To date 35 books have been reviewed by such scientists as Niles Eldredge, Chairman of the Department of Invertebrates, and François Vuilleumier, *Curator* in the Department of Ornithology, at the Museum; Michael F. Gibbons, Jr., of the University of

Penelope Bodry-Sanders, Restoration Assistant in the Department of Library Services, completes the binding of a collection of valuable art works from the Department of Ornithology. Some 700 pieces of Ornithology's art-on-paper collection, as well as pieces from the Library's art collection, were cleaned and rehoused in preservation folders and boxes. Funding for the project was provided by a grant from the National Endowment for the Arts.



Massachusetts; and Richard A. Gould of Brown University.

Plans to add an Astronomy heading and expand Botany have been completed. Beginning with the September, 1984 issue an Astronomy section will be prepared by the Perkin Library of the American Museum-Hayden Planetarium, and the expanded Botany section will be prepared by the Library of the Academy of Natural Sciences of Philadelphia.

Reorganization With the resignation of the Assistant Librarian for Archives and Photographic Collections it was decided to centralize all reference services under the Reference Services section, and all cataloging, acquisitions and processing under the Technical Services section. The reorganization has already resulted in more coordinated processes and better services.

Grants The U.S. Department of Education, Title II-C grant to catalog the Photographic Collection was successfully completed and the final version of the *Photographic Cataloging Manual* was published. Funding from the Exxon Foundation provided for the further preservation of the Photographic and Rare Film Collections. Over 700 art works from the Library's and Ornithology Department's art collections were cleaned and re-housed in preservation folders and boxes under an \$11,000 grant from the National Endowment for the Arts.

Exhibitions and Loans Two exhibits were mounted in the Library Gallery: "The Great Auk" to coincide with the American Ornithologists' Union meeting in September, and "Asiatic Expeditions." An exhibit of Alexander Wilson's copper plates, prints and copies of *American Ornithology* were mounted in the Library entrance.

Major loans of the year included: three rare volumes to the Grolier Club for its centennial exhibit; copies of 50 photogravures by Eadweard Muybridge to the International Center of Photography; a Mac Monnies sculpture and Theodore Roosevelt's Burnside rifle to the Lyndon B. Johnson Library; three Titian Ramsay Peale paintings to the Lyman House Memorial Museum in Hawaii, and two

rare books (Audubon's *Birds of America*, and Mark Catesby's *The Natural History of Carolina, Florida and the Bahama Islands* and six T. R. Peale works to the Whitney Museum of American Art. The Library staff selected the 28 historic images of China from the Photographic Collection for the "Bicycles and Dragons" exhibition.

Services The Library added 1448 volumes to the collection, 13,214 cards to the catalog and 12,778 journal issues; cataloged 2566 photographs; preserved 5883 images; bound 1748 volumes; answered 11,138 reference requests; served 6510 patrons; filled 1694 interlibrary loan requests; performed nine database searches; circulated 36,349 items to the Museum staff; realized an income of \$44,672 in the Photographic Collection and granted gratis permissions worth \$6900; distributed 53,356 issues of Museum scientific publications and published and distributed four issues of *RPINH*.

Gifts John Samson donated an additional 23 drawings and sketches by Ernest Thompson Seton, making the Library's Seton Collection the most definitive extant. Gifts of money were received from: Mrs. Alfred Loomis, Jr. (\$3000); Time-Life Books, Inc., (\$1600); Cyril dos Passos (\$350); and George F. Miller (\$150).

Staff Activities Nina Root, Library Chairwoman, was named to the Board of Trustees of the Frank M. Barnard Foundation, Boston. Ms. Root and Mary Genett, Assistant Librarian for Reference Services and Conservation, served on the Museum's Art Committee and the Technical Committee working on the restoration of six of the Museum's "Elephant Folio" plates for the upcoming publication and exhibition, tentatively titled "John James Audubon: Science into Art."

Publications:

AMNH Library

- 1984. Photographic cataloging manual. New York, 72 pp.
- 1983. Naturalist's journal. [Illustrations from the Rare Book Collection of the Library of the American Museum of Natural History selected by Nina J. Root]. Universe, New York, 160 pp.

Johnson, Bryan R.

- 1983. Letterpress lives. Small Press, vol. 1, no. 2, pp. 35-38.

Johnson, Bryan R., editor

- 1983. Book Arts Review, vol. 2, no. 3.
- 1983. Book Arts Review, vol. 2, no. 4.
- 1983. Book Arts Review, vol. 3, no. 1.
- 1983. Recent Publications in Natural History, vol. 1, no. 2.
- 1983. Recent Publications in Natural History, vol. 1, no. 3.
- 1983. Recent Publications in Natural History, vol. 1, no. 4.
- 1984. Book Arts Review, vol. 3, no. 2.
- 1984. Recent Publications in Natural History, vol. 2, no. 1.

Root, Nina J.

- 1983. [Review of] John Gould, the bird man; a chronology and bibliography, by Gordon C. Sauer. Recent Publications in Natural History, vol. 1, no. 3, p. 1.
- 1983. Biography of a museum library. Curator, vol. 26, no. 3, pp. 185-198.

Interdepartmental Facilities

The Wang VS-80 computer system has been significantly expanded. With the addition of telecommunications it is now possible to send or receive files from other computers in this country and throughout the world using ordinary telephone lines. The online disk storage capacity of the Museum's computer has been almost tripled with the addition of a new 288 megabyte disk drive, producing a storage capacity of more than 120,000 pages of text. New software recently purchased by Discovery Tours permits quick design of report formats and labels. This software is so useful that several scientific departments, including Entomology, Mammalogy and Invertebrates, are using it to

create printout formats for old and new data files on their collections.

The Scanning Electron Microscope (S.E.M.) is an extremely valuable research tool. In the past year, more than 2700 high-quality micrographs were taken of specimens as diverse as cloth fibers, aortic grafts, rats' teeth and the fossilized skull of a newly hatched dinosaur. Museum users included Curators, Research Associates, graduate students and others from eight of the 10 scientific departments. Work was also performed for non-commercial researchers from outside the Museum who do not have access to an S.E.M. in their own institutions. The S.E.M. is particularly useful not only for its ability to magnify up to 50,000 times, but also because it produces up to 300 times the depth of focus possible under similar working conditions using a light microscope.

Grants and Fellowships

The Office of Grants and Fellowships was created this year in a major effort to coordinate the administration of the Museum's grants program and to expand and unify its fellowships program.

The Grants Program includes the Frank M. Chapman Memorial Grants (ornithology), the Lerner-Gray Grants for Marine Research, the Theodore Roosevelt Memorial Grants (North American zoology), and the Lounsbery Grants for Pre-doctoral Research in Anthropology. This year, 60 individuals received Frank M. Chapman Memorial Grants; 40, Lerner-Gray Grants for Marine Research, and 48, Theodore Roosevelt Memorial Grants.

New to the program are Collection Study Grants, which provide financial assistance to pre-doctoral and recent post-doctoral investigators to study any of the scientific collections of the American Museum.

Short-term funding for qualified students to work under the direction of Museum curators is provided by Undergraduate-Graduate Research Grants. This year, seven graduate students received awards to conduct research in such areas as geochem-

ical archeology, physical anthropology and vertebrate paleontology. Three curators received Weatherhead Grants for Asian Studies to visit institutions, attend scientific meetings and give lectures in the cities of Beijing, Wuhan and Nanjing in the Peoples Republic of China. Weatherhead grants also enabled two Chinese scholars to visit the Museum to investigate the collections in the Departments of Herpetology and Ichthyology and to confer with curators.

The Research and Museum Fellowships Program provides support to recent post-doctoral investigators, established scientists and other scholars, so they may carry out specific projects within a limited period of time at the Museum or its field stations. In addition, the Curatorial Fellowship Program, established for the first time this year, brings to the Museum individuals holding doctoral degrees or equivalents to assume all the duties and responsibilities of members of the curatorial staff for a limited-term appointment. A total of six individuals has been appointed or reappointed through the Fellowships Program for the coming year.

The Programs for Grants and Fellowships are made possible through the generosity of many donors to the following funds: Boeschstein Fund, James Walter Carter Memorial Fund, Frank M. Chapman Memorial Fund, Greenwall Fund, Franklin H. Kalbfleisch Endowment Fund, Lerner-Gray Fund for Marine Research, the Richard Lounsbery Fund for Research in Anthropology, Elsie Binger Naumburg Fund, Theodore Roosevelt Memorial Fund, Thorne Fund, Weatherhead Fund for Asian Studies.

A booklet, currently available, describes each of the grant and fellowship programs and explains the application procedures.

Publications

Scientific Publications The Office of Scientific Publications published 37 articles, all on subjects pertinent to the scientific departments of the Museum. Most of the papers were written and illustrated by Museum scientists and

represent the results of their research. A few, however, were written by researchers from other institutions. Twenty-five articles appeared in *American Museum Novitates*, 10 in the *Bulletin of the American Museum* and two in *Anthropological Papers*. A 64-page paper was printed in the James Arthur Lecture series on the Evolution of the Human Brain entitled "Human Brain Evolution in an Ecological Context." During the year, 2755 pages were printed.

Two major contributions to the scientific series were: a 552-page monograph analyzing the archeology of Monitor Valley, Nevada, by David Hurst Thomas, Curator in the Department of Anthropology, published in *Anthropological Papers*. (It focused on Gatecliff Shelter in the Toiyama Range of central Nevada); and a 462-page monograph, printed in the *Bulletin of the American Museum*, revising the mirid fauna (plant bugs) of the Indo-Pacific region. In this monograph, a large and previously unstudied collection was examined and 46 genera and 272 species were treated in detail by Randall T. Schuh, Curator and Chairman of the Department of Entomology.

Curator Four issues were published during the year. The Editor, Museum Director Thomas D. Nicholson, appointed several new members to the Editorial Board including a number from museums other than the American Museum of Natural History. This continues a trend, started many years ago, to diversify the Editorial Board. The objective is to involve peer review from the broad museum community in the selection of papers and thereby to expand the scope of the journal.

Curator changed printers during the year, increasing quality while realizing substantial savings on production costs. Circulation continued to grow and during the year reached its highest point ever. An increasing flow of manuscripts has allowed *Curator* to maintain its publishing schedule while improving the quality, significance and range of the papers published.

Special Publications The Members' Book Program brings fine books to Museum members at reduced cost. During the year a

growing number of members took advantage of this service. The Book Program published a catalog, featuring more than 40 books from different publishers in various areas of interest to the Museum and its members. Advertising in *Natural History* proved effective in bringing this program to the attention of the Museum's 465,000 members, while special book promotions reached smaller groups of interested members.

During the year, Special Publications entered into a number of agreements to publish or market books and other items. These included: a 1984 calendar published in conjunction with Universe Books on Indian Arts, and a 1985 calendar on Dinosaurs; a travel log called *Naturalist's Journal* also with Universe; the Mack Lipkin Man and Nature Lecture Series with Charles Scribner's Sons; a set of notecards with Alan Hutchison Publishing Co., Ltd. and a reproduction of an E. S. Curtis print from the Rare Book Room with MBI, Inc. Other projects included a promotion of a series of Roger Tory Peterson Field Guides also with MBI, and a special promotion and royalty arrangement with Hammond, Inc. for the book "Dinosaurs: An Illustrated History," by Edwin H. Colbert. Special Publications is also launching a new anthropology magazine for young people called *Faces*, with Cobblestone Publishing, Inc., and is planning to publish a new edition of six prints from the original copper plates of "Audubon's Birds of America," with Editions Aleto, Ltd.

The new "Official Guide to the American Museum of Natural History" was published during the year, and sales have been very strong. The new guide was made possible by a grant from the General Electric Foundation. Applications for grants to publish three other guides to specific areas of the Museum have been submitted to the National Endowment for the Arts, and a grant application for an illustrated book on the Museum's Northwest Coast Indian collection was submitted to the National Endowment for the Humanities.

Administration

Plant Operations, Construction, Maintenance and Building Services. To meet the growing needs of the Museum, both in services to visitors and members, and in its diverse support services to the departments, the various units of the plant complex were reevaluated and organized more efficiently.

A separate Maintenance Department was established primarily through reassignment of employees from various shops of the former Construction and Maintenance Department and from the Building Services Department.

The new Maintenance Department is responsible for the repair and maintenance of air-handling and air-conditioning systems, for all plumbing repair and maintenance, and for lighting, cleaning, painting and repair work in public areas.

One of the department's chief goals is the development and implementation of a comprehensive maintenance program to insure that all Museum equipment and facilities remain fully operational.

The Construction Department carried out 23 projects, ranging from work on eight special exhibitions including "Silk Roads/China Ships" and "Peonies of Greece: Myth, Science and Art," to construction of a new office facility for Public Admissions. The department also finished work on the new Gallery I for special exhibitions, the first of which was "Ancestors: Four Million Years of Humanity." It completed the new mezzanine and book shop sections of the Museum Shop.

In addition to the painting associated with new construction projects, several major existing exhibition halls were painted, including the Hall of Birds of the World, the Hall of North American Mammals, the Hall of Eskimos, and the vast Hall of Ocean Life and the Biology of Fishes.

The Building Services Department's new entrance control system was installed, enabling security personnel at a remote location to screen and admit authorized personnel into the Museum after visiting hours. The system employs a video camera, two-

way speakers, an identification reader and electric door locks.

The department also purchased 15 new walkie-talkies and a new base station. The walkie-talkies are equipped with sleeve transmitters and ear plug receivers.

Museum Shop The Museum Shop ended the 1983 calendar year with its most successful Christmas sales period to date. Revenues were up 25 percent from November through January. The trend continued throughout the spring with record sales established during the Easter season. Sales were helped by the large crowds attending the exhibitions "Ancestors: Four Million Years of Humanity" and "Silk Roads/China Ships."

A new glass-enclosed mezzanine shopping level, built entirely by the Construction Department, has increased the Museum Shop's total floor area by one third, to 2800 square feet. The area features a new mezzanine entrance to the facility from the elevator, a staircase inside the shop leading to the new space, and three prominent display windows.

The book section has been expanded and moved to the new shopping level, which has been stocked with a wide variety of natural history books, records, posters, stationery and globes.

In the former book section there is now more room for popular items such as dinosaur ties, totes, T-shirts and umbrellas. This area has also been equipped with a fitting room and filled with ethnic clothes inspired by the Museum's special exhibitions and permanent halls.

Shoppers examine the Museum Shop's collection of posters in the new glass enclosed mezzanine that was added by the Museum's Construction Department. The addition, which increases the Shop's floor space to 2800 square feet, includes a new entrance to the shop off the elevator, an inside staircase, and three big display windows. The new mezzanine features an expanded selection of natural history books, records, posters and stationery.



Attendance Museum attendance for the 1983-84 fiscal year totaled 2,601,725. This figure includes 2,085,134 to the Museum and 516,591 to the Planetarium.

Development and Communications

"Ancestors: Four Million Years of Humanity" attracted national and international attention, and was visited by large numbers of people. Both the overwhelming success of the exhibition and the controversy engendered by it created their demands on the Museum administration and Public Affairs staff.

Long before "Ancestors" opened, it was the subject of a successful direct-mail fund-raising campaign. The Museum's donors—those in New York and other parts of the country—heard about and contributed to "Ancestors" well in advance. Direct support also came through an indemnity from the Federal Council on the Arts and Humanities, and by grants from the New York State Council on the Arts, the Wenner-Gren Foundation for Anthropological Research, the National Science Foundation and the L.S.B. Leakey Foundation.

"Ancestors" opened with a gala party which was followed by a private reception for the Friends, the Museum's new organization for annual high-level donors. On that occasion, Highlights Tour guides gave special tours of "Ancestors," as they did for the general public throughout the run of the exhibition. The exhibition was the site for a number of social events, including the co-chairmen's reception for the American Association for the Advancement of Science, which held its annual meeting in New York City.

Public Affairs Staff visits to editors and producers established major media contacts and long-range placement of information, which resulted in national and international coverage of "Ancestors." Segments were aired on the "CBS Morning News," "NBC

Nightly News" and the "MacNeil-Lehrer Report." Major articles appeared in *Newsweek*, *Science* 84, *Discover*, *The New York Times Magazine*, *Smithsonian* magazine and in many other news outlets.

Other exhibitions which received national attention were "African Textiles," "Silk Roads/China Ships" and three special exhibitions held in conjunction with the centennial meeting of the American Ornithologists' Union.

As part of the ongoing effort to increase public awareness of scientific research, newsworthy articles appearing in *Natural History* were promoted. An article examining the premature deaths of meadow voles living in the vicinity of the Love Canal toxic-waste dump was covered in *The New York Times* and was carried in other media through the Times News Syndicate. Articles also appeared in *Newsweek*, the *Washington Post*, and the *Buffalo Evening News*. Another story dealing with a population of voles that improved the nesting conditions for terns on Great Gull Island received featured treatment in *The New York Times* Science Times. The voles, reintroduced to the area by scientists on the island, cleared vegetation that hampered the gulls from nesting along the beaches.

The Museum's involvement in the multinational expedition to the tropical rain forests of Venezuela was chronicled in a two-page article in *Newsweek* magazine.

The Museum's nationally distributed radio series was carried by 450 stations, an increase of 36 stations over last year. The series features 13 three-minute scientific discussions between the Director and Museum researchers.

The highly visible full-page "menu" advertisements were run quarterly in *The New York Times*. They were created by the Ogilvy & Mather advertising agency, of which the Museum is a public-service client. The advertisements focused on special exhibitions and other events and programs surrounding them, and also included an invitation to Museum membership.

Development The multiphased development program moved forward on a variety of fronts: renewing the gifts of generous donors, soliciting the support of new contributors, and

strengthening corporate, foundation and government programs.

The Museum received support from the City of New York which allocated \$9,473,346. Of this, \$5,175,205 was in direct contributions, \$2,296,141 was in energy use, pension fund payments, and \$2,002,000 in commitments for capital improvements.

The New York State Council on the Arts allocated \$618,000 in general operating and special project support. The Museum enthusiastically endorsed the Council's new multi-year funding program for the next two fiscal years, enabling longer range fiscal planning.

The Institute for Museum Services granted \$50,000.

The National Endowment for the Arts Challenge Grant continued to stimulate new and increased giving in the individual and corporate areas. Direct mail campaigns identified new givers. Carefully targeted renewals of past contributors were successful. All individual gifts solicited primarily through direct mail exceeded last year's totals and this year's projections.

The Corporate Campaign, directed by Museum Trustee Donald C. Platten, raised \$951,024 from 257 companies. For the second year in a row, more than a third of the corporate contributors increased their gifts. The Employee Admission Program continued to provide and upgrade incentive in contributions, and now 55 companies gain admission benefits for their employees and families. In addition, efforts were stepped up to receive contributions from corporations matching employee gifts. That

Superstar Michael Jackson was the center of attention at a gala party attended by some 1500 guests in the American Museum's Theodore Roosevelt Memorial Hall. The party, given by CBS Records, a corporate supporter of the Museum, was organized by the Museum's Department of Guest Services. Revenue from such functions provides substantial support for the Museum. Photo by Roz Levin.



category of giving rose by 49 percent.

Funding from Mobil allowed the Museum to continue to be open on an admission-free basis on Friday and Saturday evenings. Philip Morris provided ongoing support for the restoration of the Mammal Halls. Additional corporate contributions were designated toward the Economic Mineralogy Fund, led by Trustee Plato Malozemoff. The fund supports a new curatorship in Economic Mineralogy.

A National Endowment for the Humanities grant of \$145,878 was awarded for the exhibition, "Asante: Kingdom of Gold," scheduled to open at the Museum in the fall of 1984.

Efforts to fund a new Hall of Human Biology and Evolution were kicked off by a grant of \$150,000 from the Booth Ferris Foundation. In preparation for the reinstallation of the South American Collection into the new Hall of South American Peoples, the National Endowment for the Arts awarded the Museum a grant for conservation and the purchase of lab equipment.

With the assistance of The Clarke Foundation and the National Endowment for the Arts, the Museum is installing an improved security program aimed at safeguarding collections of scientific and monetary value both in the galleries and collections management areas.

The improvement of special effects capabilities in the American Museum/Hayden Planetarium is the goal of a \$250,000 Planetarium fund-raising campaign which is now underway. With generous leadership gifts from the Prospect Hill Foundation, Bankers Trust and Chemical Bank, the Planetarium has embarked on a program to enhance visually the quality of its shows. Audio equipment and a sound studio are future objectives.

Benefit Events The year began with an overwhelmingly successful children's Halloween Party which netted \$9,750. At the spring event, another sellout, our youngest supporters happily attended a "Safari Party."

On Dec. 1, Mrs. John H. Manice and Mrs. Gordon Pattee created "A Night for All Creatures," an imaginative buffet dinner-disco complete with a gigantic hot air balloon in the Rotunda. The party attracted a new age group to the Museum and netted

\$29,000 for the Alexander M. White Natural Science Center. Plans are underway for another party for young adults on Nov. 29, 1984.

The Benefit Committee chose the opening of "Silk Roads/China Ships" as the theme for a beautiful dinner-dance which was held in the Roosevelt Rotunda. With the generous support of the American Express Company, as well as 600 ticket takers and many other contributors, the Benefit netted about \$260,000. Co-chairmen of the evening were Mrs. Charles A. Dana, Mrs. Robert G. Goelet and Mrs. Yves Robert. James D. Robinson III, Chairman and Chief Executive Officer of the American Express Company, kindly served as Honorary Chairman. The Committee is already discussing plans for another Benefit to be held in April 1985.

Guest Services The food services of the Museum achieved record sales during the past year. The recently opened American Museum Restaurant proved to be highly popular, and sales in the Terrace Cafe indicated that this al fresco-style luncheon is gaining in popularity. The Restaurant, which has found particular favor with Museum Members, offers them the opportunity to dine in the Museum before various Membership programs. The fast food concept of the Food Express gives visitors a totally different lunch-style, and efforts are continuing to expedite service. A new employee cafeteria is being planned.

The opportunities for presenting the Museum to special audiences continued to increase. It was gratifying to measure the diversity of groups and events, as well as the number of individuals introduced, or returning to the Museum through special events. These activities added substantial support for the work and interest of the Museum. Included were:

The New York Clearing House, Sigma Special Fund, Manhattan Guild, W. H. Freeman, The Theodore Roosevelt Association, Chemical Bank, Cannon Mills, American Association of Physicists in Medicine, Shearman and Sterling, Boone and Crockett Club, Metro Chapter of the Young President's Organization, IBM, American Institute of Aeronautics and Astronautics, International Council of Morgan Guaranty Trust Company, the

New School for Social Research, the Australian Consulate General, CBS Records, Marsh and McLennan, John Burroughs Association, Institute of Human Origins, American Stock Exchange Board of Governors, MIT Alumni Center of New York, New York Blood Center, United Way of America, New York Fashion Council, Friends of the New York Philharmonic, Franklin Computers, Gillette, Toronto Sun, American Association for the Advancement of Science, the Gouldlandris Natural History Museum, American Express, New York State Council on the Arts, Cornell Alumni Association, Paine Webber, the Hudson River Foundation and the American Littoral Society.

All activities in conjunction with the Centennial of the American Ornithologists' Union were coordinated by this office, as were Museum-sponsored events. Among the latter were all social events, press events, meetings, lectures, the Margaret Mead film festival, classes and screenings.

Commercial filming and photography projects included a segment on dinosaurs for "Ripley's Believe It or Not," a BBC educational series, medical and social documentaries and commercial advertisements.

Topical information for the Museum's closed circuit television system, as well as for the general information telephone message was provided. The latter reached 228,838 prospective visitors. English editions of the Museum floor plan, as well as those in four other languages, were kept updated, and 425,440 copies helped guide visitors around the Museum. More than 100,000 general information brochures, in English and foreign language editions were distributed to tourist outlets.

Volunteers Museum volunteers worked seven days a week within the Museum operating information desks, assisting in scientific and administrative offices, acting as facilitators at Museum functions, teaching children and demonstrating Origami paper-folding at holiday time.

Volunteers at this Museum are known as "unpaid employees" and are held to the same high standards of professionalism as their paid counterparts. Volunteers used their skills in clerical work, translating, proof-

reading, cataloging, conservation, restoration, sales, computer, research, casting, dissection, word processing and in the collection of data for a survey of Museum visitors. Among the more than 400 volunteers are some who have been working at the Museum for more than a decade. In the Department of Ornithology, a veteran volunteer gives several days a week, preparing specimens before their inclusion in the collection.

The Volunteer Office has been successful in filling requests from Museum departments for editors to help produce the Museum's many scientific publications, scientific illustrators to work on lifelike recreations for scientific papers, word processors, and catalogers to prepare the Museum's vast collection for entry into the computer.

The Friends of the Origami Center of America moved their activities to the Museum this year. Volunteers have flocked to training sessions to learn how to fold simple Origami figures to demonstrate at the Origami Holiday Tree. A second, six-week training session was added, but it could not accommodate all those on the waiting list.

The Volunteer Office is responsible for the daily free tours of the Museum for individual Museum visitors, as well as the prearranged group tours for which a fee is charged. Professionally trained Museum Highlights Tour guides also give tours of temporary exhibitions.

A memorial lecture for Paul Kane, a devoted member of the volunteer staff with a keen interest in Meso-America was made possible by the many contributions of his friends and fellow volunteers.

Naturemax In its third year, Naturemax, drew attendance in excess of 26,000 per month. "To Fly!" and "Living Planet" have proved to be consistently popular in drawing attendance from new visitors, and from school and summer camp groups that return season after season.

The major focus of the year's efforts was to increase the public's awareness of the educational and entertaining experience of Naturemax. This endeavor took many forms. In all of them, however, the emphasis was on

"New York's largest movie screen," "four stories high" and "super size IMAX films."

To attract Museum visitors, full-color posters were placed in the elevators and in hall directories. These allowed visitors to visualize the magnitude of the screen as well as the beauty of the theater. In addition, handouts were distributed at all entrances.

To reach prospective audiences, an attractive new brochure was produced, and is being distributed to major tourist locations around the city, as well as in the Museum. It will also be included in Museum mailings to create interest among a great number of potential visitors. Through direct mailings, New York and suburban teachers and principals were informed of the opportunity to see "the world's largest natural history museum, and New York's largest movies" in one visit.

Besides moving to attract a greater audience, measures were taken to improve the efficiency of the Naturemax operation. The box office is being run by the Public Admissions office with resultant streamlining of functions and reduction in expenses.

Discovery Tours The Museum's travel program operated 15 tours to 33 countries. There were 650 participants, a 27 percent increase over the last fiscal year. Among areas visited were Sri Lanka, Burma, Thailand, Malaysia, India, Indonesia, Papua New Guinea, China, Tibet, Egypt, Morocco, Greece, Rwanda, Tanzania, Kenya, Denmark, Finland, Sweden, Norway, Mexico and Alaska. Many of the locations visited were new to the Discovery Tour program.

The office designed the itineraries and the companion lecture programs, sold the trips to participants and performed extensive client services. Professional tour operators and numerous local agents handled the logistical arrangements. Tours were promoted through 32 advertisements in *Natural History* and other magazines, and 24 direct mailings to selected lists.

During the tours, lectures and informal discussions were given by 23 Museum staff members from 12 departments. Guest lecturers and local guides supplement the Museum staff lecture series. Behind-the-scenes visits, special performances,

and meetings with local dignitaries were also arranged.

Planning progressed for the 1985 program which will feature new tours to Borneo, the Spice Islands (Moluccas), West Africa, the Black Sea and the Caribbean.

Natural History In conjunction with the centennial meeting of the American Ornithologists' Union (AOU) at the Museum, *Natural History* published a commemorative issue in September, dedicated totally to birds. From a frontispiece on "The Joy of Birds" by Curator Emeritus Ernst Mayr, to the final essay on scrambled eggs by regular food columnist Raymond Sokolov, the issue explored the science, art and pleasure of birds. It not only delighted the AOU members; it also sold well on newsstands and by special order.

Several other issues of the magazine carried features related to special Museum events. "Yankee Doodle Went to Canton," a lushly illustrated article about the earliest trade with China, by Sue Ellen Gronewold, consultant to the Museum's Education Department, coincided with the opening in February of the special exhibition, "Silk Roads/China Ships." In April, the magazine started "Ancestors," an eight-part series of columns, the subject matter of the popular exhibition, "Ancestors: Four Million Years of Humanity."

Like cosmic clockwork, the magazine each month published the informative column and sky maps of Museum Director Thomas D. Nicholson's "Celestial Events." Publications Manager Douglas J. Preston contributed his readable "At the American Museum" columns with interesting details and anecdotes about the Museum. In May, ornithologist Helen Hays, Chairwoman of the Great Gull Island Committee, wrote an article on "The Vole that Soared." This piece, about the small rodent that helped clear vegetation from the Museum's research area at Great Gull Island, was one of many *Natural History* articles picked up by The New York Times and news wire services.

In addition to its popular columns, such as the well-read "This View of Life" essays by Stephen Jay Gould, Research Associate in the Department of Invertebrates, the magazine

continues to display colorful photographs with its scientific articles. It has also started a new short pictorial feature entitled "The Natural Moment," which has been well received and brightens the back section of the magazine. The Museum is looking into the possibility of mounting an exhibition featuring these photographs.

Both advertising and circulation improved. This growth was accomplished in a highly competitive magazine market.

Advertising pages in *Natural History* increased 25 percent, from 417 to 521. This percentage increase exceeded the industry average and the record of many other quality monthly magazines. Advertising revenue reported to the Publisher's Information Bureau reached \$4.6 million, up 36% from the prior year. Various Museum departments continue to use *Natural History* to announce and promote activities for members and friends of the Museum. The May issue featured a special pullout advertising section announcing the 1985 tours of the Museum's Discovery Tours program.

Net paid circulation, as measured by the Audit Bureau of Circulation, reached 506,813, up 7.2 percent from the same period last year. This growth was achieved despite a subscription price increase from \$15 to \$18, made necessary by rising costs of production and distribution.

The market for magazine paper has become very tight. Increasing demand strained the limits of the existing production capacity in the industry, and prices began to rise sharply beginning in the fall. During the year, *Natural History* successfully negotiated a long-term agreement to assure the magazine's paper supply at competitive prices.

Membership The Participating and Donor Membership categories grew steadily. Approximately 21,000 persons took advantage of the benefits of these higher categories.

One of the goals of the Membership program is to teach Members about the wonders of the natural world and to inform them of the Museum's activities and the work of its scientists. This is accomplished through the many Membership events and the newsletter, *Rotunda*.

This year was one of the most successful Membership programming years ever. Some 25,000 persons attended various lectures, tours and openings. Jane Goodall, pioneer researcher on wild chimpanzees; Isaac Asimov, science writer, and Robert Gordon, a member of NASA's Spacelab I mission, spoke to capacity audiences in the Museum's Main Auditorium. Members attended behind-the-scenes tours of the Departments of Mineral Sciences and Herpetology. Museum scientists such as Malcolm McKenna, Frick Curator in the Department of Vertebrate Paleontology, and Betty Faber, Research Associate in the Department of Entomology, gave talks about research in their respective areas. A musical program about dinosaurs; a special Members' viewing of the Planetarium show "Wonderful Sky" featuring the "Sesame Street" Muppets; and a Halloween program on "Spirit Stories from Around the World" were among the most popular family programs.

Stan Orser, the former editor of *Rotunda*, visited the Museum's research station on St. Catherines Island, Georgia. He wrote a journal for *Rotunda* about the work of scientists there. *Rotunda* also featured articles on the history of the Museum's brontosaurus skull, and the work of curators in helping preserve our urban parks.

This hot air balloon was tethered to the American Museum grounds as part of the Naturemax Theater's "Salute to Flight," a world wide observation of the 200th anniversary of flight. Members of the press were invited to make brief ascents in the balloon. Afterward, reporters and Museum visitors saw "To Fly" in the Naturemax Theater on the metropolitan area's largest screen—66 feet wide by 40 feet high.



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Source

Amount/Purpose

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\$7,471,346/General Operating Support plus payments for energy and pension costs
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\$50,000/General Operating Support
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\$75,000/Improved Security System
\$25,000/Conservation treatment for South American Metals
\$10,000/Purchase of Conservation lab equipment
Challenge Grant 1982-1985
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\$145,878/"Asante: Kingdom of Gold"
National Science Foundation
\$70,666/Survey of Mammals of Bolivia
\$26,299/Unisexual Species of Reptiles
\$20,000/A Comparative Study of Original Hominid Fossils
\$4,980/Symposium on Problems in Contemporary Evolutionary Theory
\$79,000/Early History of the Cryptodiran Turtles
\$70,052/Comparative Morphology and Phylogeny of Early Mesozoic Hybodont Sharks
\$43,808/Conservation and Storage of Andean Textiles
\$192,467/Operational Support for the Mammalogy Collection
\$142,488/Completion of the Herpetological Collection and Visitor Facilities
\$36,307/Zoology of Cerro de la Neblina, Venezuela: Systematic, Ecologic and Biogeographic Investigations

\$53,326/Biogeography of Chilean Spiders
\$10,988/Behavioral and Chemical Ecology of Antarctic Bryozoans
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\$2,844/Conservation and Utilization of Coral Reef Fishes
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\$83,953/Strengthening University Research Library Resources
United States Department of Health and Human Services
\$64,355/Activity of Amosite Asbestos and Grunerite Fiber

GIFTS-IN-KIND

Department of Anthropology

Collection of 226 Ethnographic Items; Waorani Indians, Ecuador; including blow guns, darts, raw materials and percolator to prepare curare for darts; quivers, spears, pottery, looms, hammocks, baskets, feather armbands, feather wands and crowns, baby carriers, combs, leg rattles, ear plugs, necklaces of teeth, stone axe heads, fish nets, machetes. Also documentation in color slides and 10 hours of film. Collected on 1983 field expedition; 59130.
Grant G. Behrman and Dr. James A. Yost

Collection of 397 ethnographic and archeological artifacts; primarily South America; including Ethnographic Objects; worldwide, saddlebags, looms, textiles, pan pipes, men's and women's costumes; Peru, Bolivia, Guatemala, Panama. Also, documentation of work-in-progress (notes and photographs). Textiles and costumes; Spain, Syria, Morocco, Java, Indonesia, Bhutan, West Pakistan, India, Tibet, Japan, China, Norway, Canada. Pre-Columbian Objects; 19th-20th century. Ceramic vessels, whistles, figurines, effigy jars, spindle whorls, wooden kero and spoon; textiles (tapestry, slit tapestry, double cloth, gauze, tie dye, plus other techniques); ponchos, belts, headbands, coca bags, miniature textiles; gilded copper rattles, miniature heads, ornaments; feather dolls; obsidian mirror and ear spools; clay seals and molds; gold ornaments; stone and jade figures, pendants, beads; Peru, Mexico, Ecuador, Colombia, Costa Rica. Stone tools for metal and pottery making; large collection of weaving implements, threads, looms, work baskets; Peru; c. 1400 B.C.-1500 A.D. 59143.
Mrs. Junius B. Bird

Two Face Masks; bone, Africa (Zaire, Lega), 20th century; wood, Africa (Liberia, Dan), 20th century; 59140
Mr. and Mrs. J. Gordon Douglas, III

Forty Objects (Carved Wood Boards, Figures and Drums); including 16 ancestral boards (gope), four figures (kakame), 10 figures (bioma), figure (agibe), animal spirit figure (gemo), two wooden trophy heads, two masks, two belts, two drums (gama); Papuan Gulf, New Guinea; 19th and 20th century. 59145.
Mrs. Evelyn A.J. Hall

Face Mask (sirige); wood, carved and painted; Africa (Mali, Dogon); 20th century; 59212.
Dr. and Mrs. Pascal James Imperato

Twenty-five Pre-Columbia Objects; including seven ceramic vessels, three stone miniature carvings, one chrysacolla miniature carving, eight shell carved ornaments, two shell earspolls, four anthracite mirrors; Peru (Chavin, c. 1400-800 B.C.); *Three Pre-Columbian Ceramic Vessels*; Peru (Paracas, c. 1200-400 B.C.); *Pre-Columbian Ceramic Figurine*; Peru (Nazca, c. 400 B.C.-500 A.D.); 59138.
Mr. and Mrs. Frederick E. Landmann

Wall Hanging; wool embroidery, paisley/birds and cartouches; Persia, 19th-20th century; 59105.
Mrs. Nikit Ordjanian

Face Mask; wood, carved; Africa (Nigeria, Bini) 20th century; 59234.
Meryl Silver

Three helmet masks (gelede); wood; Africa (Nigeria, Yoruba); 20th century; *Crocodile Mask* (Komo society); wood and fiber; Africa (Mali, Bamana); 20th century; *Wood Sculpture* (ancestor figure); Africa (Mali, Dogon); 20th century; 59139.
Herbert F. Weiss

Collection of Pre-Columbian Artifacts; Meso-America, Costa Grande Region, State of Guerrero; including small stone sculptures; ceramic figurines, figurine heads, whistles, spindle whorls and mold for making whorls; ceramic vessels (resist painted, polychrome, incised); ceramic box with miniature vessels; stone bark beaters; Mescal-style stone masks and figures; copper implements; Classic and Post-Classic, c. 1-1520 A.D.; 59144.
Bequest of Robert E. Zeller

Department of Entomology

African butterflies; collection of 8109 specimens (Lepidoptera); 59082.
Bequest of Arthur Aiken

Assorted butterflies; collection of 1044 specimens (Lepidoptera); 59200.
Dr. Bryant Mather

Beetles; collection of 11,919 specimens (Coleoptera); 59148.
Mrs. Josephine Schuh

Beetles; collection of 226 specimens of identified beetles and 45 paratypes (Coleoptera); 59078.
Frank N. Young

Hayden Planetarium

Projection equipment; programmer, power supplies, projector faders, projector racks.
Denise Harbin

Computer equipment; 10 Franklin ACE 1200 computers; 10 video monitors.
Franklin Computer Corporation

Department of Herpetology

Reptiles and amphibians; collection of 712 preserved specimens.
Michael W. Klemens

Department of Invertebrates

Marine Mollusks; collection of 8000 specimens (Conidae, Cypraeaacea, Strombidae, Acmaeidae); 59072.
Bequest of William E. Old, Jr.

Collection of 6000 slides; parasitic flatworms, including type specimens; life cycles of species; 59142.

Horace D. Stunkard

Collection of Mollusk specimens; approximately 100,000 (Cypraeaacea and Marginellidae); 59071.

Bequest of Raymond H. Summers

Collection of marine mollusk specimens; approximately 20,000 (worldwide); 59077.

Kay C. Vaught

Department of Library Sciences

Ernest Thompson Seton; collection of 22 original watercolors, sketches and drawings; one original brush painting of a woodpecker.

John S. Samson

Memorabilia, photographs and letters of Waldemar Jochelson and Dina Jochelson-Brodsky relating to Jesup-North Pacific Expeditions.

Lydia Domherr

Department of Mineral Sciences

Emerald-cut beryl; (variety aquamarine), 12.5 carats; Brazil; 59173.

Brewster Chase

Opal boulder; gold base color, 427 carats; Australia; 59183.

Mr. and Mrs. Jack Chou

Opal carving; "Seals on Rock," 100.01 carats; Australia; 59174.

Peter A. and Patricia H. Fehn

Collection of 602 cut gemstones; 12 different varieties; 59182.

Finlay Fine Jewelry

Opal carving; "Ram on the Rocks," 463.5 carats; Australia (Coober Pedy); 59186.

Mr. and Mrs. Gerald Greer

Quartz geodes; collection of 293; Indiana; 59172.

Dr. and Mrs. G. Richard Heck

Round-cut diamond; 3.06 carats, containing a red garnet inclusion; South Africa; 59060.

Mr. and Mrs. Edison P. Janney

Mineral specimens; collection of 19; Brazil; 59175.

Stephen M. Kahn

Opal clam; 69 carats; Australia; a collection of seven crystallized mineral specimens; 59095.

Mabel C. Lamb

Two opal carvings; 33.5 and 260.91 carats; Brazil; 59185.

Martin B. Lopata

Opal carving; eagle and fish, 209.8 carats; Australia (Cooper Pedy); oriental cameo; Mintabie opal, 123.1 carats; Australia; 59187.

Mr. and Mrs. Scott Magnuson

Collection of 19 Fabergé animals.

Bequest of Clara S. Peck

Minerals and literature; collection of 3000 mineral specimens and 500 pieces of mineral and gemological literature; 59285.

Ruth Rothstein

Mineral collection; 22 crystallized specimens; 59188.

Susan D. McClanahan

Mineral collection; 41 crystallized specimens; 59176.

Edgar E. Shirley

Opal carving; bevy of doves, 323 carats; Australia; 59184.

Mr. and Mrs. William Wheeler

Department of Ornithology

Collection of 57 ornithological volumes; including works by J.J. Audubon, John Cassin, Charles Bendire and James DeKay.

Mrs. Gardner D. Stout

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Seven acres of land in Westchester County, New York.

Mr. and Mrs. Alan J. Blinken

"Living Planet"; film for Naturemax Theater.

Johnson Wax

Advertising production.

Ogilvy and Mather

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To discuss opportunities for support of the Museum and its programs, contact Robert G. Goelet, President, or the Manager for Development, American Museum of Natural History, Central Park West at 79th Street, New York, N.Y. 10024. Telephone: (212) 873-5927.

COVER: Human and chimpanzee hands entwined. Both species share the same basic structure, including an opposable thumb which is more highly developed in humans. The great apes—chimpanzees, gorillas and orangutans—have long been recognized as humankind's closest relatives. All evolved from a common ancestor that probably lived some 15 to 20 million years ago. This Gulf Oil Corporation photograph hung in the special exhibition, "Ancestors: Four Million Years of Humanity," which ran from April to September, 1984. The exhibition gave visitors to the American Museum an unprecedented opportunity to examine firsthand the original, tangible evidence upon which our current understanding of human evolution is based. Before "Ancestors" opened, scientists from 20 institutions in 10 nations personally carried to New York the most extensive collection of human and pre human fossils ever assembled. The exhibition was a landmark in the Museum's 115-year history of inquiry into evolution. Photo by Art Beck.