



AMERICAN MUSEUM OF NATURAL HISTORY
118TH ANNUAL REPORT
1986/1987

American Museum of Natural History
Central Park West at 79th Street New York, N.Y. 10024 - 5192

Through its 118-year history, the American Museum has conducted basic investigations in anthropology, zoology and mineral sciences. Exhibitions and educational programs based on research projects in these disciplines are enjoyed by some 2.6 million visitors annually. Membership has grown to more than 500,000.

The American Museum is the largest natural history museum in the world and a preeminent research institution. Some 200 researchers — scientists and their assistants — use the collections, which total nearly 36 million artifacts and specimens, to conduct their studies. Their findings are shared with colleagues and the general public through lectures, exhibitions, articles and books.

The American Museum puts out 12 regularly issued serial publications, ranging from the catalogs of Micropaleontology Press to the widely read *Natural History* magazine. It also publishes numerous books, catalogs, monographs, lectures, and materials for children.

The Museum's 22 buildings, housing 39 exhibition halls, nine scientific departments, five theaters, a 400,000-volume library, classrooms, laboratories, service areas, retail shops and food service facilities, make it a veritable city of research, exhibition and education.

A private institution, the Museum receives support from the City of New York, New York State Council on the Arts, National Endowment for the Humanities, National Endowment for the Arts, National Science Foundation, Institute of Museum Services, 300 corporations, 100 private foundations, numerous individual contributors, and through membership fees and visitor contributions.

HIGHLIGHTS

1986 July

- "China Month" was celebrated with weekend performances and talks dealing with Chinese culture.

August

- The United States Department of Health, Education and Welfare awarded a grant of \$161,160 to the Library to microfilm and catalog scientific manuscripts.

September

- The Margaret Mead Film Festival, the nation's leading showcase for anthropological films, celebrated its 10th season.

October

- "Dark Caves, Bright Visions: Life in Ice Age Europe," opened in Gallery 3, with the largest collection of original late Ice Age artifacts ever assembled in the United States. It drew almost 320,000 visitors.

- The Andrew W. Mellon Foundation awarded a grant of \$725,000 for the conservation of the collections in the Department of Anthropology.

- The New York State Council on the Arts awarded the Museum a \$585,000 grant for general operating support.

- Stephen Jay Gould, a prominent evolutionary theorist, delivered the Mack Lipkin Man and Nature Lectures in the Main Auditorium.

November

- A ribbon-cutting by Mayor Koch reopened the Museum's rebuilt main entrance on Central Park West.

December

- "On Tap: New York's Water Supply," an exhibition examining New York's water supply system, opened.

- The National Endowment for the Humanities granted \$224,500 to support the exhibition "Carthage: A Mosaic of Ancient Tunisia."

- The National Science Foundation awarded \$186,000 for collection management of the Mammalogy Department's holdings.

1987 January

- The Museum played host to members of the New York State Assembly, New York State Senate, New York City Council, and their families, at the third annual "Legislators Night."

- Michael Novacek, Chairman of the Department of Vertebrate Paleontology, and his colleagues, recovered a rich variety of fossil mammals in Chile. The discovery provides a more complete picture of life in the southern Andes from 15 to 20 million years ago.

February

- "Black History Month" was celebrated; two programs examining life in Harlem were presented.
- A generous gift from the estate of George Willett established the George Willett Curatorship.
- Norman D. Newell, Curator Emeritus in the Department of Invertebrates, received the 1987 Scientific Freedom and Responsibility Award at the annual meeting of the American Association for the Advancement of Science.
- David Grimaldi, Assistant Curator in the Department of Entomology, discovered the oldest known bee, fossilized in amber.

March

- "The Chaco Phenomenon," an exhibition exploring prehistoric Pueblo culture in the American southwest, opened in Gallery 3.
- The Charles Hayden Foundation provided a grant of \$250,000 for the enlargement and improvement of the school reception area and lunch service facilities.
- The National Science Foundation awarded \$256,531 for collection management of fossil fish.

April

- "Latin American Month" was celebrated with performances, talks and demonstrations dealing with Latin American culture.

May

- "Celestial Rhythms," contemporary and classical electronic music with laser lights, was staged in the Planetarium.

June

- Biologist Garrett Hardin delivered the Mack Lipkin Man and Nature Lectures in the main auditorium.
- The Howard Phipps Foundation continued to support renovation of the Roosevelt Memorial Hall with a grant of \$250,000.

118th ANNUAL REPORT 1986/87
AMERICAN MUSEUM OF NATURAL HISTORY

Page	Contents
2	Report of the President
6	Director's Message
10	Anthropology
13	Astronomy and Planetarium
15	Entomology
20	Herpetology
23	Ichthyology
27	Invertebrates
31	Mammalogy
36	Mineral Sciences
41	Ornithology
45	Vertebrate Paleontology
49	Research Stations
50	Education
53	Exhibition and Graphics
55	Library Services
57	Collections Management
58	Interdepartmental Facilities
59	Grants and Fellowships
60	Publications, Membership and Marketing
65	Administration
67	Development and Public Affairs
72	Officers, Trustees and Staff
77	Members Elected by the Board to Higher Categories
	Contributors
78	Unrestricted Gifts
81	Restricted Gifts
82	Government Grants and Support
83	Gifts-in-Kind
	Financial Statements
A-3	Treasurer's Report
A-4	Statement of the Museum
A-10	Statement of the Planetarium

One hundred and eighteenth 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

This past year has witnessed very successful exhibitions (of which more later), critically well received scientific publications and the focusing of an effort to substantially increase the numbers of pre and postdoctoral students associated with the Museum.

In addition, this has been a time for introspection, and planning for the future of the Museum and its scientific research. We have moved closer to implementing the major recommendations made by the Long-range Planning Committee. We have a better idea of the physical needs of the Museum for the next 10 to 20 years and the funds which will be required to achieve our goals. The last and the best news is that George D. Langdon, Jr., President of Colgate University, has agreed to assume the position of President and CEO effective next year.

The Museum's role in the teaching and training of scientists dates from 1917 when we entered into an agreement with Columbia University to train scholars in paleontology. Similar programs in the biopsychology of behavior and in evolutionary biology began some 20 years ago with the City University of New York. This year we planned an additional teaching-training program in entomology in collaboration with Cornell University; the first students will be admitted to the program next year. Alumni of these programs are among the leading scientists in their fields today, holding appointments in

academic institutions worldwide.

These programs say much for the strength of the Museum's commitment to science. Equally significant as the collaborative programs with local universities are the postdoctoral fellowship awards begun two years ago, the research grant programs supported by the Museum for more than 30 years, and the graduate assistantships and undergraduate research projects which the Museum sponsors.

Our programs for training scientists have grown remarkably in recent years, reflecting both the generous assistance received from public and private sources and the commitment demonstrated by the Trustees to allocate support to that purpose. Whether the funds were provided by contributors, foundations or the Museum's general funds, the programs could count with certainty on being underwritten. That policy continues today, with much of the funding coming from endowment and other Museum funds. An example was the decision by our Board of Trustees to direct income from the Kalbfleisch Endowment to the support of postdoctoral fellowships when the full benefit of the Kalbfleisch bequest became available for general Museum purposes three years ago. Similar action by the Board this year, allocating proceeds from the sale of our Bimini property to the Government of the Bahamas, more than doubled endowed support for the Lerner-Gray Fund for Marine Research.

I was especially pleased as well to see the Lincoln Ellsworth Fund applied, with the enthusiastic approval of Mrs. Lincoln Ellsworth, to support research and exploration by young scientists that would reflect the spirit of Lincoln Ellsworth's life and accomplishments. Administering this program, named for one of our most distinguished former trustees, is a

special honor for the Museum.

Gifts from trustees Edwin Thorne and Nancy Fessenden have also been applied to research support for science students. Other recent gifts from which income is applied to such support have come from Richard Weatherhead, Herbert Axelrod, Edmund J. Retkovic, and the Greenwall Foundation. Bequests from Madeline Traina and George Willett may also fund grants and fellowships awarded by the Museum. Annual gifts from the Exxon Educational Foundation have assisted in supporting graduate fellows and undergraduate researchers.

The Frank M. Chapman Memorial Fund and the Theodore Roosevelt Memorial Fund, both of which support research grants and fellowships, have grown in recent years from the original Funds established by Elsie Binger Naumburg in the case of the Chapman Fund, and from the members of the Theodore Roosevelt Association to the Theodore Roosevelt Memorial Fund. Members of the Association and of the Roosevelt family also assist with frequent annual gifts. Similarly, the Lerner-Gray Foundation, with guidance from Trustee Arthur Gray, Jr., has made a number of gifts to the principal of the Lerner-Gray Fund for Marine Research.

Museum grant and fellowship awards this year totaled more than \$300,000. They were used to assist four undergraduate science students, 176 graduate students, and 6 postdoctoral scholars from every region of the United States, and from a number of foreign countries as well. Funds often reach these young men and women when they are most in need of financial aid, when it can best influence their career decisions and professional development. But these awards benefit the Museum and its future as much or more than they do the

French Ambassador to the United States, Emmanuel de Margerie, right, joined President Robert G. Goelet for a preview of the special exhibition "Dark Caves, Bright Visions." The exhibition of Paleolithic art and artifacts — the physical evidence of the evolution of the



human spirit — included items loaned from several French museums, including the Musée des Antiquités Nationales and the Musée de l'Homme. More than 300,000 people viewed the exhibition during its three months at the Museum.

students and scholars. They reinforce all our scientific endeavor. They influence our reputation and determine our stature among our present and future colleagues in science and research. They enhance the image of the Museum as a significant academic partner in our country's science community.

Other generous contributions were received during the year. A gift from the estate of George Willett, an independent member of the New York Stock Exchange for 55 years, has allowed the Museum to establish the George Willett Curatorship. The title was awarded to Frederick H. Rindge, Curator in the Department of Entomology, in recognition of his distinguished contributions to science during the 38 years he has served on the Museum staff. Additional funds from the Willett estate will help underwrite the graduate and undergraduate research training described earlier.

A grant from The Eppley Foundation for Research supported the second field expedition in Chile by Michael J. Novacek, Chairman and Curator in the Department of Vertebrate Paleontology, and colleagues from the American Museum and Chile's National Museum. Their discoveries of fossil mammals from regions previously unexplored in the Andes will help answer questions about South America's biological and geological evolution.

The Museum is especially grateful to the Edward John Noble Foundation for ongoing support of both the St. Catherine's Island Research Program, and the St. Catherine's Archaeological Program, the latter under the direction of David Hurst Thomas, Curator in the Department of Anthropology.

The scientific staff of our Museum, in addition to its primary work in research and collection management, gives authority to the exhibitions we present, both those developed out

of our permanent collections and those developed from special exhibits of loan material. "Dark Caves, Bright Visions: Life in Ice Age Europe" presented the largest collection of original late Ice Age (Upper Paleolithic) artifacts ever assembled for exhibition in the United States. The exhibition showed more than 300 artifacts from museums and universities throughout Europe and North America, including our own collection. The very successful exhibition catalog was published with support from the Richard Lounsbery Foundation and Mr. and Mrs. Gordon P. Getty.

A benefit preview for "Dark Caves, Bright Visions" took place in October, under the patronage of His Excellency the Ambassador of France to the United States and Mrs. Emmanuel de Margerie. We are especially grateful to the Benefit Committee. "Celestial Fantasy," "Open House" and the children's Halloween party were other events organized this year by the Benefit Events Office and its committees.

The culture and architectural complex established by the Anasazi people (precursors of modern day Pueblos) nearly 1000 years ago in the Chaco Canyon of northwestern New Mexico was illustrated in "The Chaco Phenomenon." The exhibition showed the social, political and religious aspects of Anasazi life. It was supported by grants from the National Endowment for the Humanities, the University of New Mexico Foundation, Maxwell Museum Association and Santa Fe Industries. The exhibition was prepared by the Maxwell Museum of Anthropology in Albuquerque.

"City of Light," a photographic exhibition in the Akeley Gallery, documented religious rituals associated with death in Benares, India. The exhibition was an Arthur Ross Exhibit of the Month. Others in this series of exhibits were "The Brazilian Princess," the

world's largest cut gem at more than 21,000 carats, and "Rooted in Ceremony," a display of unusual origami pieces.

"On Tap: New York's Water Supply," in Gallery 1, showed the geological, biological, historical and engineering aspects of the City's water supply system. It was supported by a grant from the Lucius N. Littauer Foundation. The exhibition was held over for several months, at the request of the New York City Department of Environmental Protection, to assist the New York City Board of Education in scheduling additional visits to the exhibition by school classes.

Education is a driving force behind much of our Museum work and our capabilities for carrying out teaching programs are continually being expanded. A generous grant from the Charles Hayden Foundation allowed the Museum to increase the capacity of our school-class orientation facilities from 2400 to 3800 students each day. In addition, overflow audiences in the Auditorium can now view programs in the Henry Kaufmann Theater through closed-circuit television equipment provided by a generous grant from the Henry Kaufmann Foundation.

The Museum's Education and Membership Departments drew upon exhibitions and other events to develop public programming that enhanced audience appreciation of their subjects. Asian, African, Caribbean, Native American and Middle Eastern cultures were highlighted during month-long programs throughout the year. They included dance, craft demonstration, music and drama, presented in the Henry Kaufmann and Harold F. Linder Theaters and the Frederick H. Leonhardt People Center of the Charles A. Dana Education Center. The Museum is very grateful to the Samuel and May Rudin Foundation and the Vidda

Foundation for their generous support of many Education Department programs.

Among the outstanding lecturers this year was Jane Goodall, the world renowned animal behaviorist. She spoke on her observations of the chimpanzees of the Gombe Stream Research Institute in Tanzania. Anthropologist Ashley Montagu spoke on the development of human intelligence.

The 1987 Mack Lipkin Man and Nature Lectures were delivered by Garrett Hardin, Professor Emeritus of Human Biology at the University of California, Santa Barbara. The lectures dealt with a two-century struggle between the dream of limitless growth and the scientific search for limiting principles to sustainable growth.

The New York State Council on the Arts awarded a grant to help support the 1986 Margaret Mead Film Festival. Celebrating a decade as the nation's most distinguished anthropological film event, this Festival has featured more than 330 film premieres.

Renovation and modernization of the Museum are continually taking place. The Wallace Funds (established by the founders of Reader's Digest) and the Howard Phipps Foundation provided support to the Roosevelt Hall Renovation Project, scheduled to begin in winter, 1988. We are also very grateful to the Clark Foundation for the third year of its support in the program to apply computers to Museum work. The Andrew W. Mellon Foundation generously supported our work in conservation and collections management. DuPont and its energy subsidiaries, Conoco and Consolidation Coal Company, provided assistance for the production and installation of a video presentation on plate tectonics in the John Lindsley Hall of Earth History.

In November, the lighting of the Origami Holiday Tree, an exhibit also sponsored by Arthur Ross, followed the reopening of the

Museum's main entrance on Central Park West at 79th Street. Mayor Edward I. Koch cut the ribbon at the entrance, which had been closed since April, 1985, for restoration of its plaza and steps. The project, part of a program of maintenance and refurbishment of the Museum's facilities, was funded under the City's capital budget through the Department of Cultural Affairs and was supervised by the City's Department of General Services.

During the past year, total City support for the Museum's operations amounted to \$8,171,169. The Trustees are grateful to the Mayor and to Council President Andrew J. Stein, Borough President David N. Dinkins and members of the City Council for their support.

The New York State Council on the Arts awarded \$626,000 in support of general Museum operations and various projects. The Museum thanks Kitty Carlisle Hart, Chairman of the New York State Council on the Arts, and Mary Hays, the Council's Executive Director, and their associates. We are especially grateful to Governor Mario Cuomo, Senate Majority Leader Warren M. Anderson, Senator John R. McHugh, Chairman of the Senate Committee on Tourism, Recreation and Sports Development, Assembly Majority Leader Daniel B. Walsh, Assembly Minority Leader Clarence D. Rappleyea, Jr., Assemblyman Matthew J. Murphy, Chairman, Assembly Committee on Tourism, Sports Development and Arts, and members of the New York State Legislature for the understanding and leadership they demonstrated in their support for the Council's work. State Senator Roy M. Goodman was instrumental in securing a grant from the Natural Heritage Trust. The NHT grant was used this year to assist in conserving beautiful and priceless treasures in our anthropology collection.

The Members of the New York City Council and the Senators and Assemblymen of New York State were invited to the third annual Legislator's Night on January 29. This educational and cultural event to acquaint the legislators and their colleagues with our resources and services has become an annual tradition.

Many Federal agencies funded specific projects within the Museum. The National Science Foundation awarded almost \$500,000 in collections management grants to Vertebrate Paleontology's fossil fish collection and Mammalogy's primate collections. The Institute of Museum Services provided \$75,000 (the maximum possible award in this category) toward Museum operations and \$21,721 for conservation of Mangbetu Objects in Anthropology. The National Endowment for the Humanities awarded \$224,500 to support the Museum's exhibition, "Carthage: A Mosaic of Ancient Tunisia." Funds from the National Endowment for the Arts helped to purchase conservation equipment for use in the Museum's Hall of South American Peoples, which is scheduled to open in 1988. The United States Department of Health, Education and Welfare granted \$161,160 to Library Services for microfilming and cataloging of 200 historical and scientific documents.

We are especially grateful to Trustee Donald C. Platten for his continuing leadership and effectiveness in stimulating corporate support. Contributions from more than 300 businesses again surpassed \$1 million. We extend particular thanks to the Mobil Corporation which once again gave its support to the Friday and Saturday evening free admission program.

Six new members were elected to the Board of Trustees. They were: Jerome Kohlberg, Jr., Founder of Kohlberg Kravis Roberts & Company; Marshall

Manley, President and Director of the Home Group, Inc.; Frank A. Metz, Jr., Senior Vice President of International Business Machines Corp.; R. William Murray, Vice Chairman of Philip Morris Companies, Inc.; Lawrence G. Rawl, President and Chairman of the Board of the Exxon Corporation, and Mrs. Ottavio Serena di Lapigio, former Chairman of the Museum's Junior Committee.

The Museum, more than most institutions, has its origins in the past, its influence on the present and its confidence in the future. The decision of the Trustees to have as Chief Executive Officer a full-time professional President establishes new opportunities for leadership that will build creatively on the greatly successful work of the past 118 years. A long and carefully conducted search led to the selection of George D. Langdon, Jr., for this vital position. I particularly want to thank Trustees Charles H. Mott, Carroll L. Wainwright, Jr., William T. Golden, Caryl P. Haskins, Frank Y. Larkin, William F. May, Donald C. Platten, Mrs. Constantine Sidamon-Eristoff, and Henry Walter, Jr., who served with me on the search committee. Their thoughtful and devoted work led to this excellent choice.



Robert G. Goelet,
President

Director's Message

The objectives set by its founders for the American Museum of Natural History recognized both a clear responsibility to public education and a firm commitment to original scientific research. These dual goals derive from our mission to build and maintain a collection and a library in the natural sciences, and they anticipate that these resources be used for both public exhibition, education and recreation, and for scholarly research. Both are reflected in the activities that have been conducted here for more than a century, in the buildings we construct and operate, in the staff we recruit and employ, in the reputation we enjoy in the communities we serve.

One of the responsibilities of a scholarly institution is to educate and train scientists; it is an essential characteristic of a mature contemporary scientific institution. The Museum carries out this responsibility in a number of ways. Its programs and the resources it commits to support the development of new scientists are growing continually.

During 1986-1987, five postdoctoral research fellows or curatorial fellows were supported by the Museum in full-time salaried employment; six graduate student candidates for doctorates were enrolled in teaching-training programs the Museum supports in collaboration with local universities; four undergraduate students received awards to work with curators in research at the Museum and in the field; and 176 graduate students and postdoctoral scientists received research assistance grants or collection study grants to assist in carrying out original scientific research associated with advancement in their careers.

The level of activities we supported this year is larger than it

has ever been. While many of these programs began decades ago, in recent years the Museum has formalized them and strengthened its financial commitment. As a consequence, they have grown substantially from modest beginnings and have achieved a stability which ensures their future.

We established the Grants and Fellowships Office just three years ago in recognition of the more substantial role science-training was to play in the Museum. At the same time we created a Grants and Fellowships Committee of trustees and curators to advise the Director's Office in establishing policy and giving sound scholarly direction to science-training activities. The Office, supervised by Deputy Director Jerome G. Rozen, Jr., and Grants and Fellowships Administrator Diane Menditto, centralized and coordinated management of grant programs, developed policies and practices to assist both the Museum and grant applicants in using the programs most effectively, established a new Museum-wide postdoctoral fellowship program, and undertook responsibility for promulgating grants and fellowship opportunities more broadly throughout the country.

The new postdoctoral training program provides research opportunities of two kinds: fellowships of one- or two-year terms to recent doctoral graduates wishing to extend their research or begin new research directions, and curatorial fellowships awarded to promising new postdoctoral scholars for five-year terms to participate in the full range of curatorial responsibilities at the Museum, including collection management and their own original scientific research. The funds available in the general program may support up to eight postdoctoral scholars at any given time, although the number of ap-

Director Thomas D. Nicholson, standing in the Akeley Memorial Hall of African Mammals, presides over a vast institution. Contained within its 22 buildings, in 39 exhibition halls and behind the scenes in the research collections, are about 36 million artifacts and specimens. The collections and the sci-



entists who curate them are the heart of the Museum's educational mission. Undergraduates, graduate students and postdoctoral researchers benefit from close association with Museum scholars and provide in return a constant stimulus that is essential to successful scientific research. Photo by Theo Westenberger/Sygma

pointments made annually will depend on the number of scholars working in continuing terms. Similar opportunities in restricted areas of research can increase this number to 10 or more postdoctoral term appointments. The first appointments to the program were made in June, 1984; they included research fellowships in the departments of Anthropology, Entomology, Invertebrates, Ornithology, Mineral Sciences, and Vertebrate Paleontology, and a curatorial fellowship in Ichthyology. Seven more research fellows were appointed in 1985-1986, and five during 1986-1987. And in 1987, a second curatorial fellowship was appointed in Entomology.

During the past year, we also committed the first fellowship support from Museum funds to students training in programs we carry out collaboratively with local universities. Until 1986-1987, these programs relied primarily on the universities for the students' financial and tuition support, supplemented at times from research grants awarded to Museum curators. But we are convinced that the long-term strength of the Museum's role in graduate training will depend on our willingness to share in the sponsorship and funding of students as an equal partner with the universities. A special grant from the Exxon Educational Foundation provided fellowships to six graduate trainees this year, and the Museum is now committed to guarantee the tuition and fellowship requirements for up to six graduate students annually. The first two students in this program will come through Columbia University next year, and additional awards will be made during the year to students from the City University of New York.

Museum support to undergraduate science majors has enabled them to participate in research with our curators and research associates. Six or more undergraduates are admitted each summer to our field research stations as volunteers with full support during their residency. They are allowed half time to pursue research of their choosing and must give half time to support the station's program. Summer support for undergraduate research (and some support for work at the Museum during school terms) was offered for many years with funds from the National Science Foundation Undergraduate Research Participation program. That program, after an interruption of several years, is being restored as the Research Experiences for Undergraduates Program. In the meantime, the Museum's commitment to such work has continued with private funds, even though at a somewhat reduced scale. In 1986-1987, four awards to undergraduate students were made from funds contributed by the Greenwall Foundation. The future of undergraduate research participation here, reflecting its successes from the past 30 years, now seems secured with private funds. The opportunity to expand it again may also be possible with a renewed commitment by the NSF to support this important area of science training.

One hundred and seventy-six graduate students and recent postdoctoral scholars received financial support for their research this past year from the several small grant programs administered by the Museum. The Chapman Fund made 70 awards to support work in ornithology; the Theodore Roosevelt Memorial Fund approved grants to 49 scholars for zoological studies related to the fauna of North America; and 36 scientists were awarded grants in marine biology from the Lerner-Gray Fund for

Marine Research. In addition, the Museum awarded six grants, two of them renewal and four original, from the Lincoln Ellsworth Fund to scientists in areas of research and exploration reflecting the ideals represented by our late trustee Lincoln Ellsworth. Fifteen additional awards were also made this year from all of these sources as Collection Study Grants, made available on short notice in a simplified application procedure to enable developing scientists to visit the Museum and study its collections. The total amount awarded to science trainees in support of their research through these programs this year was \$302,300.

The emphasis on support for scientists in training and in developing scientists in the early years of their careers demonstrates a strong effort by the Museum not only to contribute significantly to our sciences but to influence the directions they will take in the future. We have a very strong commitment in the kind of scientific research performed here, rooted to the material evidence we find in nature. We gather and manage our collections out of conviction in their unique value for understanding the world, how it has evolved, and how it and its inhabitants function in relation to each other through time. We have a vital interest in seeing that bright young people turn to these sciences for their life's work, that they are trained to work in them productively, and that they are encouraged to bring to them the methodologies and technologies from science that will help shape their future.

The Museum's role in teaching and training affirms as well its right to be recognized as an academic institution. Not a university, as has been said before, but an institution dedicated to

academic traditions and functions. True, we do not grant degrees, nor do we want to. That is the function of our university partners, equipped to meet the many detailed requirements in a degree granting program. Were the Museum to take on those responsibilities as well, it could only be at the expense of the mission and goals it is uniquely equipped to carry out. Our university partners long ago recognized this principle, leaving to us the tasks of building and maintaining the resources and personnel required in the collection-based areas of science in which we are preeminent. We treasure this partnership with universities and the cooperation it engenders between very different kinds of institutions with common academic goals.

Part of my personal commitment to science training at the Museum is based on my firm conviction regarding the value of the scholar to the student and the student to the scholar. In the exchange between them the student will always benefit most from contacts with teachers whose authority rests on personal accomplishment. In training scientists, there is simply no substitute for the scientist as the trainer. On the other hand, no one really knows something well and thoroughly until one has faced the test of teaching it to an inquisitive and alert young mind. Teaching is one of the most broadening activities that the scientist can engage in and one of the most useful.

Our teaching-training activities with scientists bring to us young people who will challenge our ideas, test our beliefs and resolve, show us new avenues and new intellectual and technological tools that have not yet been tried, and demand the very best from us in preparing them to work in our vineyard. If our sciences are to grow, to survive the fads and

challenges of the future, to earn the support from society that they deserve, we must interact in a never-ending process with every new generation of students. The resources we give to that task today do not really diminish those we apply to our work; they are essential to it if we are to maintain our stature in that work.

The American Museum of Natural History devotes as great a portion of its resources to scholarly purposes as do the great research universities of our country. It proudly and willingly shares with these other academic institutions the responsibility for stimulating, nurturing, supporting and training the future generation of scientists who will work side by side with us for a time and then succeed us in carrying out the quest for scientific knowledge to which we are dedicated.



Thomas D. Nicholson,
Director

Department of Anthropology

While maintaining its commitment to laboratory research, international fieldwork and management of one of the most diverse anthropological collections in the world, the department was also extensively involved in exhibitions. It coordinated the special exhibition "Dark Caves, Bright Visions: Life in Ice Age Europe," the largest collection of original Upper Paleolithic artifacts ever presented in the United States, and "The Chaco Phenomenon." The department is implementing five future special exhibitions and is preparing the new permanent Hall of South American Peoples. The collection management and conservation staffs progressed in moving the ethnographic collections into new, more efficient, environmentally controlled compact storage facilities. This was achieved by preparing a computerized inventory of the collections and assessing the condition of the artifacts. The Andrew W. Mellon Foundation awards an important grant of \$725,000 for conservation.

Peruvian Archeology Craig Morris, Chairman and Curator, who was heavily involved in curatorial work for the Hall of South American Peoples scheduled to open in 1988, did research in the Chincha and Pisco Valleys of Peru. The Inka site of Inkawai in the Pisco valley was surveyed and mapped in July and August, 1986. The site is on a small river and consists almost entirely of religious structures, storehouses and elite residential compounds. Common housing is essentially absent. Plans were made for a

short excavation season at La Centenela, capital of the Chincha Kingdom, in late 1987.

Amazonian Chiefdoms Robert L. Carneiro, Curator, advanced his research on the political evolution of Amazonia. Dr. Carneiro presented the paper "Ecological Basis of Amazonian Chiefdoms," at a special meeting on cultural evolution in the tropics at the South and Southeast Asia Center of the University of Michigan, Ann Arbor, in August. As part of the same general line of research, Dr. Carneiro also presented a paper at an advanced seminar of the School of American Research in Santa Fe, in May.

Indian Village Life Stanley A. Freed, Curator, in collaboration with Research Associate Ruth S. Freed, analyzed data collected in 1958-59, 1977-78, 1983, and 1986 concerning life in a village in northern India. They completed one monograph, published in June, in the *Anthropological Papers*. It describes village politics, government and the introduction of elections by universal adult suffrage and the secret ballot. Two papers on the Museum's famous Jesup North Pacific Expedition (1897-1902) were completed during the year, one of which will soon appear in *Natural History*.

Two additional monographs on village life in India are in advanced stages of preparation. One monograph is based on Hindu ideology regarding the soul and the quality of actions which determine whether one's soul is reborn at death or becomes a wandering ghost. The other analyzes some questionable deaths in related families in terms of familial and personal relationships, land inheritance, and court cases.

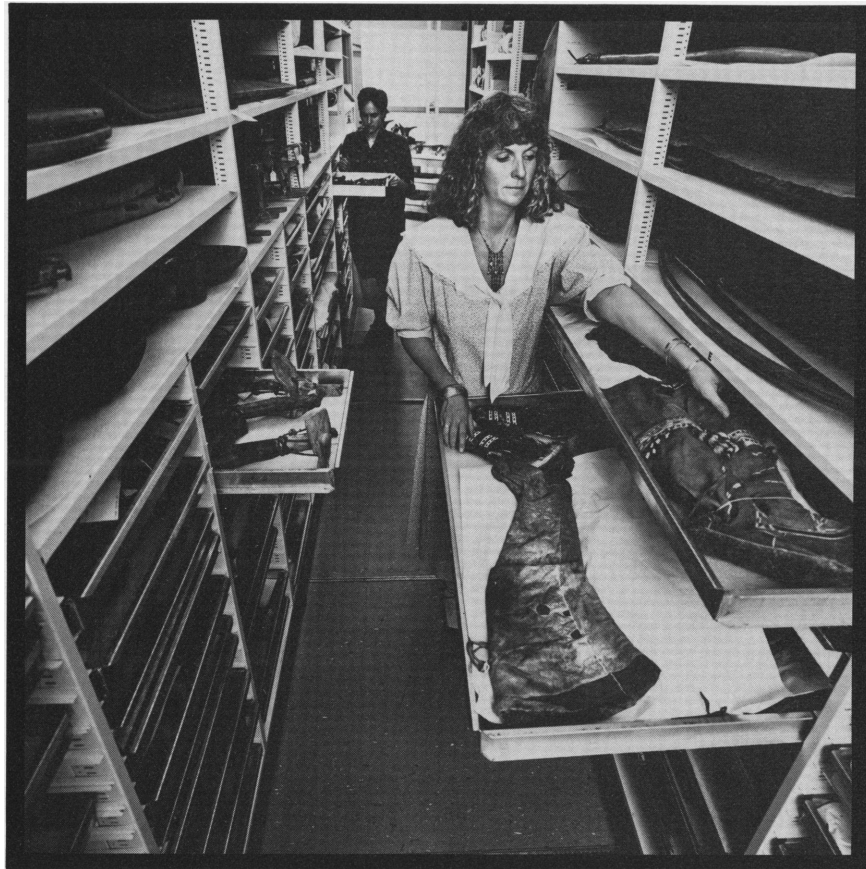
African Art Enid Schildkrout, Curator, conducted research in preparation for the planned exhibition "African Reflections:

Art from Northeastern Zaire." The exhibition, based on the Museum's collections acquired during the Lang-Chapin Expedition (1909-1915), highlights the origins of anthropomorphic art in the context of the ethnography and history of northeastern Zaire. Dr. Schildkrout received a Planning Grant from the National Endowment for the Humanities for the exhibition. The project also involves two publications coauthored and edited by Dr. Schildkrout (a catalog of the exhibition, and publication of the American Museum's Congo Expedition Fieldnotes) and conservation of Mangbetu objects supported in part by a grant from the Institute of Museum Services.

Physical Anthropology During the first part of the year Ian Tattersall, Curator, worked on final arrangements for the major exhibition, "Dark Caves, Bright Visions: Life in Ice Age Europe." The exhibition, which ran from October to January, reflected the origins of modern human culture by bringing together some 300 artifacts from museums and universities throughout Europe and North America, and from the American Museum's own holdings. It was presented only at the American Museum and attracted some 320,000 visitors. Dr. Tattersall is also working on the early stages of the Hall of Human Biology and Evolution. The hall will present a comprehensive view of human form, function and evolution.

Dr. Tattersall's research projects included the continuing analysis of field data on the macaques of Mauritius, with particular reference to glucose tolerance in the population. He initiated a new phase of research on reproductive mechanisms in the strepsirhine primates, focusing on the role of gonadotropins in the seasonal reproductive function of these mammals. Dr. Tattersall examined speciation concepts in relation to the abundance of species in the

Curatorial assistants Linda M. Garofalini, foreground, and Melanie LeMaistre of the Department of Anthropology move the department's Siberian ethnology collection into the compact storage area. Fifty-three percent of the volume of the storeroom is occupied by



the 104 mechanically driven storage units, and the system allows for an extremely efficient use of space. Several ethnographic collections, including the Siberian, are entirely within compact storage, and more will be added as old storage space is renovated.

human fossil record. He also completed a major review of the systematics, anatomy and adaptations of the subfossil primates of Madagascar. Funding from the Richard K. Lounsbery Foundation will enable Dr. Tattersall to reestablish his collaborative program with Malagasy colleagues, initially by curating and rehousing a collection of lemur specimens belonging to the Direction de la Recherche Scientifique et Technique, Antananarivo, Madagascar.

St. Catherines Island

David Hurst Thomas, Curator, continued to direct intensive archeological excavations on St. Catherines Island, Georgia, focusing on Mission Santa Catalina de Guale. The Edward John Noble Foundation continued its generous support of his work. (See Research Stations Section, St. Catherines Island, page 49.)

Dr. Thomas analyzed archeological materials from Alta Toquima, a high altitude prehistoric Shoshone village on Mt. Jefferson, Nevada, which he discovered in 1978. The site is unique. Few North American archeological sites are known above 12,000 feet, and even fewer have nearly three dozen prehistoric pit-houses with evidence of seasonally permanent occupation. Dr. Thomas's research team is attempting to determine the nature of the local prehistoric environment and the cultural adaptation to it.

The excavations at Alta Toquima Village are part of a larger research effort in Monitor Valley, central Nevada. Since 1970, Dr. Thomas and his research team have directed a detailed exploration of the prehistoric archeological record. Ten field seasons have been completed and the results are being published by the American Museum as a series "The Archaeology of Monitor Valley."

Fieldwork at Alta Toquima Village was supported by the National Geographic Society, the Richard K. Lounsbery Foundation, and the American Museum's

Ogden Mills Research Fund and James Ruel Smith Fund.

A grant from the Ruth and Vernon Taylor Foundation, currently supports the analysis of artifact distribution patterns on Mt. Jefferson. Before 1300 A.D., this remote area was inhabited only by groups of all-male hunters pursuing Bighorn Sheep. After 1300 A.D., entire families moved to the mountaintop to live throughout the summer. Dr. Thomas and his research team are determining why this shift occurred.

Korean Shamans **Laurel Kendall**, Assistant Curator, completed "The Life and Hard Times of a Korean Shaman: of Tales and the Telling of Tales," an account of Korean life, shamans and women. Dr. Kendall's research is a reflexive comment upon the process of listening to, recording and writing about the way people describe their lives.

Dr. Kendall is studying contemporary Korean weddings, contrasting the experiences of today's brides and grooms with the very different circumstances in which their parents were married. Her research focuses on the viewpoints of those who responded to her interviews, the reactions of her marriage-age Korean research assistants, and on the perspectives of the writers of government policy directives, ritual handbooks, women's magazines and folklore compendiums. Dr. Kendall is pursuing another project, sponsored by the Social Science Research Council, which explores the relationships to one another of religion, national identity and the state in countries throughout Asia.

Beginnings of Physical

Anthropology **Harry L. Shapiro**, Curator Emeritus, is completing his biography of E.A. Hooton, a distinguished physical anthropologist. He has also completed the manuscript, "A Stroll Down Memory Lane: the Beginnings of Physical Anthropology in the

United States," to be published later this year.

Scientific Publications:

Carneiro, R.L.

1986. Culturas indígenas de la cuenca del Amazonas. In Antonio Pérez (ed.), *Culturas Indígenas de la Amazonia*. Comisión Quinto Centenario, Madrid, pp. 61-71.

1986. On the relationship between size of population and complexity of social organization. In P.K. Bock (ed.), *Approaches to culture and society*, J. Anthropol. Res., 42(3): 355-364.

Freed, S.A., and R.S. Freed

1987. Uncertain revolution: Panchayat Raj and democratic elections in a north Indian village. *Anthropol. Pap. Am. Mus. Nat. Hist.*, 64(1): 1-78.

Kendall, L., and G. Dix

1987. Eds. and authors of introduction. *Religion and ritual in Korean society*, Univ. of Ca., Berkeley, East Asian Inst., Korea Res. Monogr. 12: 223.

Kendall, L.

1987. Let the Gods eat rice cake: women's rites in a Korean village. In L. Kendall, and G. Dix (eds.), *Religion and ritual in Korean society*, Univ. of Ca., Berkeley, East Asian Inst., Korea Res. Monogr. 12: 118-138.

1986. Korean shamanism: women's rites and a Chinese comparison. In G. DeVos and T. Sofue (eds.), *Religion and the family in East Asia*. Berkeley: Univ. of Cal. Press, pp. 57-73.

Larsen, C.S., and D.H. Thomas

1986. The archaeology of St. Catherines Island: 5. The south end complex. *Anthropol. Pap. Am. Mus. Nat. Hist.*, 63(1): 1-46.

Morris, C.

1987. Retrospect and prospect on the archaeology of the Inka. In R. Keatinge (ed.), *An overview of Peruvian prehistory*. Cambridge Univ. Press, pp. 233-256.

Schildkrout, E.

1987. Hajia Husaina: notes on the life history of a Hausa woman. In P.W. Romero (ed.), *Life histories of African women*. Ashfield Press, pp. 78-98.

1987. Foreword and captions. In B. Callaway. *Muslim Hausa women in Nigeria: tradition and change*. Syracuse Univ. Press, pp. xi-xiv.

Sussman, R.W., and I. Tattersall
1986. Distribution, abundance, and putative ecological strategy of *Macaca fascicularis* on the island of Mauritius, southwestern Indian ocean. *Folia Primatol.*, 46(1): 28-43.

Tattersall, I.

1986. Notes on the distribution and taxonomic status of some subspecies of *Propithecus* in Madagascar. *Folia Primatol.*, 46(1): 51-63.

1986. Species recognition in human paleontology. *J. Hum. Evol.*, 15: 165-175.

1986. A conspectus of primate evolution. Review of major topics in primate and human evolution. B. Wood, L. Martin, and P. Andrews (eds.), *J. Hum. Evol.*, 15: 313-321.

1986. Systematics of the Malagasy strepsirrhine primates. In D.R. Swindler and J. Erwin (eds.), *Comparative primate biology*. New York: Alan R. Liss, Inc., 1: 43-72.

Thomas, D.H.

1987. The archaeology of Mission Santa Catalina de Guale: 1. Search and discovery. *Anthro. Pap. Am. Mus. Nat. Hist.*, 63(2): 47-161.

Astronomy and the American Museum-Hayden Planetarium

In October of 1935, the American Museum-Hayden Planetarium first opened its doors to the public. Since then more than 25 million people have visited the Planetarium to learn about the stars and planets and to follow the human quest to explore astronomy and space science. Through its many special programs targeted to different ages and audiences, the Planetarium provides valuable learning opportunities to its various publics.

Sky Shows Early in the year, the Planetarium presented "Starborn: Earth's Odyssey Through Time and Space," narrated by Gregory Peck. During this same period, "Voyage to the Outer Planets" joined "Starborn" as a double feature. While "Starborn" traced the five-billion-year history of our evolving planet, "Voyage" told the modern-day story of the highly successful flights of two Voyager spacecraft to Jupiter, Saturn and Uranus.

In late November and throughout December, the Planetarium presented its annual holiday favorite, "The Star of Christmas." The show transports the audience back 2000 years in time, and considers possible scientific explanations for the "star" that guided the Wise Men to Bethlehem.

In the second half of the fiscal year, the Planetarium premiered "The Seven Wonders of the Universe." With Burt Lancaster as narrator, the program led audiences through a review of the seven wonders of the ancient world and on to a search for the many wonders of creation, from enormous black holes to the rings of Saturn.

For preschoolers the Planetarium

presented its highly successful program "Wonderful Sky," featuring the Sesame Street Muppets.©*

A logical next step to "Wonderful Sky" was a new monthly program, "The Secret of the Cardboard Rocket," for children six to nine. The adventure begins when two young children build a cardboard rocket in their backyard and blast off one night for a tour of the solar system.

The popular summer program, "The Skies of Summer," returned. This Sky Show provides a guide to the many celestial objects of the season, from planets to constellations to meteor showers.

Total attendance reached its highest level since 1977-1978. A total of 579,421 persons visited the Planetarium this year. Of this number, 416,288 persons attended public and school Sky Show performances.

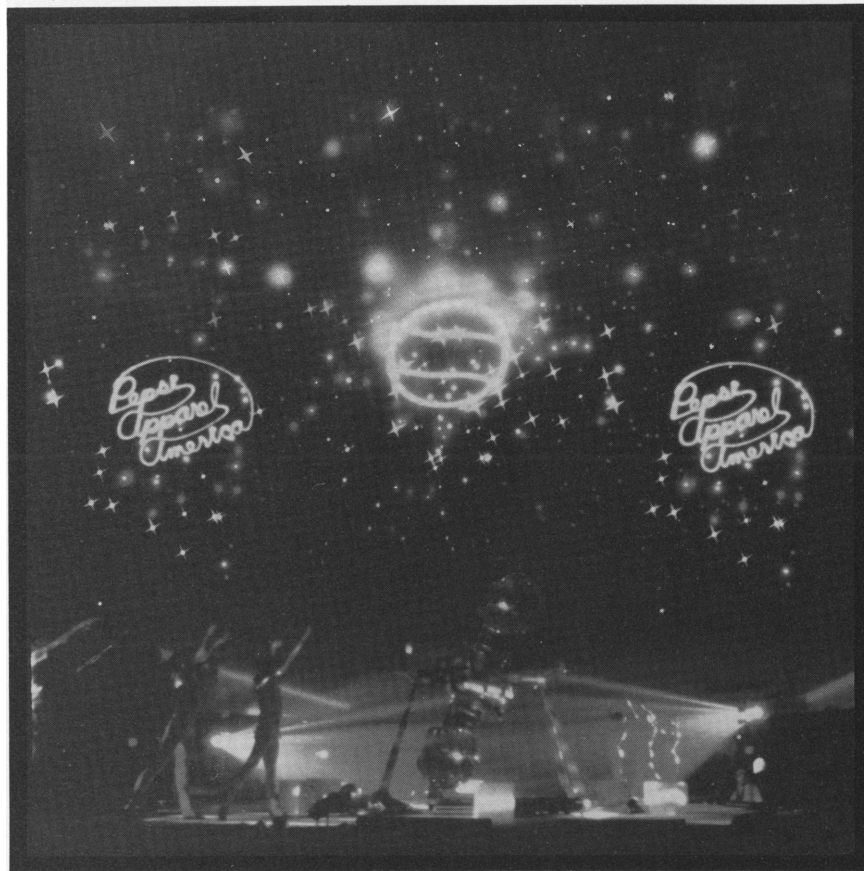
Courses From October through June, a wide range of courses was again offered for children and adults. Subjects ranged from astronomy and space science to navigation and meteorology. A new course was added to the Planetarium's curriculum: "Intellectual Toys and Mechanical Jewels: An Informal History of Timekeeping Since the Renaissance," taught by Jonathan W. Snellenburg, head of the Clock, Watch and Scientific Instruments Department at Christie's auction house. During the three terms, a total of 888 persons were enrolled in 38 courses, a record high registration for the past 10 years.

Live Concerts The Planetarium gave its increasingly popular "Live Concerts Under the Stars." In the fall, the Paul Winter Consort performed an extensive selection of original jazz to two sold-out audiences. The third annual holiday concert featuring an evening of "Mozart and Bach by Moonlight" was performed by

Notes:

1. In the bibliographies, the names of members of the staff and Fellows of the American Museum of Natural History appear in roman 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.

Dazzling laser lights, 9000 twinkling stars, special effects and outer space vistas complemented the young models on stage in the American Museum-Hayden Planetarium Sky Theater. The fanfare was part of a fashion show to introduce Vanity Fair's Pepsi Apparel America line of sportswear for children and teens to fashion buyers and



the media. Many companies took advantage of the varied facilities offered at the American Museum for parties and introductions of products. Gatherings of all sorts, from small cocktail parties to a sit-down dinner for 1000 people in the Hall of Ocean Life, are an important source of revenue for the Museum.

Music for Occasions before four S.R.O. houses.

Jonh Serrie and Mark Petersen, who have created musical scores for planetariums around the world, performed two concerts of classical and contemporary electronic music entitled "Celestial Rhythms."

Serrie and Petersen also presented the Planetarium's first children's concert, "Space Age Music," from which children learned how synthesists use modern electronics to create a wide variety of music and sound effects for planetariums, television and motion pictures.

Corporate and Members' Events

Special programs were created for Pepsi/Vanity Fair and for the Digital Equipment Corporation, utilizing the Planetarium's extensive audiovisual capabilities in its Sky and Guggenheim Space Theaters. Vanity Fair, in conjunction with the Pepsi Corporation, presented a spectacular fashion show for the press and buyers, complete with 9000 stars, a dazzling laser show, lots of glitter and special effects. Digital introduced a high performance supercomputer to the media, industry consultants and financial analysts.

The Perkin Library Through the continued generosity of the Richard S. Perkin family, the Library again serves the Planetarium staff and the public-at-large as one of the foremost repositories of astronomical literature in the region. Among those utilizing the Library's resources were MGM, the Copernican Space Science Center, Atlantic Records, the Guggenheim Museum and Columbia University.

The Planetarium was selected to host the annual business meeting of the Museums, Arts and Humanities Division of the Special Libraries Association, a national professional organization for non-public libraries. The April program consisted of a slide show about the history of the Library and the many services it provides, a special

astronomy lecture and Sky Show.

A grant of \$25,000 was received from the Perkin Fund to place the Library's extensive holdings on computer files, which will enable the Planetarium to interface its 20,000 volumes with collections around the world via the On-Line Computer Library Center.

Abstracts and Popular Publications:

Branley, F.M.

1987. *Mysteries of life: on earth and beyond*, 38 pp. New York: E.P. Dutton. Illus. Sally Bensusen.

1986. *It's raining cats and dogs*, 64 pp. Boston: Houghton Mifflin. Illus. True Kelley.

1986. *Rockets and satellites* (Rev. Ed.), 38 pp. New York: T.Y. Crowell. Illus. Giulio Maestro.

1986. *Star guide*, 56 pp. New York: T.Y. Crowell. Illus. Ellen Engle.

Gutsch, W.A.

1986/ "Sky Watch," a daily, syndicated 87. column on astronomy, space, science and meteorology for the Westchester-Rockland Gannett Newspapers, White Plains, New York.

Kitt, S.

1986. *Office politics: the games people play*. OPL Newsletter, 3(3)

Lesser, T.

1986/ "Skywatch," a monthly astronomical 87. article, St. Thomas This Week. St. Thomas, U.S. Virgin Islands.

1987. [Review of] *Mysteries of the satellites*, F.M. Branley. *In Sci. Books and Films*, 22(3).

1986. [Review of] *Chariots for Apollo: the making of the lunar module*, C.R. Pelegrino and J. Stoff. *In Recent Publications in Natural History*, 4(3).

Department of Entomology

With a total of 16 million specimens, the Department of Entomology's collections account for about half of all the specimens in the Museum's care. Furthermore, because insects make up at least three-quarters of the world's one million described animal species, the department's curators and staff have broad taxonomic responsibilities. Their areas of expertise include fruit flies, rove beetles, spiders, moths, true bugs and bees.

New Collections Substantial additions were made to the Museum's internationally recognized entomological collections. Notable was a collection of 20,500 true bugs, donated by Research Associate James A. Slater and distinguished by strong representation of species and specimens from Africa. The Museum also purchased the remainder of the Paul Grey collection of *Speyeria* butterflies, about 7100 specimens.

David A. Grimaldi, recently appointed Assistant Curator, assembled a collection of 314 pieces of Dominican (lower Miocene) amber, as well as some from the Baltic (lower Oligocene-upper Eocene), and New Jersey (middle Cretaceous), that all contain insect fossils. The Dominican material was acquired largely through the generosity of Museum President Goelet. Many of the specimens are flies in the family Mycetophilidae. Because their detailed morphology is well preserved in amber, these flies offer a source of historical information few insect groups can rival. Also represented in the collection are staphylinid beetles.

Bugs Curator Randall T. Schuh received three years of continuing support from the National Science Foundation for his work on the

phyline plant bug fauna of Mexico and western North America. He spent six weeks in mountainous areas of the western United States, accompanied by Research Associate Gary Stonedahl and Michael Schwartz, a graduate student from the City University of New York.

They collected about 14,000 specimens and documented the host plants of many species. Dr. Stonedahl began work in October as an NSF postdoctoral investigator to organize information on, and prepare a revision of, the *Atractotomus-Lepidopsallus* group of genera, which contain about 40 species whose taxonomy has heretofore been in a state of chaos.

In cooperation with former Curatorial Assistant Bella Galil and Associate John T. Polhemus, Dr. Schuh published a "Catalogue and Bibliography of Leptopodomorpha." This work assembles information on the shore bugs and their relatives from about 800 references published between 1758 and 1986. This difficult-to-collect group of true bugs numbers 297 species, including 10 which are known only as fossils.

Fruit Flies Dr. Grimaldi's dissertation, in press as a Bulletin of the American Museum of Natural History, dealt with the habits and classification of 64 species of drosophilid flies in the genus *Zygothrica*, 48 which are described as new. In his continuing work on the remaining 80 species of *Zygothrica*, Dr. Grimaldi will analyze the repeated distributional pattern seen between close relatives that are Andean or Central American on the one hand and from the Amazon Basin on the other. A paper on the evolution of broad-headed males, a trait that appears in *Zygothrica* and other Drosophilidae, is in preparation.

In a recent *Novitates*, Dr. Grimaldi put into a phylogenetic scheme with living genera and subgenera some fruit flies fossilized in amber. The genus *Drosophila* is shown to

be devoid of diagnostic characteristics and its subgenera fall out at several different levels among other genera.

This is the first of Dr. Grimaldi's efforts toward a new classification for the Drosophilidae, which will be based on a cladogram (a branching diagram representing a hypothesis about relative relationships) of about 150 species representing most of the genera, subgenera and species-groups of the family. Such an approach will make the taxonomy of the Drosophilidae biologically more meaningful and predictive, and put the current classification of two subfamilies and the current definition of the genus *Drosophila* into disuse.

Rove Beetles Lee H. Herman, Curator, continued work on his generic and subtribal revision of the large staphylinid subfamily, Paederinae. His goals for this long-term investigation include revising the classification and determining the phylogenetic relationships among the 14 subtribes and 215 genera.

Since last year, descriptions, illustrations and distributions have been completed for 20 genera. So far, five genera have been newly placed as junior synonyms and many species have been transferred to other genera.

Spiders Norman I. Platnick, Curator, studied several groups of spiders that are restricted to the south temperate parts of the world, in an effort to understand the interrelationships of the geographically disparate but taxonomically allied faunas of Chile, New Zealand, Australia and South Africa.

His research on families of Chilean spiders used specimens he collected during three trips to Chile since 1981. He collaborated with Pablo A. Goloboff of the Museo Argentino de Ciencias Naturales, Buenos Aires, on a review of the Chilean Migoidea, which belong to the

suborder Mygalomorphae (tarantulas and their allies). At least four genera of these little-studied trapdoor spiders are found in Chile, including a previously undescribed form that may well be the most primitive member of the family Migidae. In the suborder Araneomorphae (true spiders), Dr. Platnick and Research Associate Raymond R. Forster of the Otago Museum, Dunedin, New Zealand, described a new genus found only in the forests of southern Chile. They suggested that its closest relatives are two genera from Australia and Tasmania that were recently placed in their own family, the Sternodidae. The new Chilean genus provides evidence indicating that the sternodines, whose placement has been enigmatic for more than half a century, are most closely related to Australian and New Zealand taxa currently assigned to the family Malkaridae.

Thanks in large part to funding from the National Science Foundation, Dr. Platnick was able to spend the first half of 1987 in New Zealand and Australia. In New Zealand, he collaborated with Dr. Forster on a study of the austral genera of the orb-weaving family Anapidae, which form an important part of the southern litter fauna. Their studies indicate that in Chile and adjacent Argentina, where no anapids have previously been recorded, six genera, all endemic, contain at least 15 species.

In Australia, Dr. Platnick collaborated with Research Associate Robert J. Raven, of the Queensland Museum, Brisbane, on studies of an undescribed Chilean genus of the mygalomorph family Nemesiidae; they also undertook collecting trips to Tasmania, Western Australia and New Caledonia, in search of additional comparative material for their ongoing studies.

The department is fortunate to host Kalbfleisch Research Fellow Charles E. Griswold, recently with the Natal Museum, Pietermaritzburg, South Africa. Dr. Griswold is

studying the amaurobiid spider subfamily Phyxelidinae, which are conspicuous members of the South African forest biota, and which are of uncertain relationship to similar Chilean and Australasian taxa studied by Drs. Platnick and Forster. He also collaborated with Dr. Platnick on a paper describing the first known African representatives of the family Orsolobidae, an austral group otherwise known from southern South America, New Zealand and Australia.

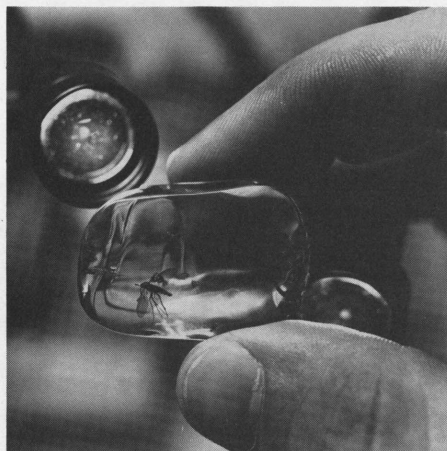
Moths Frederick H. Rindge, George Willett Curator, worked on the systematics of the geometrid moths of the New World. One genus in the group, *Eupithecia*, is worldwide in distribution and is probably the largest genus in the subfamily Larentiinae. A vital part of this project involved studying existing type specimens of previously described species, including many loaned by the British Museum (Natural History) and the Muséum National d'Histoire Naturelle, Paris. Dr. Rindge recognized 43 species in a paper on the Chilean species of the genus, with the majority being described as new. Three of these occur on the Juan Fernandez Islands, 400 miles off the coast of Chile; the remainder are from mainland Chile. So far as is known, all are endemic to the region.

Dr. Rindge's study of the Melanolophiini, a relatively small tribe of moths belonging to the very large subfamily Ennominae, was expanded to include all Ennominae genera in the New World. The members of this group occur from southern Canada to southern South America, including the Antilles but excluding Chile; the largest number of species occurs in Central and South America.

From preliminary character analysis, it is already evident that some of the genera will have to be redefined in order to ensure that all groups are monophyletic, that is, composed of an ancestral

species and all its descendents. This, in turn, will require that several new generic names be proposed. Many previously unknown species are present in the available material and will be described as part of the overall study.

Kurt Johnson, Research Associate, published three studies of rare swallowtails as part of his work on Neotropical butterflies. He also published the first of a series of



This wood gnat is part of a collection of several hundred Dominican amber fossils purchased for the Museum by President Goelet. This specimen, which has not yet been formally described in a scientific paper, represents a primitive new genus (family: Anisopdidae) and is roughly 25 million years old. It is just one of the Department of Entomology's important and growing collection of amber insects. Formed when an insect is trapped in tree resin, an amber fossil is usually extremely well preserved, providing additional information to entomologists who study the details of insect evolution.

papers on butterflies of the little-known area of the western Argentinean Andes and a review of "hairstreak" and "metalmark" butterflies that mimic the only butterfly known to feed on toxic lycosid plants.

Bees While carrying out investigations at the Southwestern Research Station, Curator Jerome G. Rozen, Jr., discovered the nest of *Ashmeadiella holtii*, a small solitary leaf

cutter bee belonging to the family Megachilidae. This is the first ground-nesting *Ashmeadiella* to have its nesting behavior described.

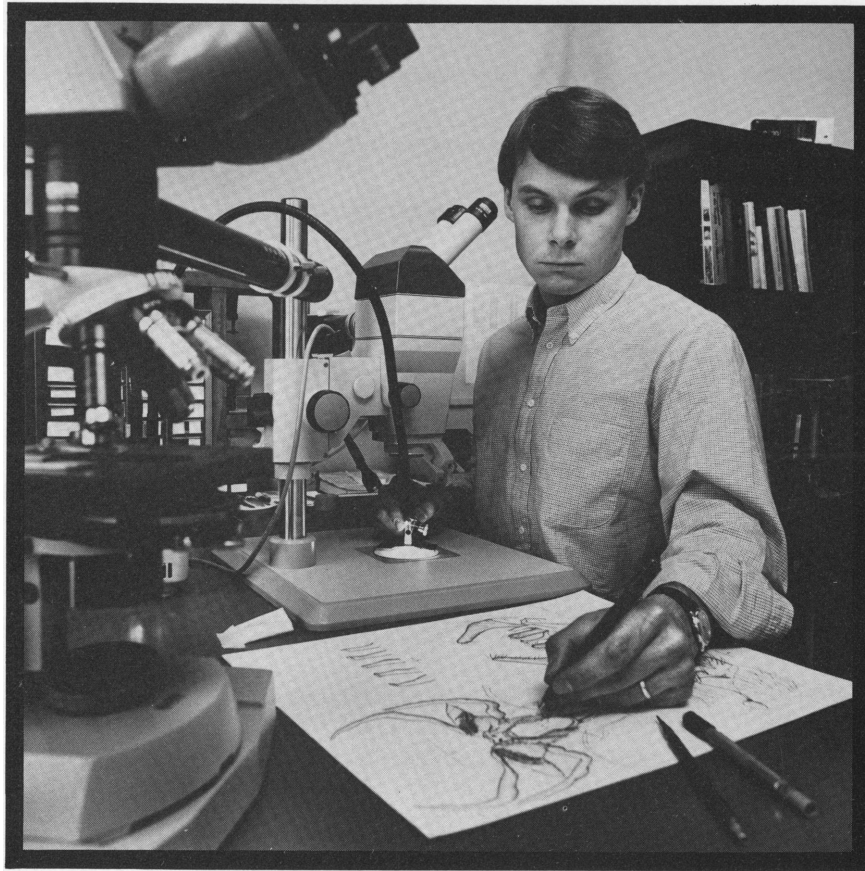
A new species of the cleptoparasitic bee genus *Stelis* attacks the nest cells of *A. holtii*. Neither the *Stelis* female nor its first instar (developmental stage) kills the *Ashmeadiella* offspring, in contrast to most cleptoparasitic bees. Rather, a later instar kills the immature host. Whereas the anatomy of the first *Stelis* instar is unremarkable, the last instar possesses massive, sharp-pointed mandibles and an enlarged, globose head, which are adaptations for attacking the host larva.

Charles D. Michener, Research Associate, and Dr. Rozen cooperated on a study of the nesting biology and immature stages of the neotropical bee *Paratetrapedia swainsonae*, from Jamaica, West Indies. Uncertainty has existed as to the phylogenetic relationships of this genus and others considered to be primitive offshoots of the family Anthophoridae. This investigation revealed no features indicating that the genus should be moved. The manuscript offers the first descriptions of pupae of the Exomalopsini.

Bee systematics has been based traditionally on dried, pinned adults, and consequently internal anatomical structures have been overlooked. Dr. Rozen and Cornell University graduate student Byron Alexander collected, and preserved in fluid, specimens from Arizona and the Yucatan to pursue an investigation on the systematic and biological implications of the ovaries, ovarioles and oocytes of cleptoparasitic bees. The study verified the potential importance of internal anatomy for bee systematics, prompting Dr. Rozen to begin to build a collection of fluid-preserved adult bees.

Staff Transitions Pedro W. Wygodzinsky, internationally

David A. Grimaldi, Assistant Curator in the Department of Entomology, adds a finishing touch to his illustration of midge genitalia. Detailed drawings are essential to insect taxonomy; they allow entomologists to emphasize important characteristics when communicating



their work to colleagues. Dr. Grimaldi, other curators in the department and some scientific assistants illustrate taxonomic articles. They often use a camera lucida, a device that projects an image of the specimen to be illustrated onto a flat surface so its outline can be traced.

renowned scientist and curator in the department since 1962, died on Jan. 27, 1987. He came to the Museum as curator of Diptera (true flies) after having already established an international reputation as an authority on several groups of unrelated insects, namely the bristletails, silverfish, assassin bugs, unique-headed bugs and black flies.

Among his nearly 250 publications, his monograph on the assassin bug subfamily Emesinae was one of the largest ever to appear in the Museum's scientific series. Later, in cooperation with Herman Lent, he prepared a "Revision of the Triatominae," an equally comprehensive monograph that summarizes knowledge of the group of assassin bugs that transmits Chagas' Disease in South America.

Shortly after his arrival in New York, Dr. Wygodzinsky set out on an NSF-supported field program to acquire specimens of black flies from the Andean region of South America. This work resulted in several papers that described a large but poorly known fauna whose members do not bite man and thus are seldom encountered by the non-specialist. Dr. Wygodzinsky's final contribution on this group is a manuscript revising approximately 75 species of the genus *Gigantodax*, nearly completed by coauthor Research Associate Sixto Coscaron of the Museo de La Plata, La Plata, Argentina.

Dr. Rozen rejoined the Department as a full-time researcher and curator on Jan. 2, 1987, after serving as the Museum's Deputy Director for Research for 15 years.

At the May 12 meeting of the trustees, Dr. Rindge was designated the first George Willett Curator. The curatorship is named for its benefactor, a member of the Museum and a frequent visitor, and will be held by a senior curator. Dr. Rindge joined the Museum in 1949 in the Department of Entomology, where he was placed in charge of Lepidoptera.

Under his stewardship, the collection of moths and butterflies has more than tripled in size, to more than two million specimens. Last year, the Lepidopterists' Society honored him with its Karl Jordan medal for his distinguished contributions to the field.

Scientific Publications:

Alexander, B., and J.G. Rozen, Jr.

1987. Ovaries, ovarioles, and oocytes in parasitic bees (Hymenoptera: Apoidea). *Pan-Pacific Ent.*, 63:155-164.

Coyle, F.A.

1986. *Chilehexops*, a new funnelweb mygalomorph spider genus from Chile (Araneae: Dipluridae). *Am. Mus. Novitates*, no. 2860, 10 pp.

Deeleman-Reinhold, C.L., and N.I.

Platnick

1986. A new *Panjange* from northern Borneo (Araneae: Pholcidae). *J. N.Y. Ent. Soc.*, 94: 559-561.

Forster, R.R., N.I. Platnick, and M.R. Gray

1987. A review of the spider superfamilies Hypochiloidea and Austrochiloidea (Araneae: Araneomorphae). *Bull. Am. Mus. Nat. Hist.*, 185: 1-116.

Gertsch, W.J.

1987. The spider genus *Metagonia* (Araneae: Pholcidae) in North America, Central America, and the West Indies. *Texas Mem. Mus. Speleol. Monogr.*, 1: 39-62.

Grimaldi, D.A.

1986. The *Chymomyza aldrichii* species-group: relationships, new neotropical species, and the evolution of some sexual traits. *J. N.Y. Ent. Soc.*, 94: 324-371.

1986. A new broad-headed species of *Drosophila* (*Hirtodrosophila*) from Malaysia. *J. N.Y. Ent. Soc.*, 94: 372-376.

1987. Amber fossil Drosophilidae (Diptera) with particular reference to the fauna of Hispaniola. *Am. Mus. Novitates*, no. 2880, 23 pp.

Grimaldi, D.A., and B. A. Underwood

1986. *Megabraula*, a new genus for two new species of Braulidae (Diptera), and comments on braulid evolution. *Syst. Ent.*, 11: 427-438.

Johnson, K.

"1985"

- [1986]. Specimens of *Callophrys rubi* L. (Lycaenidae) from Fiji—transplanted colony or one-time occurrence? *J. Lepidopterists' Soc.*, 39: 335-337.

1986. A new species of *Tmolus*

(Lycaenidae) with notes on the *Euptychia westwoodi* (Satyridae) mimicry complex. *Bull. Allyn Mus.*, no. 106, 11 pp.

Johnson, K., and D. Matusik

1986. First reported males, species status, and affinities of *Epargyreus spanna* Evans (Hesperiidae). *J. Lepidopterists' Soc.*, 40: 59-63.

Johnson, K., and R. Rozycki

1986. A new species of the *anchisiades* group of *Heracles* from Venezuela (Lepidoptera: Papilionidae). *J. N.Y. Ent. Soc.*, 94: 383-393.

Johnson, K., B. MacPherson, and J.I.

Ingraham

1986. A new genus and species of Eumaeini (Theclinae) from western Argentina (Lepidoptera: Lycaenidae). *Bull. Allyn Mus.*, no. 102, 107 pp.

Johnson, K., R. Rozycki, and D. Matusik

1986. The female of *Papilio xanthopleura* Godman and Salvin (Papilionidae). *J. Lepidopterists' Soc.*, 40: 65-66.

1986. Rediscovery and species status of the Neotropical swallowtail butterfly *Papilio illuminatus* Neipelt (Lepidoptera: Papilionidae). *J. N.Y. Ent. Soc.*, 94: 516-525.

Murphy, J.A., and N.I. Platnick

1986. On *Zelotes subterraneus* (C. L. Koch) in Britain (Araneae: Gnaphosidae). *Bull. Brit. Arachnol. Soc.*, 97-100.

Platnick, N.I.

1986. On the tibial and patellar glands, relationships, and American genera of the spider family Leptonetidae (Arachnidae: Araneae). *Am. Mus. Novitates*, no. 2855, 16 pp.

1986. A review of the spider genus *Cyriocetea* (Araneae: Zodariidae). *Am. Mus. Novitates*, no. 2858, 9 pp.

1986. On the spider genus *Ottacloea* (Araneae: Gnaphosidae). *Rev. Arachnol.*, 7: 9-14.

1986. "Evolutionary cladistics" or evolutionary systematics? *Cladistics*, 2: 288-296.

1986. Taxonomic methods and "evolutionary cladistics." *Cladistics*, 2: 375-377.

1986. On the male of *Sphodros paisano* (Araneae: Atypidae). J. Arachnol., 14: 140-141.
1987. An empirical comparison of micro-computer parsimony programs. Cladistics, 3: 121-144.
- Platnick, N.I., and R.R. Forster
1986. On *Teutoniella*, an American genus of the spider family Micropholcommatidae (Araneae: Palpimanoidea). Am. Mus. Novitates, no. 2854, 9 pp.
- Platnick, N.I., and J.A. Murphy
1987. Studies on Malagasy spiders, 3. The zelotine Gnaphosidae (Arachnida: Araneae), with a review of the genus *Camillina*. Am. Mus. Novitates, no. 2874, 33 pp.
- Platnick, N.I., and D.E. Rosen
1987. Popper and evolutionary novelties. Hist. Philos. Life Sciences, 9: 5-16.
- Platnick, N.I., and D.X. Song
1986. A review of the zelotine spiders (Araneae: Gnaphosidae) of China. Am. Mus. Novitates, no. 2848, 22 pp.
- Rozen, J.G., Jr.
1986. Survey of the number of ovarioles in various taxa of bees (Hymenoptera: Apoidea). Proc. Ent. Soc. Wash., 88: 707-710.
1986. The natural history of the Old World nomadine parasitic bee *Pasites maculatus* (Anthophoridae: Nomadinae) and its host *Pseudapis diversipes* (Halictidae: Nomiinae). Am. Mus. Novitates, no. 2861, 8 pp.
- Rozen, J.G., Jr., and B.L. Rozen
1986. Bionomics of crepuscular bees associated with the plant *Psoralea scoparius* (Hymenoptera: Apoidea). J. N.Y. Ent. Soc., 94: 472-479.
- Rozen, J.G., Jr., and R.R. Snelling
1986. Ethology of the bee *Exomalopsis nitens* and its cleptoparasite (Hymenoptera: Anthophoridae). J. N.Y. Ent. Soc., 94: 480-488.
- Rozen, J.G., Jr., and R. Ayala
1987. The nesting biology of the squash bee, *Peponapis utahensis*. J. N.Y. Ent. Soc., 95: 28-33.
- Schuh, R. T.
1986. *Schizopteromiris*, a new genus and four new species of coleopteroid clypeine Miridae from the Australian Region (Heteroptera). Ann. Soc. Entomol. France, n.s., 22: 241-246.
- Schuh, R.T., and G.M. Stonedahl
1987. Historical biogeography in the Indo-Pacific: a cladistic approach. Cladistics, 2: 337-355.
- Schuh, R.T., B. Galil, and J.T. Polhemus
1987. Catalog and bibliography of Leptopodomorpha (Heteroptera). Bull. Am. Mus. Nat. Hist., 185: 243-406.
- Schwartz, M.D.* (Sponsor: R.T. Schuh), and G.M. Stonedahl
1987. *Oaxacacoris*, a new plant bug genus and three new species of Orthotylinae from Mexico (Heteroptera: Miridae). Proc. Entomol. Soc. Wash., 89: 15-23.
1986. Revision of the plant bug genus *Noctuocoris* Knight (Heteroptera: Miridae: Orthotylinae). Pan-Pac. Entomol., 62: 237-247.
- Sedgwick, W.C., and N.I. Platnick
1986. On the male of *Liphistius panching* (Araneae: Mesothelae). Malayan Nature J., 39: 203-206.
- Snelling, R.R., and J.G. Rozen, Jr.
1987. Contributions toward a revision of the New World nomadine bees, 2. The genus *Melanomada* (Hymenoptera: Anthophoridae). Nat. Hist. Mus. of L.A. County, Contr. in Sci., 384:1-12.
- Stonedahl, G.M., and R.T. Schuh
1986. *Squamocoris* Knight and *Ramentomiris*, new genus (Heteroptera: Miridae: Orthotylinae). A cladistic analysis and the description of seven new species from Mexico and the western United States. Am. Mus. Novitates, no. 2852, 26 pp.

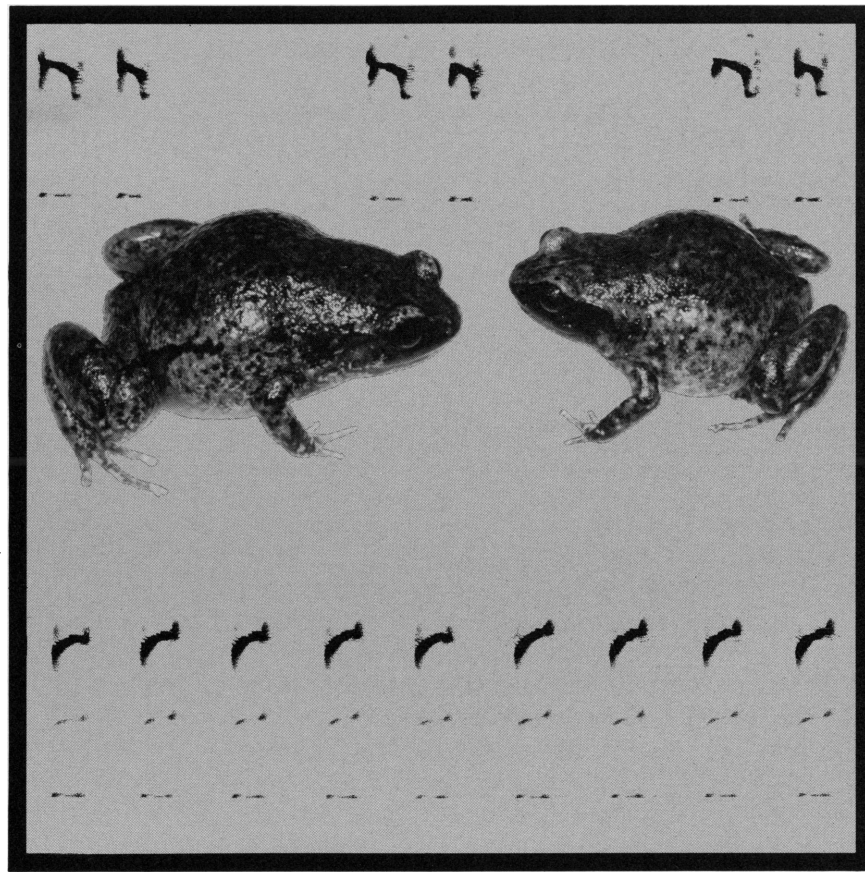
Department of Herpetology

This department is committed to advancing knowledge on the comparative biology of amphibians and reptiles. The National Science Foundation has been a strong supporter of the department's collection, which is considered a national resource. Fieldwork by the staff helps to enrich the collection and adds depth to a wide range of departmental research. Tropical frogs and snakes, unisexual lizards and giant sea turtles are all subjects of current investigation.

Tropical Poison Frogs Certain gaudily colored diurnal frogs of the family Dendrobatidae are conspicuous elements of rain forests in the New World tropics. One might expect such animals to be well known, but many species in the family have such small geographic ranges and may be so secretive that the extent of their diversity is just beginning to be appreciated. Almost half of the nearly 50 species currently assigned to one genus, *Dendrobates*, have been named since 1970, in large part due to the work of Chairman and Curator Charles W. Myers and his colleagues. The description of an additional new Andean *Dendrobates* was completed in collaboration with Colombian biologist Patricia A. Burrowes, and Dr. Myers is working on the descriptions of an additional half-dozen species.

This basic taxonomic work is part of a broader interdisciplinary study aimed at elucidating the skin biochemistry and evolution of toxic dendrobatids. Fieldwork in nine tropical countries by Dr. Myers and Research Associate John W. Daly, of the National Institutes of Health, has led to the discovery of more than 200 new skin alkaloids from dendrobatid frogs. A paper con-

Discriminating between these two frog species based on their appearance is next to impossible. Richard G. Zweifel, Curator in the Department of Herpetology, demonstrated that the species can be distinguished by their "advertisement" calls, represented here by their audiospectrograms. Such calls are made by males to attract females or to alert



other males that a territory is occupied. Sphenophryne robusta (frog on the right, spectrogram above) and S. fryi (frog on the left, spectrogram below) are denizens of the tropical rain forest of northern Australia. Audiospectrograms are an additional source of data for herpetologists and may be as important a part of a species' description as its color or size.

taining a classification of these alkaloids and a general survey of toxic/noxious substances in the Amphibia was accepted for publication in the journal *Toxicon*.

Unisexual Lizards Curator Charles J. Cole spent the summer collecting in the Southwest and Mexico, assisted for several weeks by Senior Scientific Assistant Carol R. Townsend. Most of Dr. Cole's research this year concerned investigations in reproduction, genetics, hybridization, origins and systematics of whiptail lizards (*Cnemidophorus*) and shiny lizards (*Gymnophthalmus*), including unisexual (all-female) and bisexual species.

He also spent a month in the laboratories of colleagues at Louisiana State University. He worked on biochemical genetics of unisexual species of *Cnemidophorus* and *Gymnophthalmus*, with Research Associate Herbert C. Dessauer at the Department of Biochemistry and Molecular Biology, LSU Medical Center, New Orleans; and on reproductive tissue histology of the same lizards, documenting for additional species their reproduction in the absence of spermatozoa, with Dr. Laurence M. Hardy at the Department of Biological Sciences, LSU, Shreveport.

Dr. Cole's continuing investigations of two tropical lizards indicate that unisexual populations of *Cnemidophorus lemniscatus* and *Gymnophthalmus underwoodi* in Surinam may have originated by the cloning of hybrids between closely related bisexual ancestral species. Thus, it appears that similar explanations may serve for the separate origins of certain all-female populations in the temperate zones of North America and in tropical South America.

The fifth and final year's support of a research grant from the National Science Foundation for Dr. Cole's investigations of unisexual lizards was completed. A major accomplishment this year was the first publication (in collab-

oration with Oscar G. Ward, a cytogeneticist at the University of Arizona) of a study concerning activity of ribosomal RNA genes in unisexual and bisexual lizards. The Museum's unique colonies of whiptail and shiny lizards continue to provide important data concerning the origin of clonal inheritance and polyploidy in vertebrates that reproduce by means of unfertilized eggs.

In addition, Dr. Cole's chromosome studies of amphisbaenians, with Research Associate Carl Gans, contributed to a growing understanding of their evolutionary history. These poorly known tropical reptiles are specialized burrowers closely related to lizards and snakes.

Tropical Microhylid Frogs

Investigations in systematics and taxonomy can lead a researcher in many directions, sometimes almost simultaneously, it seems. This year, for example, Curator Richard G. Zweifel completed and saw published the first herpetological paper arising from the 1984-1985 Expedition to Cerro de la Neblina in southern Venezuela.

In the paper, he describes a new genus and species of the family Microhylidae and gives a preliminary assessment of relationships among the American genera of this cosmopolitan family. This led Dr. Zweifel to start the description of a new species of the microhylid genus *Ctenophryne*, collected by Dr. Myers in western Colombia. An outgrowth of that study was the discovery that an earlier named species of *Ctenophryne*, supposedly from South America, actually came from South Africa and belongs to a different genus.

Dr. Zweifel also continued revisionary studies of Australasian microhylid frogs. He spent several days in the Museum of Comparative Zoology (Harvard) studying type and other material of New Guinean frogs with particular reference to his ongoing revision of the genus

Sphenophryne. A grant from The Sabin Conservation Fund will allow Dr. Zweifel to conduct fieldwork in Papua New Guinea in the summer of 1987.

Snake Studies All three curators conducted original research of some aspect of snake systematics. Dr. Myers published on the tribe Xenodontini, with the description of a new species of snake from the Andes of Peru. He also prepared most of the manuscript of a revisionary study of the Central American genus *Trimetopon*, and drafted descriptions of new species of snakes from Panama.

In collaboration with colleagues from the National Museum of Natural History, Dr. Cole published a study of the chromosomes of the diminutive *Ramphotyphlops braminus*, the world's only known unisexual species of snake. Dr. Zweifel continued his long-term genetic studies of the kingsnake *Lampropeltis getulus*, based on a breeding colony that has been maintained at the Museum for 26 years.

Endangered Sea Turtles

Associate Anne B. Meylan carried forward her research on the ecology and migrations of sea turtles. Investigation of the chemical ecology of sponge predation by the hawksbill turtle (*Eretmochelys imbricata*) was facilitated by a grant from the Lerner Gray Fund for Marine Research. Chemical analyses of tissue samples and sponges collected in Panama are being carried out at Scripps Institute of Oceanography. A collaborative study of the population structure and evolution of marine turtles was begun with John Avise and Brian Bowen of the Department of Genetics at the University of Georgia.

A new assay system, restriction fragment analysis of mitochondrial DNA, is being employed to examine genetic differences among populations of marine turtles, with particular emphasis on the green

turtle (*Chelonia mydas*).

Dr. Meylan and her colleagues from the University of Georgia obtained material for the study from three of the major breeding colonies of this species in the Atlantic and Caribbean. Tissue samples collected from other species will allow the construction of a molecular phylogeny, based on this methodology.

Dr. Meylan served as Director of Field Research at the Green Turtle Station in Tortuguero, Costa Rica, during August and September, 1986. In June, 1987, she returned to Panama to continue studies of the marine turtle fauna of the Province of Bocas del Toro. She and Peter Meylan, research fellow in the Department of Vertebrate Paleontology, conducted a census of nesting by leatherback turtles at Playa Chiriquí, and reconnoitered nesting and foraging habitats of other marine turtles in remote areas of this Caribbean province. Grants from the National Marine Fisheries Service and the Explorers' Club funded these studies.

Collection Growth and

Utilization The third and final year of the latest facilities grant from the National Science Foundation was completed. A total award of more than \$500,000 supported renovation of new space for the department, purchase of new cases and steel tanks for specimens, new microscopes and other equipment for use by visiting scientists, and salaries of curatorial assistants.

The growing collection, now containing nearly 280,000 specimens, is a vast permanent library of the world's amphibian and reptile faunas. About 47 percent of the 2190 newly accessioned specimens resulted from fieldwork by staff members, including 904 specimens collected by Senior Scientific Assistant Michael W. Klemens in the northeastern U.S. and Yugoslavia.

An especially significant gift of

232 well-documented specimens of reptiles and frogs from Liberia substantially enhanced the Museum's holdings from western Africa; this material was collected by Peace Corps Volunteer Andrew Voros, who is still in Liberia and anticipates adding to his collections. Wade C. Sherbrooke, Director of the Museum's Southwestern Research Station, donated a superb series of 344 lizards (*Neusticurus*) from Peru. Peter R. Warny gave 196 specimens of amphibians and reptiles from New York and Massachusetts. An additional 39 sea turtles from New York waters, including the rare Kemp's ridley, were received from the Okeanos Ocean Research Foundation. A total of 2516 specimens were lent to or returned by 82 researchers at other institutions in this country and abroad.

Scientific Publications:

Cole, C.J., and C. Gans

1987. Chromosomes of *Bipes*, *Mesobaena*, and other amphisbaenians (Reptilia), with comments on their evolution. *Am. Mus. Novitates*, no. 2869, 9 pp.

Myers, C.W.

1986. An enigmatic new snake from the Peruvian Andes, with notes on the Xenodontini (Colubridae: Xenodontinae). *Am. Mus. Novitates*, no. 2853, 12 pp.

Meylan, A.B., and S. Sadove

1986. Cold-stunning in Long Island Sound, New York. *Mar. Turtle Newsl.*, no. 37: 7-8.

Ward, O.G., and C.J. Cole

1986. Nucleolar dominance in diploid and triploid parthenogenetic lizards of hybrid origin. *Cytogenet. Cell Genet.*, 42: 177-182.

Wynn, A.H., C.J. Cole, and A.L. Gardner

1987. Apparent triploidy in the unisexual Brahminy blind snake, *Ramphotyphlops braminus*. *Am. Mus. Novitates*, no. 2868, 7 pp.

Zweifel, R.G.

1986. [Review of] Biology of Australasian frogs and reptiles, G. Grigg, R. Shine, and H. Ehmann (eds.). *Copeia*, 1986, 3: 838-841.

1986. A new genus and species of microhylid frog from the Cerro de la Neblina region of Venezuela and a discussion of relationships among New World microhylid genera. *Am. Mus. Novitates*, no. 2863, 24 pp.

Abstracts and Popular Publications:

Meylan, A.B.

1986. Riddle of the ridleys. *Nat. Hist.*, 95(11): 90, 92-96.

1987. Bocas del Toro: a window on the migration of sea turtles. *Orion Nature Quarterly*, 6: 42-49.

Department of Ichthyology

The Department of Ichthyology is responsible for the curation and maintenance of a research collection of approximately 1.25 million fishes. New research projects are being pursued in areas ranging from food preferences of fish of the New York Bight to long-distance transport of larval fishes in the British West Indies. The storage areas have recently been renovated and expanded. Recent emphasis on development of the skeleton collection has resulted in its becoming one of the largest and most comprehensive in the world. The department lost its former Chairman and Curator, with the death of Donn E. Rosen. Under his leadership it became a major international research center in systematic ichthyology.

Collection Facilities Renovation of the collection facilities, begun five years ago with support of the National Science Foundation, was recently completed. The space housing the cataloged collection of specimens in alcohol was doubled.

During the past quarter century the collection expanded from approximately 20,000 lots to the present 100,000. There remain about 20,000 lots of uncataloged specimens which currently occupy a newly installed compact storage system. This area also provides, for the first time, office space for Scientific Assistants as well as rooms for radiography, the mixing of alcohol, and for skeletal preparation.

Deep-Water Sharks of Mid-Atlantic Ridge An impressive collection of large and rare deep-sea sharks and other fishes was acquired. They were taken by long line in water as deep as 3200 meters along the northern mid-Atlantic ridge and in the vicinity of the Canary Islands. The collection was donated to the Museum by the Undersea Systems Laboratory of AT&T Bell Laboratories. The collecting cruise was organized by Guido Dingerkus, graduate student in the Joint Program of Graduate Education of the Museum and the City University of New York, with the participation of members of the Museum's department and representatives of several other scientific institutions.

Electric Simulation of Elephant-Fish Behavior Peter Moller, Research Associate, and Jacques Serrier, Associate, continued their studies of African elephant fishes (Mormyridae). In experiments with the LINEX device, a mechanical apparatus that moves tubes holding fishes together or apart in an aquarium, they have discovered how to simulate electrical behavior of one fish of a pair through computer-controlled discharges. This technical breakthrough enabled them to perform further experiments on learning and sensitivity thresholds. They have discovered that elephant fishes are more sensitive to electricity than had been thought. The elephant fishes seem to be as sensitive as sharks to weak electrical

fields, with a lower threshold on the order of one microvolt per centimeter.

Pupfishes and Livebearers from Mexico Michael L. Smith, Kalbfleisch Assistant Curator, in collaboration with Robert R. Miller, professor of zoology at the University of Michigan, determined the characteristics of a new species of the genus *Allotoca*, one of the livebearers (Goodeidae) of the Mexican plateau. Most of the members of this unusual family numbering more than 40 species are found exclusively in this region. Dr. Smith also clarified the relationships of a number of species previously arranged in two genera (*Neophorus* and *Allotoca*), finding that they all belong to one genus (*Allotoca*).

In a continuing study of killifishes (Cyprinodontidae), he found evidence of relationships among several small genera, related to *Cyprinodon*, including the gold-spotted killifish (*Floridichthys*) and the flagfish (*Jordanella*). He determined that these small genera appear only distantly related to the many species grouped in *Cyprinodon*.

Marine Ecology C. Lavett Smith, Curator, in collaboration with James C. Tyler, Research Associate, collected larval fishes in Carrie Bow Cay, Belize, and in the Turks and Caicos Islands, British West Indies. Having completed a study of the relationship between larval specialization and long-distance transport, they are collaborating on an atlas of larval fishes of the Caribbean Sea and on a checklist of fishes known from that area.

Joseph W. Rachlin, Research Associate, continued studies on resource partitioning and food preferences of the fish communities of the New York Bight. With Barbara E. Warkentine, graduate student at Lehman College, he demonstrated the usefulness of the department's collection for diet studies and as a

means of providing an initial insight into the ecological history of a species.

Dr. Rachlin, Ms. Warkentine and Dr. C.L. Smith conducted a computer-assisted reevaluation of the chromosomal karyotype of the Atlantic silverside, *Menidia menidia*. They discovered that the original chromosomal number for this species, as published in 1904, was in error. The corrected karyotype is 48; consisting of four metacentric, 14 submetacentric, 12 subacrocentric and 18 acrocentric chromosomes.

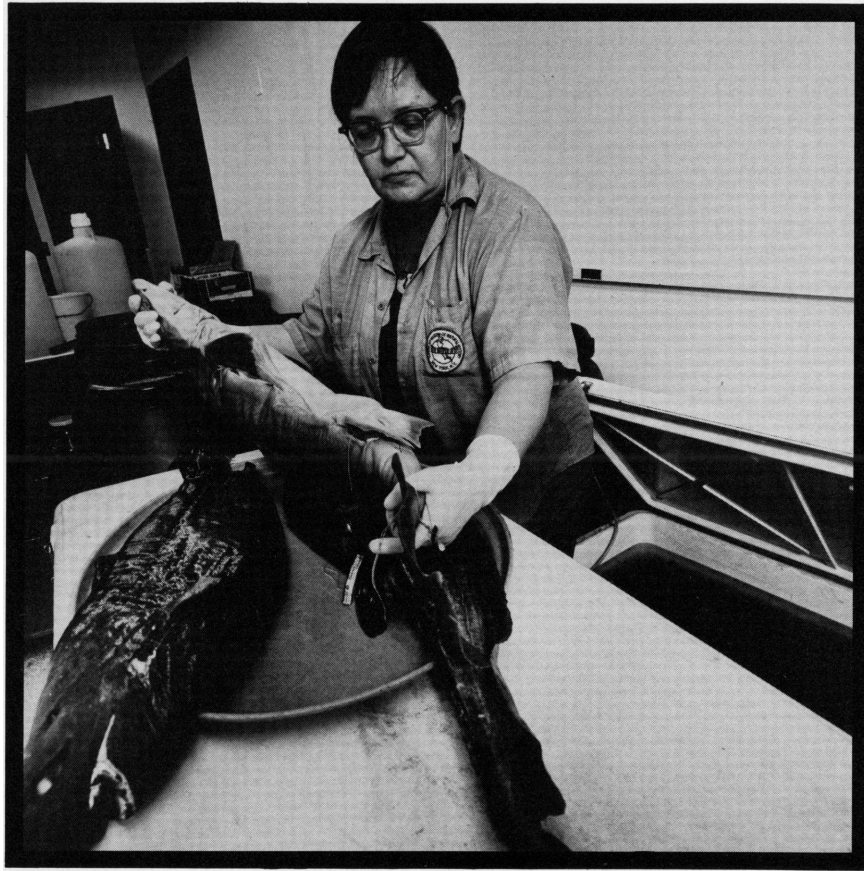
Dr. Rachlin and Ms. Warkentine, using both whole animal and skeletal material from the department's collection, have initiated a cladistic analysis of the seven species of hakes of the genus *Urophycis*. They are common to the east coast of Canada and to the U.S., from Nova Scotia to the Gulf of Mexico.

Freshwater Ecology Dr. C.L. Smith and Barbara A. Brown, Scientific Assistant, continued their survey of the fishes of the Mary Flagler Cary Arboretum in Dutchess County, N.Y. They have focused on the population structure of the fishes of Wappinger's Creek, which flows through the Arboretum, in order to test the hypothesis of local differentiation in growth rate.

Dr. Rachlin continued his studies on heavy metal uptake by freshwater algae. In collaboration with Ms. Warkentine, he developed an organizational framework for ordering algal toxicity responses.

Problematical Anchovies Gareth Nelson, Chairman and Curator, continued systematic studies of living anchovies (Engraulidae). He is studying tropical forms from the gulfs of Panama and California, where anchovy species are particularly diverse. Among them are certain species which were named but inadequately described earlier in this century.

Senior Scientific Assistant M. Norma Feinberg, of the Department of Ichthyology, unpacks a large drum of deep-water sharks collected on a cruise along the mid-Atlantic Ridge. The cruise was sponsored by AT&T, which enlisted the aid of several scientific organizations



to try to determine what was biting its submarine cables. Sharks were the culprits. The 345 fish specimens collected by long lines — elaborate fishing lines lowered to depths up to 10,000 feet — are now part of the department's collection of nearly 1.5 million fish specimens.

Catalog of Anchovies of the World

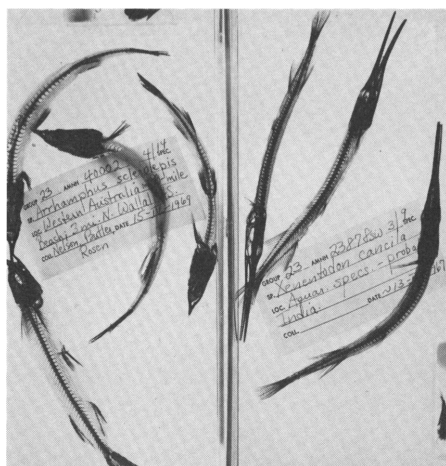
Peter J.P. Whitehead, Research Associate, in collaboration with Dr. Nelson and Thosaporn Wongratana, professor of biology at Chulalongkorn University, Bangkok, completed a world catalog of anchovies for the Food and Agriculture Organization of the United Nations. There are more than 150 species of anchovies. Despite their small size, they are among the most important commercial fishes in the world.

Minnows, Suckers, Loaches

Darrell J. Siebert, graduate student in the American Museum/City University of New York Joint Program in Evolutionary Biology, completed his doctoral thesis on the interrelationships of the families of cypriniform fishes. He showed that the North American suckers (Catostomidae) are more closely related to the Eurasian loaches and hillstream fishes (Cobitidae and Homalopteridae), than to the minnows (Cyprinidae). Mr. Siebert's last year of research was supported under the Museum's doctoral training program which enabled him to pursue curatorial work and dissertation writing. This was one of several awarded during the first year of the fellowship program.

Collection of Skeletons

The skeleton collection has outgrown the space that had been allotted to it three years ago. It now occupies some of its former, but now renovated, storage cabinets. During the year, some 500 skeletal specimens were cataloged. They were obtained through the cooperation of Robert L. Shipp, Associate Director for Academic Affairs at the Dauphin Island Sea Lab in Mobile Bay, Alabama, and of the Alabama Deep-Sea Fishing Rodeo; Dannie Hensley, associate professor of marine sciences in the Department of Marine Sciences at the University of Puerto Rico, and Richard L. Lord of the Fulton Fish Market Information Service in New York City.



These cleared and stained fish specimens are an important part of the Ichthyology Department's collections, which include specimens in alcohol and skeletons. After a week-long treatment in a special bath, a fish's flesh becomes transparent (cleared). The bony structure thus revealed, with cartilage that is stained blue and bones stained red, is of great significance to scientists studying the systematics of fishes.

Donn E. Rosen 1929-1986

Donn Eric Rosen, Curator and former Chairman of the department, died at age 57. During his career, he extensively improved the department's collection, facilities, research and graduate student programs. Dr. Rosen's leadership in these endeavors, which continued long beyond his service as Chairman, transformed the department's holdings into a major international collection.

A "child of the Museum," he was a volunteer at age eight in the School Nature League, a forerunner of the present Natural Science Center. At 14, he was a volunteer in the Fish Genetics Laboratory of the New York Zoological Society, then located on the sixth floor of the Whitney wing of the Museum. Dr. Rosen began his adult scientific work at the Museum in February, 1961, as an Assistant Curator. He was Chairman from 1965 to 1975.

In 1967, Dr. Rosen was awarded the Leidy Medal by the Academy of Natural Sciences of Philadelphia. He served as Dean of the Museum's Council of the Scientific Staff in

1970, President of the Society of Systematic Zoology in 1976 and 1977, and Secretary of the American Society of Ichthyologists and Herpetologists from 1979 to 1981. In 1986, Dr. Rosen was nominated for the International Prize in Biology by the Society of Systematic Zoology. He was also elected a Foreign Member of the Linnean Society of London, and a Distinguished Fellow of the American Society of Ichthyologists and Herpetologists.

Dr. Rosen maintained an active research program in fish systematics throughout his career, and his research played a vital role in the development of cladistic theory in systematics and vicariance theory in biogeography. His administrative initiatives were instrumental in forming the Systematics Discussion Group of the Museum and the joint program of graduate education in evolutionary biology of the Museum and the City University of New York.

Scientific Publications:

Ferraris, C.J., Jr.* (Sponsor: G. Nelson), I. Isbrücker, and H. Nijssen

1986. *Nebelinichthys pilosus*, a new genus and species of mailed catfish from the Rio Baria system, southern Venezuela (Pisces, Siluriformes, Loricariidae). *Rev. fr. Aquariol.*, 13: 69-72.

Ferraris, C.J., Jr.* (Sponsor: G. Nelson), and J. Fernandez

1987. *Trachelyopterichthys anduzei*, a new species of auchenipterid catfish from the upper Rio Orinoco of Venezuela, with notes on *T. taeniatus* (Kner). *Proc. Biol. Soc. of Washington*, 100: 257-261.

Jensen, T.E., J.W. Rachlin, V. Jani, and B.E. Warkentine

1986. Heavy metal uptake in relation to phosphorus nutrition in *Anabaena variabilis* (Cyanophyceae). *Environmental Pollution (Series R)*, 42: 261-271.

Nelson, G.

1986. Identity of the anchovy *Engraulis clarki* with notes on the species-groups of *Anchoa*. *Copeia*, 1986: 891-902.

1986. Models and prospects of historical biogeography. In A.C. Pierrot-Bults, S. van der Spod, B.J. Zahuranec, and R.K. Johnson (eds.), *Pelagic biogeography*. Unesco Technical Papers in Marine Science, 49: 214-218.

Nelson, G., and P. Sonoda
1987. *Anchoa mundeola* (Gilbert & Pierson): a valid species of Engraulidae from the Gulf of Panama. *Copeia*, 1987: 521-524.

Rachlin, J.W., and B.E. Warkentine
1987. The use of museum ichthyological holdings for initial diet studies. *Copeia*, 1987: 214-216.

Rachlin, J.W., A. Pappantoniou, and B.E. Warkentine
1987. A bias estimator of the environmental resource base in diet preference studies with fish. *J. of Freshwater Ecol.*, 4: 23-31.

Rankin, C.H., and P. Moller
1986. Social behavior of the African electric catfish *Malapterurus electricus*, during intra- and inter-specific encounters. *Ethology*, 73: 177-190.

Smith, M.L.
1987. Osteology and systematics of the fossil catfishes (*Ictalurus*) of central Mexico. *J. of Paleontol.*, 61: 380-387.

Warkentine, B.E., and J.W. Rachlin
1986. A test of a proposed organizational framework for the ordering of algal toxicity responses. *Bull. Torrey Botanical Club*, 113: 12-15.

Warkentine, B.E., C.L. Smith, and J.W. Rachlin
1987. A Reevaluation of the karyotype of the Atlantic silverside, *Menidia menidia*. *Copeia*, 1987: 222-224.

Abstracts and Popular Publications:

Atz, J.W.
1986. C.M. Breder, Jr., 1897-1983. *Copeia*, 1986: 853-856.

Nelson, G.
1987. [Review of] *Evolution and classification: The reformation of cladism*, by M. Ridley. *Cladistics*, 3: 72.

Nelson, G., J.W. Atz, K.D. Kallman, and C.L. Smith
1987. Donn Eric Rosen, 1929-1986. *Copeia*, 1987: 541-547.

Siebert, D.J.* (Sponsor: G. Nelson)
1987. [Review of] *Ontogeny and Systematics of Fishes*. Spec. Publ. no. 1, Am. Soc. Ichthyologists and Herpetologists. *Cladistics*, 3: 93-97.

Smith, C.L.
1987. [Review of] *The zoogeography of north American freshwater fishes*. *Q. Rev. Biol.*, June 1987.

Smith, M.L.
1987. [Review of] *Morphometrics in evolutionary biology*, by F. Bookstein, B. Chernoff, R. Elder, J. Humphries, G. Smith, and R. Strauss. *Cladistics*, 3: 97-99.

Szabo, T., and P. Moller
1986. Comparative aspects of neuronal basis and behavior of electrosensing. 1st Int. Congr. Neuroethol., Tokyo, Japan, p. 39.

Department of Invertebrates

The Department of Invertebrates pursues a curatorial and research program encompassing a broad array of invertebrate organisms. As its central objective, the department seeks to document the history and the rich diversity of predominantly marine invertebrate life. Complex invertebrates appeared 575 million years ago, and the department's fossil collections encompass this vast temporal range. The department's holdings of Recent invertebrates is global in scope, providing an invaluable resource for systematics of living invertebrates.

Curatorial Progress In 60 accessions, the department added some 24,600 new specimens to its holdings of Recent mollusks. To expedite the process of cataloging the donated molluscan collections, a computer system with a laser printer has been purchased through funds donated to the department. Niles Eldredge, Chairman and Curator, added several lots of Paleozoic inverte-

brates, while bryozoans and fossil and Recent shelled cephalopods were added through the efforts of Judith E. Winston, Associate Curator, and Neil H. Landman, Assistant Curator.

Macroevolution Dr. Eldredge carried forward studies of the inter-relationships of systematics, paleontology and causal theories of the evolutionary process. His long-term goal remains the achievement of an evolutionary theory that takes into account patterns of evolutionary stasis and change as documented by systematists and paleontologists. The aim is to produce a theory that more precisely specifies the context and control of adaptive stasis and change in the evolutionary process, particularly incorporating speciation processes along with the classic statements on adaptive change. He has begun work on a "Primer on Macroevolution," in which these and related issues are analyzed.

Cuban Snail in Bahamian Waters William K. Emerson, Curator, and Walter E. Sage, Scientific Assistant, rediscovered a large volutid snail, *Teramachia mirabilis* (Clench and Aguayo, 1941). It had been known only by a single specimen, described in 1941, off the coast of Cuba. The disjunct modern distribution of the genus *Teramachia*—with six species known to be living in the western Pacific, one in the western Atlantic, and other extinct species in the Neogene of Okinawa and Ecuador—presents various problems in zoogeographic interpretation. The presence of *Teramachia mirabilis* in the western Atlantic may be an example of a Pacific faunal element which survived after being carried into the Caribbean region on the East-Pacific geologic plate to its present position adjacent to Cuba.

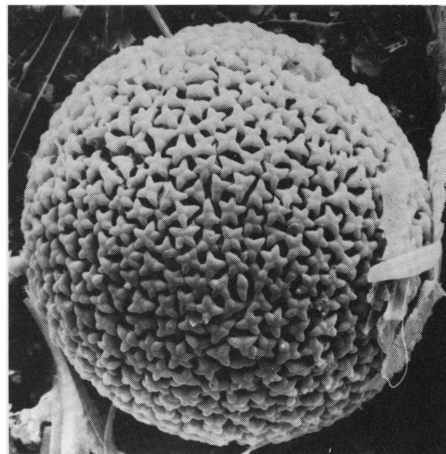
Ribbon Worms Ernst Kirsteuer, Curator, who retired in June, inves-

tigated the systematics, anatomy and geographic distribution of nemertean ("ribbon") worms. Focusing primarily on minute species living between sand grains, he was able to clarify the known geographic distribution of the genus *Otocyphlonemertes*. Dr. Kirsteuer also explored the relationships between subterranean and marine nemerteans, publishing his results in a multi-authored book on stygofauna—small, cryptic, interstitial forms of life.

Ancient and Modern Shelled Cephalopods As part of his research on shelled cephalopods, Dr. Landman completed a study of a group of ammonite species from Late Cretaceous strata of North America, describing their morphology, systematics and life history. He has also continued his study of the only extant shelled cephalopod, the pearly nautilus. He collected live specimens of *N. belauensis* in Palau and is studying their embryology with John M. Arnold, Research Associate.

Interstitial Refuge Research by Dr. Winston and Eckart Håkansson, a paleontologist at the Institute of Historical Geology and Paleontology of the University of Copenhagen, resulted in the description of nine new species of bryozoans whose colonies encrust single grains of sand. Their minute, sexually precocious colonies show unique adaptations to life on a sand grain. However, a more important fact may be that reproductive colonies of 24 other species, previously known from larger substrates, were also found on sand grains. This discovery explains how encrusting bryozoan species have become widely distributed across broad sandy areas of continental shelf, although their larvae are not long-distance swimmers.

Permian Gastropods Roger L. Batten, who retired as Curator on June 30, 1986, continued his studies of the Permian gastropods from the vast silicified faunas in the southwestern United States. He concentrated on the worthenioids, a group that had exhibited little evolutionary change until they underwent an episode of radiation in the Permian and Triassic Periods. With R.H. Dott, professor of geology at the University of Wisconsin, he completed the fourth edition of the textbook "The Evolution of the Earth."



While diving in the Red Sea as part of his research on foraminifera and other organisms living on sea grass, John J. Lee, Research Associate in the Department of Invertebrates, discovered this unusual organism. The tiny algae, just 60 micrometers in diameter, is unlike anything ever seen alive in modern oceans. It may be related to a group called the discoasters known only from fossils. Dr. Lee was able to make the discovery with the help of the Museum's electron microscope, which is available to all departments in the Interdepartmental Laboratory.

The Unsettled Mystery Norman D. Newell, Curator Emeritus, concludes that mass extinction of marine organisms at the end of the Paleozoic was not abrupt, but occurred gradually over five or 10 million years. He believes it terminated at the end of the Griesbachian Stage (247 million years ago), instead of at the beginning of that interval, as is generally supposed. New evidence indicates

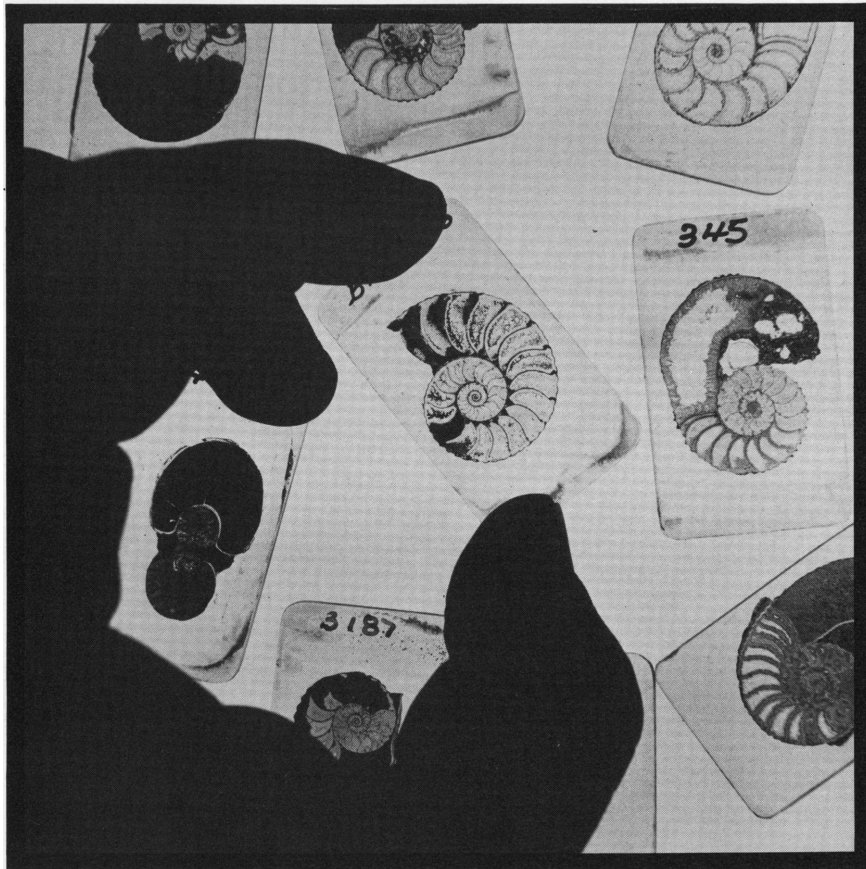
that a surviving line of bivalves—true oysters of the family Gryphaeidae—probably branched off from an aberrant Australian scallop during the time of mass extinctions. This scallop is being studied by Dr. Newell and Donald W. Boyd, Research Associate and professor of geology at the University of Wyoming in Laramie.

Paleozoic and Mesozoic Brachiopods Howard R. Feldman, Research Associate, pursued his interests in the biogeography and systematics of Mesozoic brachiopods of the Ethiopian Province. In cooperation with Patrick Rachebouef, paleontologist in the Laboratory of Paleontology and Stratigraphy at the Université de Bretagne Occidentale, Brest, France, he has also begun an investigation into the systematics of chonetid brachiopods of the Devonian Onondaga Limestone of New York State.

Symbiosis John J. Lee, Research Associate, has continued his study of endosymbiotic algae living in the tissues of larger foraminifera. His results demonstrated that a species of the foraminifera *Elphidium*, collected in Kenya and Israel, partially digests diatoms, and temporarily retains their chloroplasts and other features. He has also announced the discovery of a new microorganism from the Red Sea that appears to be a close relative of the discoasters, a prominent group of marine microfossils which have been thought, until now, to be extinct.

Hormones of Green Crabs Linda H. Mantel, Research Associate, found in her continuing studies on green crabs that the animals show different responses to changing salinity as a function of season. When crabs are transferred to a dilute medium in winter, they are able to maintain their blood in a more concentrated form than they can in summer. Neurohormones

These thin slices of ammonites — fossil mollusks related to the chambered nautilus still alive today — help scientists understand the life history and evolution of one of the world's most diverse animal groups. The extinction of ammonites about 65 million years ago coincided with the extinction of the



dinosaurs. The slices are along the median plane of symmetry and are glued to glass slides for viewing. They are part of the collection of the Department of Invertebrates, whose 8.5 million specimens are particularly strong on macroscopic marine organisms, including 38,500 type specimens and illustrations of fossil invertebrates.

that influence this regulatory process are more effective in summer than in winter. Enzymes related to uptake of salt are intrinsically more active in winter but are more responsive to hormones in summer.

Geologic Maps and Computer Graphics Using desktop computer color graphics, Leslie F. Marcus, Research Associate, continues development of an expert system for displaying geologic maps and stratigraphy to identify potential mineral deposits. His work is supported by the United States Geological Survey.

Parasitology Horace W. Stunkard, Research Associate, who is in his 98th year, continues to enliven the department with his regular presence. Considered the dean of parasitologists, he recently completed the transfer of his collection of more than 64,000 reprints, including more than 300 monographs, to the Manter Laboratory at the University of Nebraska, Lincoln.

Departmental Outreach The department made 61 loans to research scientists at other institutions. There were 105 visitors to the collections. Departmental members continued to serve on the faculties of several universities, and to lecture to a variety of scientific, academic and lay audiences. Sidney S. Horenstein, Senior Scientific Assistant, participated in the development and narration of the new film "Earth's Wildfire," shown in the John Lindsley Hall of Earth History. Mr. Horenstein was also involved in the implementation of a new exhibit section dealing with life on the sea floor, in the Hall of the Biology of Invertebrates. He conceived, organized and wrote the copy for the successful temporary exhibition, "On Tap: New York's Water Supply," on the geology and history of the New York City water supply system.

Scientific Publications:

Batten, Roger L., and W.L. Stokes
1986. Early Triassic gastropods from the Sinbad Member of the Moenkopi Formation, San Rafael Swell, Utah. *Am. Mus. Novitates*, no. 2864, 33 pp.

Eldredge, N.
1986. Information, economics and evolution. *Ann. Rev. Ecol. Syst.*, 17: 351-369.

1986. Large-scale biological entities and the evolutionary process. *Philos. of Sci. Assoc. (PSA)* 1984, 2: 551-566.

1986. Progress in evolution? *New Scientist*, June 5, 1986: 54-57.

Emerson, W.K.
1986. A new species of *Morum* from the Andaman Sea (Gastropoda: Volutacea). *The Nautilus*, 100(3): 96-98.

Emerson, W.K., and W.E. Sage III
1986. A new species of *Lyria* (Gastropoda: Volutidae) from the Arabian Sea. *The Nautilus*, 100(3): 101-104.

1986. On the rediscovery of *Teramachia mirabilis* (Clench and Aguayo, 1941), and its relationship to other calliotectine volutes. *The Nautilus*, 100(4): 147-151.

Feldman, H.R., and R.H. Lindemann
1986. Fossils and facies of the Onondaga Limestone in central New York. *New York State Geological Association Guidebook for Fieldtrips* (58th Annual Meeting), pp. 145-166.

Garcia, E.F., and W.K. Emerson
1987. A new species of *Scaphella* (Gastropoda: Volutidae) from off Yucatan, Mexico. *Apex, Infor. Sci. Soc. Belge Malacol.*, 2(1): 1-5.

Gould, S.J., and N. Eldredge
1986. Punctuated equilibrium at the third stage. *Syst. Zool.*, 35: 143-147.

Hughes, R.N., and W.K. Emerson
1987. Anatomical and taxonomic characteristics of *Harpa* and *Morum* (Neogastropoda: Harpidae). *The Veliger*, 29(4): 349-358.

Kirsteuer, E.
1986. Nemertina. In L. Botosaneanu (ed.), *Stygo fauna Mundi*, pp. 72-75. Leiden: Brill/Backhuys.

Landman, N.H.
1987. Ontogeny of Upper Cretaceous (Turonian-Santonian) scaphitid ammonites from the western interior of North America; systematics, developmental patterns, and life history. *Bull. Am. Mus. Nat. Hist.*, 185(2): 117-241.

Lee, J.J., J. Erez, M.E. McEnery, A. Lagziel, and X. Xenophontos
1986. Experiments on persistence of endosymbiotic diatoms in the larger foraminifera: *Amphistegina lessona*. *Symbiosis*, 1: 211-226.

Newell, N.D.
1986. Paleobiology's golden age (Editorial). *Palaios*, 1(4): 345.

Newell, N.D., and D.W. Boyd
1987. Iteration of ligament structures in pteriomorphian bivalves. *Am. Mus. Novitates*, no. 2875, 11 pp.

Stupakoff, I.* (Sponsor: W.K. Emerson)
1986. Observations on the feeding behavior of the gastropod *Pleuroploca princeps* (Fascioliariidae) in the Galapagos Islands. *The Nautilus*, 100(3): 92-95

Thorpe, J.P., and J.E. Winston
1986. On the identity of *Alcyonidium diaphanum*. Lamouroux, 1813 (Bryozoa: Ctenostomata). *J. Nat. Hist.*, 20: 845-848.

Winston, J.E.
1986. An annotated checklist of coral-associated bryozoans. *Am. Mus. Novitates*, no. 2859, 39 pp.

Winston, J.E., and E. Hakansson
1986. The Interstitial bryozoan fauna from Capron Shoal, Florida. *Am. Mus. Novitates*, no. 2865, 50 pp.

Abstracts and Popular Publications:

Eldredge, N.
1986. [Review of] *Evolution: A Theory in Crisis* by M. Denton. *Q. Rev. Biol.*, 61: 541-542.

1986. Claiming the animals. [Review of] *The Eagle's Nest* by Charlotte M. Porter. *The New York Times Book Review*, Oct. 19: 39.

1987. *Life pulse*, 246 pp. New York: Facts on File.

- Feldman, H.R.
1986. (Abstract) Morphologic diversity of some Devonian brachiopods from southeastern New York. Geol. Soc. of Am., northeastern section meeting, Kiamasha Lake, New York, p. 16.
1987. (Abstract) Brachiopod life strategies and ontogenetic development: examples from the Jurassic and Devonian. Geol. Soc. of Am., northeastern section meeting, Pittsburgh, Pennsylvania, p. 13.
1986. A page from earth's history: the Tischman building. The New York Chronicle, 1(1): 4-5.
1986. Grand Central Terminal. The New York Chronicle, 1(2): 4-5.
1987. Photographs for Life pulse by Niles Eldredge. New York: Facts on File.
1987. New York's Ice Age elephants. The New York Chronicle, 1(3): 10-11.
- Landman, N.H.
1986. (Abstract) Developmental criteria for comparing ammonite ontogenies. Geol. Soc. Am. 18(6): 665.
- Mantel, L.H., M. Sommer, A. Ng, and L. Buck.
1986. Function of neuroendocrine substance in osmoregulation of the green crab, *Carcinus maenas*. Abstr. of the 30th Congr. of Int. Union of Physiological Scientists.
- Mantel, L.H., M. Sommer, A. Ng, L. Buck, and B. Curran
1986. Neuroendocrine effects on osmoregulation in the green crab, *Carcinus maenas*. Am. Zool., 26: 29A.
- Newell, N.D., and D.W. Boyd
1986. Natural cast fossils as clues to carbonate diagenesis. Abstr. Int. Congr. of Assoc. Sedimentologists. Canberra, Australia. p. 1.
- Sage, W.E. III
1986. News of new species. Hawaiian Shell News, 34(5): 10; 34(7): 8; 34(8): 10; 34(9): 10; 34(10): 9; 34(11): 10; 34(12): 11.
1986. [Review of] The freshwater snails of Florida—A manual for identification by Fred G. Thompson. Hawaiian Shell News, 34(5): 6.
1986. [Review of] The distribution of the native land mollusks of the Eastern United States by Leslie Hubricht. Hawaiian Shell News, 34(5): 6.
1986. [Review of] Analysis of mussel (*Mytilus californianus*) communities in areas chronically exposed to natural oil seepage by Dale Straughan. N.Y. Shell Club Notes, 299: 4.
1986. [Review of] The Tribe Alasmidontini (Unionidae: Anodontinae), part II: *Lasmigona* and *Simpsonaias* by Arthur H. Clarke. N.Y. Shell Club Notes, 299: 4, 5.
1986. [Review of] The Genus *Clypeomorus* Jousseaume (Cerithiidae: Prosobranchia) by Richard S. Houbbrick. N.Y. Shell Club Notes, 299: 5.
1986. Publication notices. Hawaiian Shell News, 34(6): 6.
1986. [Review of] Seashell treasures of the Caribbean by Lesley Suttly. The Nautilus, 100(3): 113, 114.
1986. Am. Malacological Union—Western Soc. of Malacologists Annual Meeting. N.Y. Shell Club Notes, 300: 9.
1986. Conchologists of Am. Annual Meeting. N.Y. Shell Club Notes, 300: 9, 10.
1986. [Review of] Moluscos de la Ria de Vigo I, Gasteropodos by Emilio Rolan Mosquera. N.Y. Shell Club Notes, 300: 17.
1986. [Review of] The Marine mollusca of the Bay of Algeciras, Spain, with general notes on *Mitrella*, *Marginellidae* and *Turridae* by J.J. Van Aartsen, H.P.M.G. Menkhorst, and E. Gittenberger. N.Y. Shell Club Notes, 300: 18.
1986. [Review of] Monograph of living chitons (Mollusca: Polyplacophora), Volume II: Suborder Ischnochitonina Ischnochitonidae: Schizoplacinae, Callochitoninae and Lepidochitoninae by Piet Kaas and Richard A. Van Belle. Hawaiian Shell News, 34(10): 10.
1986. [Review of] Shells of the Philippines by F.J. Springsteen and F.M. Leobrera. Boston Malacological Club Newsl., Oct., p. 9.
1986. [Review of] It's EASY to say *Crepidula* (kreh PID' yu luh) a phonetic guide to pronunciation of the scientific names of seashells and glossary of terms frequently used in malacology by Jean M. Cate and Selma Raskin. The Littorina, 11(4): 3.
1986. Some recent developments in malacology. The Whelk Wavelength, 2(2): 3-9.
1986. [Review of] Coquillages du Gabon—Seashells of Gabon by Pierre A. Bernard. N.Y. Shell Club Notes, 301: 7, 8.
1987. News of new species. Hawaiian Shell News, 35(1): 11; 35(2): 11; 35(3): 10; 35(4): 13.
1987. [Review of] A history of shell collecting by S. Peter Dance. N.Y. Shell Club Notes, 302: 7, 8.
1987. [Review of] Atlas of the living olive shells of the world by Edward J. Petuch and Dennis M. Sargent. N.Y. Shell Club Notes, 302: 8, 9.
1987. [Review of] Crabs of Cape Cod by Stephen Berrick. N.Y. Shell Club Notes, 302: 11.
1987. Notes on nomenclature and labeling. Conchologists of Am. Bull., 15(1): 16.
- Winston, J.E.
1987. Palmer Station Diary. Rotunda, 12(1): 9-10.

Department of Mammalogy

The Department of Mammalogy devoted much attention this year to researching the evolutionary relationships of mammals in the tropical parts of South America, Africa and south-eastern Asia. More than 1100 mammals were collected as part of the department's survey of the animals of Bolivia. A data matrix of morphological, ecological and distributional information on mammals of the Philippines was also being prepared. The National Science Foundation awarded a grant of \$186,000 for collection management.

Mammals of Bolivia The department carried forward its survey of the mammals of Bolivia, supported by a grant from the National Science Foundation. The project was initiated by Curator Sydney Anderson, in collaboration with the Museum of Southeastern Biology at the University of New Mexico and the Museo Nacional de Historia Natural in La Paz, Bolivia.

Members of the expedition were 31

in the field from July to October, working in Bolivia's northern lowlands and southwestern highlands. They collected more than 1100 mammals. In addition, Dr. Anderson's team received specimens from recent work done by the Centro Nacional de Enfermedades Tropicales de Santa Cruz and the Instituto Boliviano por Biología Altura of La Paz.

Goals for collaboration included involving Bolivian colleagues and students in the research and in preparing results for publication. Tissues, cell suspensions and parasite preparations were dispersed to appropriate specialists.

Savanna Mammals of Northern South America Assistant Curator Robert S. Voss began a series of field expeditions to the savanna regions of northern South America to collect small mammals from grassland habitats and adjacent forests. The purpose of the expedition was to better understand the biogeography of the area's savannas.

Many vertebrate taxa occur throughout the savannas scattered from Costa Rica to the Guianas, but do not occur in intervening forested regions. Such distributions suggest that grassland habitats may once have been continuous across the northern Neotropics. If so, the historical connections among contemporary savanna islands should be reflected in the phylogenetic relationships among isolated populations of their vertebrate inhabitants.

One of the vertebrate taxa that are endemic to South America is the rodent genus *Zygodontomys*, which was the focus of this year's expedition to Venezuela. The expedition was undertaken in collaboration with the Museo de Historia Natural La Salle (MHNLS), a private research and educational organization in Caracas. Dr. Voss and Hernan Castellanos of MHNLS were the principal investigators for the expedition, which was mainly

supported by the Smithsonian Institution and La Salle, with contributions of funds and equipment from the American Museum's Department of Mammalogy.

Members of the expedition were in the field from June to August, and collected 517 specimens of mammals from three localities. The first location was in the Gran Sabana, near the Brazilian border in extreme southeastern Venezuela. The second was in the Maracaibo basin of northwestern Venezuela. The last locality investigated was in Estado Apure, in central Venezuela. A very large series of *Zygodontomys* was collected in these three areas, and research is being conducted on their phylogenetic relationships. It has already been discovered that the *Zygodontomys* populations of the Maracaibo basin appear to be closely related to Central American populations.

Neotropical Ichthyomyine Rodents Dr. Voss is preparing a monograph on the systematics and ecology of ichthyomyine rodents. The manuscript will describe the patterns of morphological evolution within a small adaptive radiation of these semiaquatic, carnivorous Neotropical rodents.

Ichthyomyines prey on aquatic insect larvae, crustaceans and other small animals in rain forest streams from Mexico to Peru. These rats and mice afford a good opportunity to analyze adaptive divergence in relation to the branching pattern in evolution. Dr. Voss has studied their specialized diets and habitats in the field. Studies have also been done on the department's collections of Old World insectivores and New Guinean rodents, which share convergent ecological adaptations with the South American ichthyomyines. Dr. Voss will use this information to test hypotheses about the ecological significance of phylogenetic character transformations.

Central and South American Rodents Guy G. Musser, Chairman and Curator, in collaboration with Alfred Gardner of the United States Fish and Wildlife Service and Michael Carleton of the National Museum of Natural History, Smithsonian Institution, carried forward studies defining morphological limits and geographic distributions of small-bodied muroid rodents native to tropical forests of Central and South America. Manuscripts are being prepared for publication that will report results of their taxonomic studies of *Oryzomys talamancae*, *O. bolivaris*, and *O. yunganus*, which occur in forests at middle to low elevations. Another paper will detail the nature of *Microroryzomys*, a genus of two species of mice that are restricted to forests and grasslands of the South American Andes.

Bats Curator Emeritus Karl Koopman's interest in the taxonomy, geographic distributions and phylogenetic relationships of bats was demonstrated this year by his report on the biogeography of West Indian bats and his study of the bat fauna of Liberia. He submitted his comprehensive treatise on "Systematics of Chiroptera" for the *Handbuch der Zoologie* series, to be published in Germany by Walter De Gruyter & Co.

Primate Social Behavior Curator Ethel Tobach pursued the relationship between individual adjustment, social behavior and environmental characteristics as they affect foraging, feeding, communication and self-awareness in primates.

The orangutan has not been as extensively studied in these respects as the chimpanzee. The Sedgwick County Zoo, Wichita, Kansas, has a group of orangutans in an ecologically, physiologically and behaviorally healthful setting. Dr. Tobach, in collaboration with Gary Greenberg, Curator of Behavioral Research at the Zoo, and Kenneth Redman, the Zoo's

Marie A. Lawrence, Senior Scientific Assistant in the Department of Mammalogy, examines the holotype of one of the lion species. The holotype specimen is the standard against which other suspected members of a species are com-



pared. She is revising the department's catalog of holotypes, which are so important to systematists that the department's collection of them, numbering roughly 1000, is stored apart from the rest of the collection.

Curator of Mammals, conducted a study in which they found that orangutans have a complex relationship with each other.

Captivity, with enforced proximity, was not sufficient to explain the group's social organization. The activity of the group's infants also brought the adults of both sexes together in small groupings, which appeared to challenge the asocial reputation of orangutans.

To investigate how new feeding patterns develop in an island-bound population of monkeys, Dr. Tobach, in collaboration with Bernadette Marriott of the University of Puerto Rico and Alexander Skolnick, a candidate for the Master's degree in Biopsychology at Hunter College, has been studying rhesus macaques on Cayo Santiago, a facility of the University of Puerto Rico. These animals, which are typically herbivorous, have been seen in the water off the island, foraging and feeding on marine organisms.

Social/Emotional Behavior

A powerful species adaptation to the environment is the ability of individual organisms to discriminate nutritive and toxic substances by taste, a chemical sense. The significant role of genetic processes in this differential sensitivity is well known. For this reason, the function of chemical sensitivity in the differential selection of amino acids has continued to engage Dr. Tobach and Scientific Assistant Teresa Hernandez. They are working with the Fawnhooded rat, an animal with a low level of serotonin in the pineal gland and blood platelets. In a series of experiments, they offered the rat the opportunity to drink sweet solutions made with non-nutritive saccharin and the amino acid D-tryptophan, or bitter solutions made with non-nutritive PTC and the amino acid L-tryptophan (a precursor of serotonin). The results showed that the Fawnhooded rat drank more L-tryptophan and less

D-tryptophan than the normal rat (Wistar). The Fawnhooded rat also drank as much saccharin as the normal rat, but more of the bitter PTC than the normal rat. These results point to the possibility that *Rattus norvegicus*, as represented by these two laboratory stocks, may have specific sensory mechanisms for discriminating between the amino acids as well as bitter and sweet-tasting substances.

Dr. Tobach, with visiting scientist Marjorie Goldman, Mr. Skolnick, and high school student Frank Lopez (Middle College High School, New York City), studied jumping behavior in *Acomys cahirinus*. Although these desert spiny mice can discriminate distance when jumping vertically, they do not discriminate distance cues of depth or shallowness when they are presented horizontally.

Sea Hares Conducting research on the inking behavior of *Aplysia dactylomela* (sea hares) in Puerto Rico, Dr. Tobach, in collaboration with undergraduate Andrea Zafares (University of Michigan) and Luis Migenis-Lopez, a Master's degree candidate at the University of Puerto Rico, showed that the release of ink and opaline by immature sea hares did not prevent their being eaten by predators. This discovery supports Dr. Tobach's hypothesis that ink in *Aplysia* is not a defense mechanism.

Philippine Mammals The thousands of islands comprising the Philippine archipelago support an ecologically and morphologically diverse mammalian fauna of about 150 endemic species. Approximately a third of the fauna consists of native species of rats and mice. Some species occur on most islands in the archipelago, and some are endemic to either the northern group of islands or to the southern cluster. Some of these native rats have been known to zoologists for many years, while others have been discovered only recently.

For most species, very little is known of their actual insular distributions in the archipelago, and hardly any information is available about their phylogenetic relationships and evolutionary histories. Dr. Musser and Lawrence Heaney of the National Museum of Natural History, Smithsonian Institution, have been studying these native Philippine rodents. Dr. Musser's experience with morphological variation within and between species, combined with Dr. Heaney's field knowledge of habitats and distributions, is providing a data matrix of morphological, ecological and distributional information. The data will be used in preparing hypotheses of phylogenetic relationships among the species and between the Philippine fauna and rodent faunas from surrounding regions.

The study is part of a more expansive endeavor committed to discovering biogeographic patterns that may yield insights into evolution of the rodent assemblages native to various archipelagos in the Indo-Australian region.

Timor Rodents The rodents now living on Timor are commensal species, benefiting from their association with human environments. Although these species are not native to the Malay-Australian region, native rodents once occurred on the island and are represented by thousands of subfossil pieces collected from sediments ranging from 240 to 13,400 years old. The material comes from eastern Timor and was obtained by Ian Glover of the Institute of Archaeology at the University of London. Samples were sent to Dr. Musser, who sorted the material into what appeared to be different species.

Four species of giant rats were present as well as two species of *Melomys*, a genus of small-bodied rats that are native to the Moluccan Islands, New Guinea and Australia. Most of the species will have to be described and named, and samples of all the Timor species must be

compared with the living rodent fauna endemic to the eastern segment of the Indo-Australian region to obtain some estimate of phylogenetic relationships of these Timor endemics.

Scientific Publications:

Best, T.L., R.M. Sullivan, J.A. Cook, and T.L. Yates

1986. Chromosomal, genic, and morphologic variation in the agile kangaroo rat, *Dipodomys agilis* (Rodentia: Heteromyidae). Syst. Zool., 35(3): 311-324.

Burton, D.W., J.W. Bickham, H.H.

Genoways, and T.J. McCarthy

1987. Karyotypic analysis of five rodents and a marsupial from Belize, Central America. Ann. Carnegie Mus. Nat. Hist., 56(4): 103-112.

Daly, J.C., and J.L. Patton

1986. Growth, reproduction, and sexual dimorphism in *Thomomys bottae* pocket gophers. J. Mamm., 67: 256-265.

Emmons, L.H.

1987. Comparative feeding ecology of felids in a neotropical rain forest. Behav. Ecol. Sociobiol., 20: 271-283.

Gautier-Hion, A., J.-M. Duplantier, L.H.

Emmons, F. Feer, P. Hecketsweiler, A.

Moungazi, R. Quris, and C. Sourd.

1985. Coadaptation entre rythmes de fructification et frugivorie en forêt tropicale humide du Gabon: mythe ou réalité. Rev. Evol., 40: 405-434.

Gentz, E.J., and T.L. Yates

1986. Genetic identification of a hybrid camelid. Zoo Biol., 5(4): 349-354.

Gibson, D.I., and T.J. McCarthy

1987. Bats as hosts of acanthocephalan parasites. Helminth. Abstr., Ser. A, 56(5): 159-162.

Gill, A.E., D.P. Christian, J.N. Layne, J.S.

Millar, and J.L. Patton

1987. Roles of standing communities of the American Society of Mammalogists. J. Mammal. Suppl., 68(1): 1-13.

Hafner, M.S., J.C. Hafner, J.L. Patton, and M.F. Smith

1987. Macrogeographic patterns of genetic differentiation in pocket gophers, *Thomomys umbrinus*. Syst. Zool., 36(1): 18-34.

Layne, J.N.

1986. Observations on Cooper's hawk nesting in south-central Florida. Fl. Field Nat., 14: 85-95.

1987. *Leiocephalus carinatus* (curly-tailed lizard). Herp. Rev., 18: 20.

Layne, J.N., T.J. Walsh, and P. Meylan

1986. New records for the mole snake, *Lampropeltis calligaster* in peninsular Florida. Fl. Sci., 49: 171-175.

McCarthy, T.J.

1986. The gentle giants of Belize. Part II: distribution of manatees. Belize Audubon Soc. Bull., 18(1): 3-5.

1987. Additional mammalian prey of the carnivorous bats, *Chrotopterus auritus* and *Vampyrus spectrum*. Bat Res. News, 28(1): 2-3.

McCarthy, T.J., and M. Blake

1987. Noteworthy bat records from the Maya Mountains Forest Reserve, Belize. Mammalia, 51(1): 109-112.

Musser, G.G.

1986. Sundaic *Rattus*: definitions of *Rattus baluensis* and *Rattus korinchi*. Am. Mus. Novitates, no. 2862, 24 pp.

1987. Mammals of Sulawesi. In T.C. Whitmore (ed.), Biogeographic evolution of the Malay Archipelago, pp. 73-93. London: Oxford Univ. Press.

1987. The occurrence of *Hadromys* (Rodentia: Muridae) in early Pleistocene Siwalik strata in northern Pakistan and its bearing on biogeographic affinities between Indian and northeastern African murine faunas. Am. Mus. Novitates, no. 2883, 36 pp.

Musser, G.G., and M. Dagosto

1987. The identity of *Tarsius pumilus*, a pygmy species endemic to the montane mossy forests of central Sulawesi. Am. Mus. Novitates, no. 2867, 53 pp.

Olivera, J., J. Ramirez-Pulido, and S.L. Williams

1986. Biología de la reproducción de *Peromyscus alstoni* (Mammalia: Muridae) en condiciones de laboratorio. Acta. Zool. Méx., n.s., 16: 1-27.

Ramirez-Pulido, J., M.C. Britton, A.

Perdomo, and A. Castro

1986. Guía de los mamíferos de México. Referencias hasta 1983. Univ. Autónoma Metropolitana Iztapalapa.

Sage, R.D., J.R. Contreras, V.G. Roig, and J.L. Patton

1986. Genetic variation in the South American burrowing rodents of the genus *Ctenomys* (Rodentia: Ctenomyidae). Z. für Sauget., 51: 158-172.

Sarmiento, E.E.

1987. The phylogenetic position of *Oreopithecus* and its significance in the origin of the Hominoidea. Am. Mus. Novitates, no. 2881, 44 pp.

Schaller, G.B., T. Qitao, P. Wenshi, Q. Zisheng, W. Xiaoming, H. Jinchu, and S. Heming

1986. Feeding behavior of Sichuan takin (*Budorcas taxicolor*). Mammalia, 50(3): 311-322.

Smith, D.R., and J.N. Layne

1986. Occurrence of a double brood in red-headed woodpeckers south central Florida. Fl. Field Nat., 14: 98-99.

Sullivan, R.M., D.J. Hafner, and T.L. Yates

1986. Genetics of a contact zone between three chromosomal forms of the grasshopper mouse (*Onychomys*): a reassessment. J. Mammal., 67(4): 640-659.

Terborgh, J., L.H. Emmons, and C. Freese

1986. La fauna silvestre de la Amazonia: el despilfarro de un recurso renovable. Bol. de Lina, 46: 77-85.

Tobach, E.

1986. Evolutionary theories and the issue of nuclear war: implications for mental health. Int. J. of Mental Health, 15: 56-64.

Tobach, E., K. Murofushi, J. Beatty, and J. Takahashi

1987. Changes in social behavior of *Macaca fuscata yakui* in relation to unfamiliar objects. Bull. Psychonomic Soc., 25(2): 106-108.

Wolfe, J.L., and D.K. Bradshaw

1986. Homing behavior in the nutria. J. Mississippi Acad. Sci., 31: 1-4.

Wolfe, J.L., D.K. Bradshaw, and R.H.

Chabreck

1987. Alligator feeding habits: new data and a review. Northeast Gulf Sci., 9(1): 1-8.

Yates, T.L., W.R. Barber, and D.W.

Armstrong

1987. Survey of North American collections of recent mammals. J. Mamm. Suppl., 68(1): 1-76.

Abstracts and Popular Publications:

Anderson, S.

1986. A survey of the literature of natural history. *AB Bookman's Weekly*, June, 2: 2533-2535, 2538.

Emmons, L.H.

1986. Jungle cruisers. *Anim. Kingdom*, 90: 22-30.

Griffiths, T.A.

1987. Library education: the point of view of the scientist. In L. Colter (ed.), *Leadership and the liberal arts*, pp. 1-28. Bloomington, IL: Illinois Wesleyan University Press.

Koopman, K. F.

1986. [Review of] Cladistic theory and methodology, *Bioscience*, 36: 691-692.

Layne, J.N.

1986. (Abstract) Plumages and molts of the crested caracara (*Polyborus plancus*). In *Program and abstracts, Raptor Res. Found. Annu. Meeting*, Gainesville, FL., p. 27.

Martin, P.L., and J.N. Layne

1987. (Abstract) Relationship of gopher tortoise size to burrow size. *Fl. Sci.*, 50 (Supplement 1): 36.

Department of Mineral Sciences

The Department of Mineral Sciences has four curators and support staff to carry out research programs in petrology, economic geology, mineralogy and meteoritics. It manages extensive collections in these fields and the complex equipment needed to carry out the research. Its goal is to understand processes operating in the Earth and in the solar system by studying samples from the collections. Research this year focused on carbon in the Earth's mantle; on platinum, on jadeite and on olivine; on migration of gold in groundwater; on meteorites called polymict ureilites, on a basaltic asteroid, and on ore deposits under volcanoes. Significant equipment was acquired, including a petrographic microscope, new computers and an automation package for the powder X-ray diffractometer. The mineral and meteorite collections grew significantly by means of important donations, exchanges and purchases.

Acquisitions and Loans This year, 1350 minerals and gems were acquired, up from last year's total of 433. Of these, 1170 were donated, 25 exchanged, 100 purchased and 55 recovered from the collections.

Some of the notable gifts include the Conrad Yandola collection of more than 1000 specimens; two gem-quality emeralds from the Swat district of Pakistan; nine synthetic berlinite crystals; and a small collection from the Brumado Mine, Bahia, Brazil.

Some of the purchases include a 67.35-carat sphalerite from Picos de Europa, Spain; a suite of minerals from Kuruman and Phalaborwa,

South Africa; a fine, rare crystal of pollucite from Pakistan and a crystallized azurite from Arizona. Among the 175 minerals and gems loaned to various institutions were Siberian minerals to The Frick Collection for their exhibition on Jean-Baptiste Le Prince, a naturalist who visited Siberia in the 1760s.

Eighteen meteorites were acquired last year as a result of donations and exchange. These included Otinapa, a pallasite from Mexico, and a fine specimen of the Mundrabilla iron. Twenty-eight meteorite specimens were loaned to a wide range of institutions, including University of California at Los Angeles, University of Tennessee, University of Arizona, University of Chicago, NASA-Johnson Space Center, and The Open University at Milton Keynes, England.

New Instrumentation New equipment was acquired this year that improved the productivity and capabilities of the department, notably an automation package for the powder X-ray diffractometer. Previously, one could analyze only one mineral specimen at a time, measure the X-ray peaks, compare the values to those of known substances and interpret the results. Now, up to 35 specimens can be analyzed automatically, one after another, culminating in a computer search for comparisons with known substances. The automation upgrade, which cost about \$75,000, permits a broader research and identification program.

A new Nikon petrographic microscope, which can use transmitted and reflected light, was also acquired.

Education and Exhibition

The main educational event was the development of the AMNH-Columbia doctoral training program, allowing graduate students to work for the Ph.D. in

the Department of Geological Sciences and Lamont-Doherty Geological Observatory of Columbia University, in collaboration with a curator in the Museum's Department of Mineral Sciences. Students apply to and are accepted by Columbia, which will pay their tuition for up to five years; the Museum will pay for their stipends and fringe benefits. Stipend funds can come from grants to the supervising curator or the Museum doctoral training program. The first Ph.D. candidate, Cheryl Peach, was scheduled to begin work with Assistant Curator Edmond A. Mathez in September, 1987.

At the Museum, a course entitled "Metals, Mining and Man" was taught by Assistant Curator Demetrius C. Pohl, and another course, "Gems of the Earth," was taught by Associate Curator George E. Harlow. Dr. Pohl, Senior Scientific Assistant Joseph J. Peters, and Chairman and Curator Martin Prinz. All of the curators gave lectures on their research at national meetings, at universities, at mineral clubs and at mineral and gem shows. Scientific Assistant Michael K. Weisberg lectured on meteorites to gifted children. Dr. Harlow was interviewed several times on national television about so-called "crystal power" and its effect on health and stress. He maintained that there was no scientific basis for the effects cited, other than psychological.

Small traveling exhibits of minerals and gems were presented in Tucson, Providence, Detroit and West Paterson, N.J. The Brunflo fossil meteorite, from Sweden, was on temporary display in the Arthur Ross Hall of Meteorites. The meteorite has been preserved for about 460 million years inside a limestone which has been metamorphosed to marble. No other meteorite is known to have resided on Earth for more than about five million years. The exhibit was opened to the public on the

occasion of the 49th Annual Meeting of the Meteoritical Society, held at the Museum from Sept. 21-24, 1986, and attended by 320 scientists from all over the world.

Geochemistry of Mantle Carbon Carbon is thought to constitute the major element in vapor and therefore plays a vital role in the deep Earth because vapor influences the bulk physical properties of the mantle and the nature of magma formed there. The amount of carbon that can dissolve in the minerals of the mantle helps determine where vapor exists in the Earth.

In order to determine carbon solubilities, Assistant Curator Edmond A. Mathez, in collaboration with Drs. Jim Blacic and Carl Maggiore of Los Alamos National Laboratory, developed ways of using high-energy beams of deuterium ions to analyze carbon in small spots in minerals. Their study showed that very little carbon can dissolve in mantle olivine, disproving some theories. Their technique can be used to study carbon solubilities in synthetic ultra-high pressure minerals thought to be similar to those present in the deep mantle.

Platinum Most of the world's supply of platinum and related elements comes from large layered mafic intrusions in South Africa (the Bushveld) and the Soviet Union (the Noril'sk). Platinum has also been discovered in the Stillwater intrusion in Montana, which represents a significant additional resource and should come into production soon. The growing demand for platinum in chemical processes encourages even more exploration and research into such unresolved questions as the roles and relative importance of high-temperature vapor and magmatic sulfides in concentrating platinum.

Several studies by Dr. Mathez and coworkers are directed at resolving this issue. In one, he and

graduate student Cheryl Peach have analyzed the sulfide particles in submarine basalts. The equilibria between silicate magma and sulfide are preserved in these rocks, which therefore provide good models for the magmas of layered intrusions. The sulfide particles were found to be highly enriched in certain elements to which platinum is related. The data confirm that sulfides may be important in concentrating platinum in layered intrusions, but in a more complex process than previously thought.

Dr. Mathez and colleagues Drs. I.S. McCallum and A.E. Boudreau of the University of Washington discovered unusually chlorine-rich apatite in the Stillwater and Bushveld rocks, which led them to propose that platinum was transported by high-temperature chlorine-rich fluids. The chemical properties of such fluids are now being deduced theoretically.

Gold in Groundwater The discovery that gold and silver can be dissolved and transported in saline groundwater prompted an investigation by Dr. Pohl of the chemistry of groundwater from Sierra Gorda in Chile. He found that the water had one of the highest bromine to chlorine ratios ever recorded, and that bromine was largely responsible for the large amount of gold dissolved in the groundwater. Bromine in groundwater may indicate gold enrichment in mineral deposits in arid environments.

Dr. Pohl also visited the Guanaco district in Chile, which has geochemical similarities to the Sierra Gorda district. He became aware of the existence of this locality by finding specimens from the area in the Museum's collections. The Guanaco gold deposits show the same mode of gold enrichment imposed on a system of epithermal vein gold deposits.

Study of the mineralogy of the

La Compania mine at Sierra Gorda has revealed an unusual assemblage of lead, copper and silver chloride minerals typical of deposition from very saline groundwater. This assemblage contains a new mineral species that is being characterized by Drs. Pohl and Harlow, and Donald Whittemore of the Kansas Geological Survey. The small, brilliantly glassy crystals found growing in the ore are a new compound of lead, chlorine and iodine. Only two other similar compounds are known to occur naturally.

Jadeitites Dr. Harlow continues his research on the jadeite-rich rocks from Guatemala that he collected in 1984, making progress in two areas: the breakdown reactions recorded in the jadeitites and the archeological implications. The jadeitites occur in the host serpentine rock as pods rimmed with albite rock (albite is a sodium feldspar that is compositionally jadeite and quartz). Studies show a complex set of reactions that break down the jadeite rock into feldspar rock (plus unusual minerals), indicating a dramatic change in the geochemical conditions around jadeite near the Earth's surface. A proposed model of the reactions appears to solve some of the problems posed in the literature on jadeite genesis (at least for Guatemalan occurrences).

Dr. Harlow addressed an archeological problem: The Maya and Olmec were the first humans to work jadeite into artistic objects, but the source of the full range of Mesoamerican lapidary materials has been a nagging problem. Dr. Harlow has found that the assemblage of jadeite, albite and other assorted green rocks from the Motagua Valley in Guatemala appears to account for a larger proportion of the "jades" of Mesoamerica than previously thought. His studies show that emerald-green jade, composing many of the finest artifacts, can be found along

with other Guatemalan jadeitites. He finds that the Motagua Valley was probably the primary, if not the only, source of true jadeite jades and many of the albitite jades.

Olivine Olivine is a major mineral in the Earth's upper mantle and in basaltic rocks, and is nominally water-free. Dr. Harlow collaborated with George Rossman and one of his students at the California Institute of Technology on the measurement of H_2O-OH in olivine. They discovered a wide range of abundances and modes of minor hydration in olivines. This work and its implications were presented in a recent paper. Further study of these same samples is underway in order to determine how the water is incorporated into the olivine, with respect to the geologic source of the olivine.

Polymict Ureilites In last year's report, note was made of studies by Dr. Prinz, Research Associate C.E. Nehru, Research Fellow Jeremy S. Delaney, and Mr. Weisberg on an unusual group of meteorites called ureilites. They contain mainly olivine, pigeonite, and carbon (including shock-produced diamonds) and form under unusual conditions that are not fully understood. They appear to have undergone melting, just as rocks from the Earth have, but only one rock type predominates.

This year a new group of ureilites was recognized by Dr. Prinz and his research group. They are called polymict because they contain bits and pieces of a wide variety of rock types, some of which are similar to the ureilites already known. The polymict ureilite group consists of only three members, two discovered just recently. The small pieces of differing rock types are being characterized, and have so far revealed that the planet from which the ureilites are derived is quite different from what had been previously thought. Some of the fragments, as well as new data on oxygen isotopes,

indicate that this planet is rather primitive in its origins, in spite of the rock types having experienced high-temperature melting. The polymict ureilites show that the included rock types are closely related to primitive carbonaceous chondrites, even though they appear to be non-chondritic. Years of future studies, by Dr. Prinz and his group, as well as other scientists, will be needed to sort out the significance of these non-primitive-appearing primitive materials.

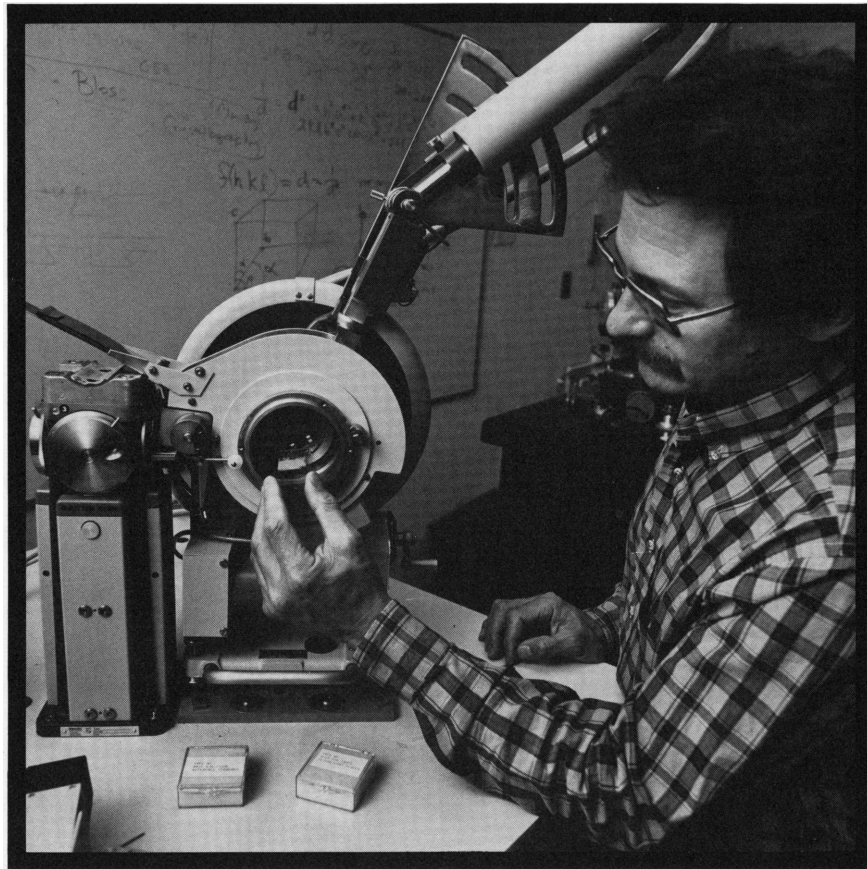
A Basaltic Asteroid Research Fellow Jeremy S. Delaney worked on the development of a comprehensive model that relates all the meteoritic basaltic achondrites to one another. Using several different approaches, he tried to find the least number of conditions that account for all the meteorites. He produced a model significantly more complex than earlier attempts, and suggests that the basaltic achondrites are from a fairly large asteroidal body with a diameter greater than roughly 500 kilometers (300 miles). Only near-surface samples are represented among the meteorites.

The asteroid has followed an evolutionary path similar to that of the Earth and Moon, and these similarities indicate that the processes that shape the surface of the Earth are common to all rocky planets and are not a special case resulting from its large size and high energy content.

Research on the continuing supply of new Antarctic meteorites was carried out with the help of graduate student Stephen Okulewicz. Volunteer William Zeek photographed dozens of rock fragments from these meteorites and is creating a computer-based catalog of the hundreds of fragments that represent the basaltic planetoid.

Dr. Delaney also studied the partitioning of minor and trace elements between minerals in meteorites. This type of study is fundamental to elucidating the

Demetrius C. Pohl, Assistant Curator in the Department of Mineral Sciences, loads a sample into the department's X-ray diffractometer. He uses it to help him understand the conditions in



which gold and silver deposits form. The newly computerized research tool is widely used in the department to help in identification and analysis of coexisting minerals.

physical conditions under which the meteorite assemblages formed, and involved three main groups of meteorites: irons, basaltic achondrites and ureilites. Sensitive instruments such as the ion microprobe and the synchrotron X-ray fluorescence microprobe have helped obtain significant results.

Ion microprobe studies of basaltic achondrite feldspars, with Dr. R.L. Hervig at the Arizona State University, revealed that the partitioning of alkali elements constrain the magmatic and shock histories of basaltic achondrites. Work on iron meteorites proceeded in collaboration with Stephen Sutton of Brookhaven National Laboratory and Research Associate J.V. Smith of the University of Chicago. The research provided important new constraints on the partitioning of trace elements in iron meteorites. Trace element data, in turn, constrain the cosmological history of meteorites, so that the new insights will have far reaching influences on our understanding of past events.

Ore Deposits Under Volcanoes

Kalbfleisch Research Fellow Christopher J. Fridrich is studying the environment in which a large disseminated copper deposit formed in the Sierrita Mountains of southeastern Arizona. Recent fieldwork on this project revealed that the present-day horizontal bedrock surface of the Sierrita Mountains is a natural cross-section through the upper crust of the Earth as it was when copper mineralization occurred. The slab-like fault block under study was once vertical but, under the forces of plate tectonics, the slab and its neighbors tilted over, much as a row of dominoes falls. In this cross-section, the ore deposit is located under a large, extinct caldera volcano, at the top of a massive body of granite that crystallized from the magma reservoir that fed the volcano from below. Ongoing analytical work is aimed at under-

standing the chemical and physical evolution of the magma reservoir and the associated ore-forming hydrothermal system from the earliest volcanic stage to the final mineralization stage.

Scientific Publications:

- Delaney, J.S., and M. Prinz
1987. ALH 82106/130 and the fractionation of augite-bearing ureilites. *Lunar Planet. Sci.*, 18: 802-803.
- Dowty, E.
1987. Fully automated microcomputer calculation of vibrational spectra. *Phys. Chem. Minerals*, 14: 67-79.
1987. Vibrational interactions of tetrahedra in silicate glasses and crystals: I. Calculations on ideal silicate-aluminate-germanate structural units. *Phys. Chem. Minerals*, 14: 80-93.
1987. Vibrational interactions of tetrahedra in silicate glasses and crystals: II. Calculations on melilites, pyroxenes, silica polymorphs and feldspars. *Phys. Chem. Minerals*, 14: 122-138.
- Fridrich, C.J., and G.A. Mahood
1987. Compositional layers in the zoned magma chamber of the Grizzly Peak Tuff. *Geology*, 15: 299-303.
- Harlow, G.E., and E.P. Olds
1987. Observations on terrestrial ureyite and ureyitic pyroxene. *Am. Mineral.*, 72: 126-136.
- Lindsley, R.L., and J.J. Peters
1987. Garnets from Delaware County, Pennsylvania. *Rocks and Minerals*, 62: 175-178.
- Liou, J.G., D.C. Pohl, J.M. Potter, and R. Guillemette
1986. Dickson-type hydrothermal apparatus for water-rock interaction experiment. *Memoirs for Prof. Sang Man Lee's Sixtieth Birthday*, pp. 17-33.
- Mathez, E.A., J.D. Blacic, J. Beery, C. Maggiore, and M. Hollander
1987. Carbon in olivine: Results from nuclear reaction analysis. *J. Geophys. Res.*, 92: 3500-3506.
- Miller, G.H., G.R. Rossman, and G.E. Harlow
1987. The natural occurrence of hydroxide in olivine. *Phys. Chem. Miner.*, 14: 461-472.
- Okulewicz, S., and J.S. Delaney
1987. Petrography of EET 83212, 7 and EET 83229, 7: A comparison of 2 new howardites. *Lunar Planet. Sci.*, 18: 748-749.

O'Neill, C., Y. Ikeda, and J.S. Delaney
1987. The compositional zoning of feldspathic phases in Allan Hills 77005, 2. *Lunar Planet. Sci.*, 18: 750-751.

Parks, G.A., and D.C. Pohl
1986. Hydrothermal solubility of uraninite. *Dep. Energy/Earth Res. Fin. Tech. Rep.*, 12016-1, 42 pp.

Pohl, D.C.
1986. Supergene gold migration and enrichment, Sierra Gorda, Chile. *Proceedings, Geocongress '86*: 575-578, Johannesburg, S.A.

Pohl, D.C., F. Llerena, and V. Quirita
1987. Mineral zoning related to fossil geothermal systems, Castrovirreyana Ag-Pb-Zn District, central Peru. In R.D. Hagni (ed.), *Process Mineralogy VI*: 239-252. The Metallurgical Society.

Potter, J.M., D.C. Pohl, and J.D. Rinsidt
1987. Fluid flow systems for kinetic and solubility studies. In G.C. Ulmer and H.L. Barnes (eds.), *Hydrothermal experimental techniques*, pp. 240-260. New York: John Wiley and Sons.

Prinz, M., M.K. Weisberg, C.E. Nehru, and J.S. Delaney
1987. Bencubbin, Kakangari, Tucson and Renazzo: A speculative connection between some of their major components. *Lunar Planet. Sci.*, 18: 800-801.

1987. EET 83309, a polymict ureilite: Recognition of a new group. *Lunar Planet. Sci.*, 18: 802-803.

Sutton, S.R., J.S. Delaney, J.V. Smith, and M. Prinz
1987. Trace element contents of eucritic plagioclase determined by synchrotron X-ray fluorescence. *Lunar Planet. Sci.*, 18: 980-982.

Weisberg, M.K.
1987. Barred olivine chondrules in ordinary chondrites. *Proceedings Seventeenth Lunar and Planetary Science Conference, Part 2. J. Geophys. Res.*, 92 (B4): E663-E678.

Abstracts and Popular Publications:

Delaney, J.S., M. Prinz, S. Sutton, and J.V. Smith
1986. Chalcophile and siderophile behavior of Cu and its effect on the composition of iron meteorites. *Meteoritics*, 21: 351-352.

Delaney, J.S.
1986. A provincial model for the crust of a basaltic achondrite planetoid. *Meteoritics*, 21: 352-353.

Harlow, G.E.

1986. (Abstracts) Metasomatic/retrograde reactions in Guatemalan jadeitite. Geological Society of America, 18: 629.

1986. Jadeitites and their fluid inclusions from Rio Motagua, Guatemala. International Mineralogical Association, 14th General Meeting, Stanford University, p. 119.

Hervig, R., J.S. Delaney, and C. O'Neill
1986. Evidence for partial remelting of Stannern and comparison with a silica-bearing clast in Juvinas. Meteoritics, 21: 395-396.

Mathez, E.A., J.D. Blacic, J. Beery, C. Maggiore, and M. Hollander
1986. Carbon in olivine by nuclear reaction analysis. Fourth International Kimberlite Conference (Perth), Geol. Soc. Australia, 16: 410.

Mathez, E.A., V.J. Dietrich, J.R. Holloway, and E.A. Boudreau
1987. Chemical evolution of vapor during crystallization of the stillwater complex. Geo-Platinum 87 Symposium, The Open University, Milton Keynes, U.K.

Mathez, E.A., F. Pineau, and M. Javoy
1987. The nature of carbonaceous matter in mantle xenoliths and its bearing on the isotopes. Terra Cognita, 7: 401.

Parks, G.A. and D.C. Pohl
1986. Hydrothermal solubility of uraninite, UO₂. 69th Canadian Chemical Conference, Saskatoon, Saskatchewan, Paper no. IN-A3-3, p. 65.

Peach, C.L., and E.A. Mathez
1987. Gold and iridium in sulphides from submarine basalt glasses. Geo-Platinum 87 Symposium, The Open University, Milton Keynes, U.K.

Pohl, D.C.
1986. Supergene transport of gold in bromide groundwater. Geological Society of America, Program with abstracts, 18: 720.

Prinz, M., M.K. Weisberg, C.E. Nehru, and J.S. Delaney
1986. Layered chondrules in carbonaceous chondrites. Meteoritics, 21: 485-486.

Takeda, H., H. Tbyoda, J.S. Delaney, and M. Prinz
1986. A Yamato polymict eucrite with some affinities to howardites. Meteoritics, 21: 523-524.

Weisberg, M.K.
1986. Barred olivine chondrules in carbonaceous chondrites. Meteoritics, 21: 535-536.

Department of Ornithology

The Department of Ornithology's staff combines research on birds with a diverse program of public education, preservation efforts and cooperative ventures with ornithologists throughout the world. The curators and scientific assistants maintain a study skin collection of about one million specimens, the largest by far in the western hemisphere. Ornithologists from around the world visited the department to consult the collection during July and August, after the 19th International Ornithological Congress in Ottawa. Investigations into the systematics, behavior, biogeography and ecology of this popular group of animals took department staff to four continents.

Honeyguides Chairman and Curator Lester L. Short spent July to October and parts of December and January conducting research on honeyguides and other woodpeckerlike birds with Jennifer F.M. Horne, research associate of the National Museums of Kenya, on the Gallmann Memorial Foundation's Ol Ari Nyiro Ranch in central Kenya. They color-marked 147 honeyguides of four species and studied the birds' behavior and ecology. They have been invited to present their results at the German Ornithologists' Union Centennial Meeting in 1988.

Cuban Ties The remarkable finding of the near-extinct Ivory-billed Woodpecker (*Campephilus principalis*) in Cuba by Dr. Short, Ms. Horne and other Cuban and American ornithologists in 1986 led to a return trip to Cuba in April, mainly for ministerial-level discussions of how best to preserve the woodpecker and enhance con-

servation in that country. The ornithologists attended meetings with Cuban biologists and officials at which policies for conservation were put forth and equipment and other needs were ascertained.

There appears to be optimism for preservation of the woodpecker, one of the rarest birds in the world. Dr. Short and Ms. Horne were awarded medals for their conservation efforts by the Governor of Havana, and Dr. Short was named Special Consultant to the Cuban government on the Ivory-billed Woodpecker.

Tyrant Flycatchers Wesley E. Lanyon, Lamont Curator of Birds, continued his investigation of higher-level relationships among the tyrant flycatchers (Tyrannidae), the largest family of birds in the New World. Approximately 85 percent of the 112 genera in the family have been placed in monophyletic assemblages, groups consisting of species derived from a single ancestor. The foundation for this research is a unique comparative series of skeletons and of cleared and stained syringes (sound-producing organs). Dr. Lanyon has identified in the cranium and in the syrinx of flycatchers shared derived characters that are less variable evolutionarily than commonly used external characters, and that can be used to determine the limits of genera and to reconstruct phylogenies.

Collaboration between Dr. Lanyon and colleagues at the Field Museum of Natural History led to a paper on the phylogeny of the tody-tyrants, the smallest of the New World flycatchers, and to a biochemical analysis of the relationships among the flycatchers independent of the relationships determined by morphology. Dr. Lanyon also worked with Richard Prum, a graduate student at the University of Michigan, on reconstructing a phylogeny of the manakins (Pipridae) using syringeal characters. Manakins had

been considered just close relatives of tyrant flycatchers, but six genera of manakins probably should be reclassified as tyrant flycatchers because they share the uniquely derived syringeal character that defines them.

Dr. Lanyon carried out a second season of fieldwork in the Adirondack Mountains on the evolutionary relationships and interactions of two species of chickadees, the Boreal Chickadee (*Parus hudsonicus*) and the Black-capped Chickadee (*P. atricapillus*). The research will examine the extent to which the two species interact during the breeding season and the behavioral and ecological factors that influence that interaction.

Quasi-Island Biogeography

Curator François Vuilleumier did fieldwork in southern Chile in February and March sponsored by the Leonard C. Sanford Fund. He studied patterns of speciation in five genera of birds distributed from the Andes to Patagonia (*Attagis*, *Polyborus*, *Cinclodes*, *Geositta*, and *Phrygilus*). As on islands, there appear to be cases of isolation and double invasion, possibly because of the repeated ebb and flow of glaciers. The result is complex patterns of replacement of related species, and hybridization between *Phrygilus patagonicus* and *P. garyi*. Dr. Vuilleumier and his colleagues obtained peat cores for the sequences of fossil pollen and fossil beetles that may allow reconstruction of biogeographic events of the last 12,000 years.

Geographic Variation in Juncos

George F. Barrowclough, Associate Curator, conducted fieldwork in the summer of 1986 at the Southwestern Research Station, collecting series of specimens of *Junco phaeonotus*, *Junco hyemalis caniceps* and *J. h. dorsalis*. The skin, skeleton and tissue samples are being used in investigations of microgeographic variation in

J. phaeonotus and the transition between the two subspecies of *J. hyemalis*.

Dr. Barrowclough began a study of the systematics of the Darwin's Finches (Geospizinae) of the Galapagos Islands with Robert M. Zink of the Louisiana State University Museum of Zoology. This varied research program makes extensive use of the department's skeletal collection, which Dr. Barrowclough oversees, and which is growing at 5 to 10 percent per year.

Birds of Prey Lamont Curator Emeritus Dean Amadon completed a reference list of the world's species of hawks, falcons and owls with Field Associate John Bull and Joe T. Marshall of the U.S. Fish and Wildlife Service.

Senior Scientific Assistant Mary LeCroy studied display behavior of birds of paradise in the hills of the Huon Peninsula in Papua New Guinea. Research Associate Walter J. Bock assumed duties as the first Permanent Secretary of the International Ornithological Congress. Associate Parker Cane studied Liberian birds in the Museum's collection, documenting a significant range extension for an African sunbird.

Research Associate Cheryl F. Harding completed research demonstrating that singing behavior in male Red-winged Blackbirds can only be activated by the combined action of male and female hormones. In fact, most of the calls in this species seems to be under similar hormonal control, highlighting the importance of female hormones in activating normal patterns of male behavior.

Ornithologist in China

Field Associate Ben F. King continued his Asian bird studies in the field and in the Museum. Following up last year's fieldwork in Sichuan, China, he provided conclusive evidence that the warbler *Bradypaterus thoracicus* actually represents

two distinct species, based upon vocal, plumage and ecological differences between two populations. He made field trips to Malaysia in July and August, and to Thailand and Burma in November, observing many little-known species, and tape-recording their voices. In December he was invited to visit an area of Jiangxi Province in southern China, where he studied the endangered Elliot's Pheasant (*Syrnaticus ellioti*). The first non-Chinese ornithologist to observe this species in the wild since prior to World War II, Mr. King proposed means to insure the bird's preservation.

Research Associate Robert F. Rockwell studied the Lesser Snow Goose (*Chen caerulescens caerulescens*) near Churchill, Manitoba, in the summer of 1986 and late spring 1987, in collaboration with Fred Cooke of Queen's University, Canada. Their goal is to construct a life table for the species, which summarizes a wealth of information, including fecundity, growth rate and survivorship. Goose embryos that have failed to hatch are being examined for abnormalities, which could signal potentially toxic accumulation of substances by the adults on their migration.

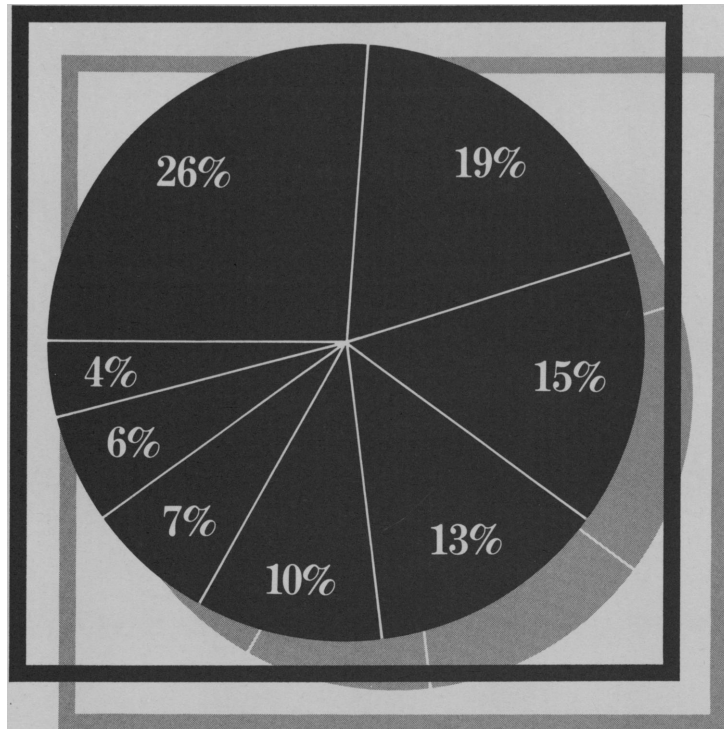
Awards The Frank M. Chapman Memorial Fund Committee awarded 71 grants to researchers, mainly graduate students, around the world. Chapman Fellowships were also awarded, to Jonathan Becker of the Smithsonian Institution for studies of small arboreal birds of the Neogene of North America, and to Angelo Capparella of Louisiana State University for studying phylogeny and diversification of the woodcreepers (Dendrocolaptidae) using allozyme biochemistry.

Significant acquisitions during the year included 384 specimens obtained by Dr. Barrowclough, 234 from Robert W. Dickerman, and 59 from Michael Carter. The New Mexico Department of Game and

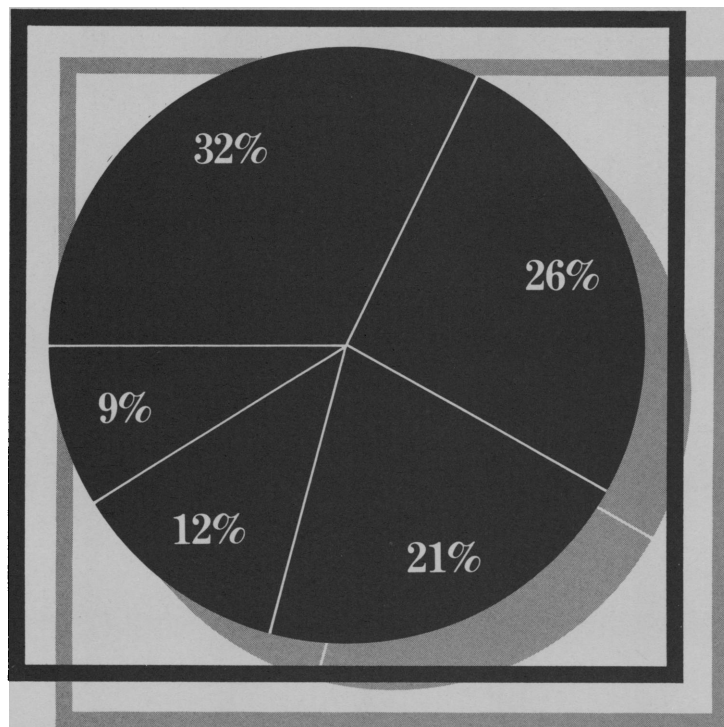
Financial Statements

Revenue 1986-87 42,743,258

- 26%** Natural History Magazine & Membership
- 19%** City of New York (Appropriated Funds 14%.) (Value of Energy Services & Contributions to Pension Costs 5%.)
- 15%** Endowment & Related Funds
- 13%** Auxiliary Activities
- 10%** Grants & Other Restricted Funds
- 7%** Other Revenue
- 6%** Visitor Contributions
- 4%** Corporate & Individual Contributions



- 32%** Scientific Research, Education & Exhibition
- 26%** Natural History Magazine & Membership
- 21%** Plant Operation & Maintenance
- 12%** Administrative & General
- 9%** Auxiliary Activities



Expenses 1986-87 39,919,369

Treasurer's Report

The reports on the following pages summarize the financial condition of the American Museum of Natural History. They consist of the Balance Sheet, Statement of Revenue and Expenses of Current Funds, and Statement of Changes in Fund Balances which have been audited by Coopers & Lybrand. The related notes appear on pages A-8 and A-9.

In reviewing the Balance Sheet it should be noted that investments in marketable securities are recorded at cost and amount to \$169,594,008 recorded on a trade date basis; they include General Fund of \$9,719,622, Special Funds of \$16,981,095 and Endowment Funds of \$142,893,291.

General Fund investments of \$9,719,622 consist mainly of cash received from Museum members for benefits to be provided in future years and are generally offset by the liability for unearned membership which amounts to \$7,507,354. Special Funds investments of \$16,981,095 consist primarily of funds received for the completion of special programs and projects funded by government agencies, private foundations and individuals, as well as Museum funds set aside for specific programs to be completed in future years. Endowment Funds investments of \$142,893,291 represent funds allocated for endowment purposes by donors or the Board of Trustees since the organization of the Museum in 1869.

The revenue and expenses of the

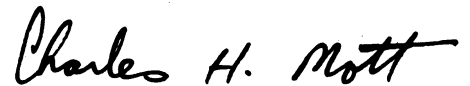
General Fund and Special Funds appear on page A-6 in the Statement of Revenue and Expenses of Current Funds. Total revenues for the funds amounted to \$42,743,258. Total expenses amounted to \$39,919,369. Revenues exceeded expenses by \$2,823,889 before support grants of \$660,000. It should be noted in reviewing this statement that, while the combined operations of both funds showed a total excess of revenue over expenses of \$3,483,889, the General Fund, which provides the ongoing support for scientific, program and administrative activities, had an excess of expenses over revenue after support grants of \$296,882. It should also be noted that Special Funds, which are restricted in use for special programs and projects and which may continue for several years, had an excess of revenue over expenses of \$3,780,771.

General Fund revenue in fiscal 1986-1987 amounted to \$31,966,966, an increase of \$1,351,985 over the prior year. The major areas accounting for this increase were distributions from Endowment Funds, revenue from *Natural History* magazine and membership, and auxiliary activities. The increase of \$466,000 in distribution from Endowment Funds resulted from an increase in the market value of Endowment Funds and additions to Endowment Funds from bequests and grants. The increase in *Natural History* magazine and membership revenue

resulted from the increase in membership dues which was put into effect on July 1, 1986. Revenue from auxiliary activities was increased by \$917,293, as detailed in Note 9.

The General Fund expenses for the year amounted to \$32,923,848, compared to \$31,504,163 in the prior year, an increase of \$1,419,685. The increase in the General Fund expenses for scientific and educational activities, administrative and general, plant operation and maintenance, and *Natural History* magazine and membership, includes cost-of-living and merit adjustments to the salaries of employees, increased costs for services and supplies purchased from outside vendors, as well as expenditures to increase conservation and fund raising programs, and to carry out physical improvements to the Museum facilities.

The administration is grateful to the Museum's contributors for the support it received during the past year. This support in conjunction with government and private grants has enabled the Museum to carry out and expand services to the general public and the scientific community.



Charles H. Mott
Treasurer

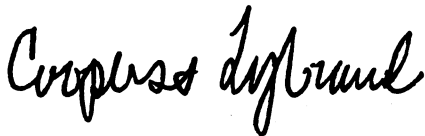
Report of Independent Certified Public Accountants

To the Board of Trustees of the
American Museum of Natural History:

We have examined the balance sheets of the AMERICAN MUSEUM of NATURAL HISTORY as of June 30, 1987 and 1986, 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, 1987 and 1986, and the results of its operations and changes in its fund balances for the years then ended, in conformity with generally accepted accounting principles applied on a consistent basis.



New York, New York
October 8, 1987.

American Museum of Natural History Balance Sheets, June 30, 1987 and 1986

Assets:

Cash
Receivable for securities sold
Accrued interest and dividends receivable
Accounts receivable, less allowance for doubtful accounts
 of \$312,000 in 1987 and \$310,000 in 1986
Investments (Note 2)
Planetarium Authority bonds (Note 3)
Inventories (Note 4)
Prepaid expenses and other assets

Liabilities and Funds:

Accounts payable and accrued expenses
Accrued employee benefit costs
Payable for securities purchased
Unearned membership income
Funds:
 General Fund deficit
 Special Funds (Notes 5 and 6)
 Endowment Funds (Notes 7 and 8)

The accompanying notes are an integral part of these
financial statements.

1987					1986				
Current Funds				Total	Current Funds				Total
General Fund	Special Funds	Endowment Funds			General Fund	Special Funds	Endowment Funds		
\$ 306,080		\$ 143,187	\$ 449,267		\$ 183,055	\$ 1,137	\$ 466	\$ 184,658	
		1,141,826	1,141,826				2,489,364	2,489,364	
16,318	\$ 28,525	933,635	978,478		72,326	124,520	996,076	1,192,922	
1,489,530	306,868		1,796,398		1,614,376	225,246	169,159	2,008,781	
9,719,622	16,981,095	142,893,291	169,594,008		7,585,720	13,282,837	109,871,841	130,740,398	
	425,000		425,000			425,000		425,000	
1,085,475			1,085,475		1,085,578			1,085,578	
710,564	150,682		861,246		772,195	3,000		775,195	
\$13,327,589	\$17,892,170	\$145,111,939	\$176,331,698		\$11,313,250	\$14,061,740	\$113,526,906	\$138,901,896	
\$ 3,899,882	\$ 450,144	\$ 133,739	\$ 4,483,765		\$ 2,000,490	\$ 400,485	\$ 183,010	\$ 2,583,985	
2,217,235			2,217,235		2,326,848			2,326,848	
		13,223,902	13,223,902				2,713,063	2,713,063	
7,507,354			7,507,354		7,215,094			7,215,094	
(296,882)			(296,882)		(229,182)			(229,182)	
	17,442,026		17,442,026			13,661,255		13,661,255	
		131,754,298	131,754,298				110,630,833	110,630,833	
\$13,327,589	\$17,892,170	\$145,111,939	\$176,331,698		\$11,313,250	\$14,061,740	\$113,526,906	\$138,901,896	

Statements of Revenue and Expenses of Current Funds for the years ended June 30, 1987 and 1986

	General Fund		Special Funds		Total	
Revenue:	1987	1986	1987	1986	1987	1986
The City of New York:						
Appropriated funds	\$ 6,188,506	\$ 6,416,809			\$ 6,188,506	\$ 6,416,809
Value of energy services and contributions to pension costs (Notes 10 and 11)	1,982,663	1,902,004			1,982,663	1,902,004
Gifts, bequests and grants	1,913,679	1,791,543	\$ 4,209,629	\$2,771,610	6,123,308	4,563,153
Distribution from Endowment Funds (Note 8)	3,512,000	3,046,000	1,370,142	1,197,045	4,882,142	4,243,045
Interest and dividends	956,646	1,250,342	515,509	395,110	1,472,155	1,645,452
Visitors' contributions			2,641,531	2,190,969	2,641,531	2,190,969
Natural History Magazine and membership	11,009,704	10,748,415			11,009,704	10,748,415
Other revenue	739,439	712,832	2,039,481	2,243,471	2,778,920	2,956,303
Auxiliary activities (Note 9)	5,664,329	4,747,036			5,664,329	4,747,036
Total revenue	31,966,966	30,614,981	10,776,292	8,798,205	42,743,258	39,413,186
Expenses:						
Scientific and educational activities	6,540,224	6,433,619			6,540,224	6,433,619
Exhibition halls and exhibits			1,748,553	1,204,813	1,748,553	1,204,813
Other special purpose programs and projects			4,622,673	3,888,860	4,622,673	3,888,860
Administrative and general	4,334,548	3,860,162	624,295	506,118	4,958,843	4,366,280
Plant operating and maintenance (Note 10)	8,200,282	7,983,427			8,200,282	7,983,427
Natural History Magazine and membership	10,257,161	10,089,137			10,257,161	10,089,137
Auxiliary activities (Note 9)	3,591,633	3,137,818			3,591,633	3,137,818
Total expenses	32,923,848	31,504,163	6,995,521	5,599,791	39,919,369	37,103,954
Excess of revenue over expenses (expenses over revenue) before support grants	(956,882)	(889,182)	3,780,771	3,198,414	2,823,889	2,309,232
Support grants (Note 13)	660,000	660,000			660,000	660,000
Excess of revenue over expenses (expenses over revenue)	(\$ 296,882)	(\$ 229,182)	\$ 3,780,771	\$3,198,414	\$ 3,483,889	\$ 2,969,232

The accompanying notes are an integral part of these financial statements.

Statements of Changes in Fund Balances for the years ended June 30, 1987 and 1986

	Current Funds				Endowment Funds	
	General Fund		Special Funds		1987	1986
	1987	1986	1987	1986	1987	1986
Balances, beginning of year	(\$229,182)	(\$317,128)	\$13,661,255	\$10,620,418	\$110,630,833	\$ 91,517,496
Additions:						
Gifts, bequests and grants					1,974,603	2,216,535
Interest and dividend income (Note 8)					1,673,444	3,101,499
Net gain on sale of investments					18,511,090	14,689,130
Excess of revenue over expenses			3,780,771	3,198,414		
Total additions			3,780,771	3,198,414	22,159,137	20,007,164
Deductions:						
Excess of expenses over revenue	296,882	229,182				
General and administrative expenses					562,632	521,806
Contributions to prior service cost (Note 11)					243,858	212,470
Total deductions	296,882	229,182			806,490	734,276
Transfers between funds:						
Financing of:						
1986 and 1985 General Fund deficits	229,182	317,128		(174,021)	(229,182)	(143,107)
Special Funds activities				16,444		(16,444)
Total transfers	229,182	317,128		(157,577)	(229,182)	(159,551)
Balances, end of year	(\$296,882)	(\$229,182)	\$17,442,026	\$13,661,255	\$131,754,298	\$110,630,833

The accompanying notes are an integral part of these financial statements.

Notes to Financial Statements

1. Summary of Significant Accounting Policies: The American Museum of Natural History ("Museum") maintains its accounts principally on the accrual basis. The Museum is a not-for-profit organization exempt from federal income tax under Section 501(c)(3) of the Internal Revenue Code.

The land and buildings utilized by the Museum are owned by the City of New York ("City") and are not reflected in the balance sheets. Fixed assets, exhibits, collections and library additions are expensed at time of purchase.

To insure 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 specified activities and objectives. 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 as 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 funds subject to restrictions established by the donor requiring that the original principal be invested in perpetuity, and 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 8).

Investments are stated at cost or, if acquired by gift, at fair value at date of acquisition. Nonmarketable securities are valued by the Finance Committee of the Museum and approved by the Trustees. Securities transactions are recorded on a trade date basis. Realized gains and losses on disposition of investments are calculated on the basis of average cost.

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

Membership income is recognized ratably over the membership term.

2. Investments:

Cost and market values of investments at June 30 are as follows:		1987	1986	
	Cost	Market	Cost	Market
General Fund	\$ 9,719,622	\$ 10,621,618	\$ 7,585,720	\$ 8,487,269
Special Funds	16,981,095	18,558,651	13,282,837	14,867,903
Endowment Funds	142,893,291	162,402,360	109,871,841	134,236,912
Investments on trade date basis	169,594,008	191,582,629	130,740,398	157,592,084
Receivable for securities sold	1,141,826	1,141,826	2,489,364	2,489,364
Payable for securities purchased	(13,223,902)	(13,223,902)	(2,713,063)	(2,713,063)
Investments on settlement date basis	\$157,511,932	\$179,500,553	\$130,516,699	\$157,368,385
The Museum's investments consist of the following:				
Short-term obligations	\$ 50,197,900	\$ 50,197,900	\$ 15,006,000	\$ 15,006,000
Fixed income securities	58,351,222	60,409,463	39,914,063	42,012,355
Common and preferred stocks	59,044,886	78,919,081	74,220,335	98,973,729
Other investments	2,000,000	2,056,185	1,600,000	1,600,000
	\$169,594,008	\$191,582,629	\$130,740,398	\$157,592,084

The Museum participates in a securities lending program with United States Trust Company of New York ("Custodian"), whereby certain investments are temporarily loaned to brokerage firms. The Museum receives in return cash or securities as collateral in an amount which approximates the value of securities loaned. Cash received is invested 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, 1987 and 1986, the market value of securities loaned amounted to approximately \$9,312,000 and \$14,091,000, respectively, and the market value of the related collateral amounted to approximately \$9,315,000 and \$14,766,000, 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.

Net capital gains are included in other revenue.

3. Planetarium Authority Bonds: The Museum 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, which are past due. For the years ended June 30, 1987 and 1986, interest income on these bonds (at 4½%) of \$25,650 was paid and is included in the General Fund revenue.

4. Inventories:

	1987	1986
Natural History Magazine paper	\$ 595,164	\$ 722,004
Museum Shops merchandise	490,311	363,574
	\$1,085,475	\$1,085,578

5. Special Funds: Included in Special Funds balances is approximately \$6,856,000 and \$5,480,000 at June 30, 1987 and 1986, respectively, restricted by the donor as to use.

6. Overdrafts: Special Funds balances at June 30, 1987 and 1986 are net of overdrafts of approximately \$2,503,000 and \$1,821,000, respectively. These overdrafts represent expenditures in anticipation of transfers from Endowment Funds, other Special Funds, or receipt of gifts and grants from government or private donors.

7. Endowment Funds:

Endowment Funds consist of:	June 30, 1987	June 30, 1986
Endowment Funds, income available for:		
Restricted purposes	\$ 56,571,816	\$ 47,315,287
Unrestricted purposes	18,093,000	15,311,157
Funds functioning as endowment, principal and income available for:		
Restricted purposes	27,073,384	22,735,328
Unrestricted purposes	30,016,098	25,269,061
	\$131,754,298	\$110,630,833

8. Distribution from Endowment Funds: Total interest and dividend income for the Endowment Funds for fiscal 1987 and 1986 was \$6,555,586 and \$7,344,544, respectively. In accordance with the policy adopted by the Board of Trustees, distributions to the General Fund and Special Funds were fixed at 5 percent of the average of the market value of the Endowment Funds for the three preceding years. The distributions were:

	1987	1986
General Fund	\$3,512,000	\$3,046,000
Special Funds	1,370,142	1,197,045
	\$4,882,142	\$4,243,045

The excess income was retained in the Endowment Funds. Of this amount, \$243,858 and \$212,470 in fiscal 1987 and 1986, respectively, were allocated for pension support to the Cultural Institutions Retirement System ("CIRS"), based on the 5 percent formula.

9. Auxiliary Activities: Revenue and expenses for auxiliary activities in fiscal 1987 and 1986 are:

	1987		1986	
	Revenue	Expenses	Revenue	Expenses
Museum Shops	\$2,668,054	\$2,028,617	\$2,074,432	\$1,627,557
Discovery Tours	1,125,066	713,975	758,719	604,997
Naturemax	665,704	415,842	823,095	518,612
Other	1,205,505	433,199	1,090,790	386,652
	\$5,664,329	\$3,591,633	\$4,747,036	\$3,137,818

10. Plant Operating and Maintenance Expenses: Plant operating and maintenance expenses in fiscal 1987 and 1986 include the value of energy services supplied by the City of New York of \$1,544,677 and \$1,480,193, respectively.

11. Pension Plan: The Museum participates in the Cultural Institutions Retirement System ("CIRS Plan"). It is a multiemployer plan, and 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. On July 1,

1986, the CIRS Plan was changed from a defined benefit plan to a defined benefit/defined contribution 401K plan.

The Museum accrues and funds annually the normal cost for eligible employees participating in the CIRS pension plan. To be eligible under this plan, employees must be over 21 and

employed for a minimum of one year. The unfunded prior-service cost, with interest, is being funded over 30 years, ending in fiscal 2004.

Total pension costs for eligible employees, including Planetarium personnel, amounted to approximately \$1,307,000 and \$1,282,000 in fiscal 1987 and 1986, respectively. Of this amount, \$437,986 and \$421,811 were paid by the City of New York directly to CIRS in fiscal 1987 and 1986, respectively, and \$243,858 and \$212,470, respectively, were funded through Endowment Funds.

The Planetarium reimburses the Museum for all employee benefit costs, including pension. The aggregate amounts charged in 1987 and 1986 were \$152,941 and \$123,770, respectively. In 1987 the charge for all benefit costs was calculated as a percentage of payroll, while in 1986 those benefits were individually calculated.

12. Post-retirement Benefits: The Museum provides health insurance for all retired employees and life insurance for certain retired employees. These costs, charged to current operations, amounted to \$234,951 and \$301,264 in fiscal 1987 and 1986, respectively.

13. Support Grants: Support grants were received from the New York State Council on the Arts and the Institute of Museum Services in the amounts of \$585,000 and \$75,000, respectively, in both fiscal 1987 and 1986.

14. Related Party Transactions: The Museum provides certain services to the Planetarium, such as insurance, accounting and maintenance, for which the Planetarium was charged an aggregate amount of \$172,244 and \$187,862 in fiscal 1987 and 1986, respectively. The Planetarium also reimburses the Museum for actual payroll costs. For visitors who enter the Museum from the Planetarium, the Museum was compensated approximately \$58,000 and \$63,000 in fiscal 1987 and 1986, respectively.

15. Buildings: The buildings occupied by the Museum are owned by the City, which appropriates funds for their renovation, improvement and alteration. Funds committed by the City for these capital projects in fiscal 1987 and 1986 amounted to \$1,443,000 and \$1,652,000, respectively.

Report of Independent Certified Public Accountants

To the Board of Trustees of the
American Museum of Natural
History Planetarium Authority:

We have examined the balance sheets of the AMERICAN MUSEUM of NATURAL HISTORY PLANETARIUM AUTHORITY as of June 30, 1987 and 1986, 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 Planetarium Authority at June 30, 1987 and 1986, and the results of its operations and changes in its fund balances for the years then ended, in conformity with generally accepted accounting principles applied on a consistent basis.

New York, New York
September 25, 1987.

American Museum of Natural History Pl

Assets:

Cash
Investments
Receivables and other assets
Planetarium shop inventory

Building, at cost
Building improvements and equipment:
 Building improvements, at cost
 Zeiss planetarium instrument, at cost

Less, Accumulated depreciation

Liabilities, Contributed Capital and Funds:

Liabilities:

Accounts payable and accrued expenses
Accrued employee benefit costs
4½% Refunding Serial Revenue Bonds, past due
Accrued interest, past due

Contributed capital:

Charles Hayden
Charles Hayden Foundation
The Perkin Fund

Funds:

General Fund
Special Funds

Statements of Revenue and Expenses of

Revenue:

Admission fees, net
Planetarium shop sales
Special lectures and courses
Gifts, bequests and grants
Income from investments
Other revenue

Total revenue

Expenses:

Preparation, presentation and promotion
Operation and maintenance
Administrative and general
Planetarium shop expenses
Special lectures and courses
Special purpose programs and projects
Laser program expenses
Interest on past due 4½% Refunding Serial Revenue Bonds
Depreciation

Total expenses

Excess (deficit) of revenue over expenses

The accompanying notes are an integral part
of these financial statements.

anetarium Authority Balance Sheets, June 30, 1987 and 1986

1987			1986		
General Fund	Special Funds	Total	General Fund	Special Funds	Total
\$ 75,885		\$ 75,885	\$ 270,031		\$ 270,031
603,847	\$1,046,153	1,650,000	141,264	\$758,736	900,000
15,705	2,280	17,985	17,883	2,381	20,264
64,244		64,244	63,325		63,325
759,681	1,048,433	1,808,114	492,503	761,117	1,253,620
1,019,210		1,019,210	1,019,210		1,019,210
698,833		698,833	662,290		662,290
221,928		221,928	221,928		221,928
920,761		920,761	884,218		884,218
(655,493)		(655,493)	(598,776)		(598,776)
265,268		265,268	285,442		285,442
\$2,044,159	\$1,048,433	\$3,092,592	\$1,797,155	\$761,117	\$2,558,272
\$ 73,229	\$ 10,511	\$ 83,740	\$ 36,570	\$ 21,397	\$ 57,967
86,346		86,346	74,936		74,936
570,000		570,000	570,000		570,000
315,450		315,450	315,450		315,450
1,045,025	10,511	1,055,536	996,956	21,397	1,018,353
156,869		156,869	156,869		156,869
429,455		429,455	429,455		429,455
400,000		400,000	400,000		400,000
986,324		986,324	986,324		986,324
12,810		12,810	(186,125)		(186,125)
	1,037,922	1,037,922		739,720	739,720
\$2,044,159	\$1,048,433	\$3,092,592	\$1,797,155	\$761,117	\$2,558,272

Current Funds for the years ended June 30, 1987 and 1986

General Fund		Special Funds		Total	
1987	1986	1987	1986	1987	1986
\$1,080,174	\$1,155,636	\$267,955	\$198,861	\$1,348,129	\$1,354,497
237,556	302,385			237,556	302,385
59,180	61,633			59,180	61,633
36,000	39,250	232,250	18,000	268,250	57,250
29,544	11,807	54,867	59,477	84,411	71,284
65,250	52,929			65,250	52,929
1,507,704	1,623,640	555,072	276,338	2,062,776	1,899,978
664,659	657,568			664,659	657,568
233,231	228,082			233,231	228,082
129,317	86,660			129,317	86,660
203,548	229,163			203,548	229,163
41,268	38,257			41,268	38,257
		7,100	18,615	7,100	18,615
		204,149	341,209	204,149	341,209
25,650	25,650			25,650	25,650
56,717	66,184			56,717	66,184
1,354,390	1,331,564	211,249	359,824	1,565,639	1,691,388
\$ 153,314	\$ 292,076	\$343,823	(\$ 83,486)	\$ 497,137	\$ 208,590

Statements of Changes in Fund Balances for the years ended June 30, 1987 and 1986

	General Fund		Special Funds	
	1987	1986	1987	1986
Balances, beginning of year	(\$186,125)	(\$533,279)	\$ 739,720	\$878,284
Excess (deficit) of revenue over expenses	153,314	292,076	343,823	(83,486)
Transfers between funds	45,621	55,078	(45,621)	(55,078)
Balances, end of year	\$ 12,810	(\$186,125)	\$1,037,922	\$739,720

The accompanying notes are an integral part of these financial statements.

Notes to Financial Statements

1. Summary of Significant

Accounting Policies: The American Museum of Natural History Planetarium Authority's ("Planetarium") corporate charter terminates when all of 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 any other City property occupied by the Museum. The Museum and the Planetarium are separate legal entities which share the same Board of Trustees ("Trustees") and Officers. The land utilized by the Planetarium was donated by the City of New York.

The Planetarium maintains its accounts principally on the accrual basis.

The Planetarium is a not-for-profit organization exempt from federal income tax under Section 501(c)(3) of the Internal Revenue Code.

To insure observance of limitations and restrictions placed on the use of the resources available to the Planetarium, the accounts of the Planetarium 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 specified activities and objectives. 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 Trustees are so indicated as 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 Planetarium.

Major building improvements are capitalized and depreciated using 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.

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

2. Depreciation: Depreciation on major plant additions and replacements which have been financed from cash generated by restricted funds is funded by transfers from restricted funds.

3. Revenue Bonds: The Planetarium Authority bonds are owned by the Museum. The Charles Hayden Foundation contributed \$200,000 to the Museum toward the purchase of such bonds.

4. Special Funds: Included in Special Fund balances are approximately \$258,000 and \$57,000 at June 30, 1987 and 1986, respectively, restricted by the donor as to use.

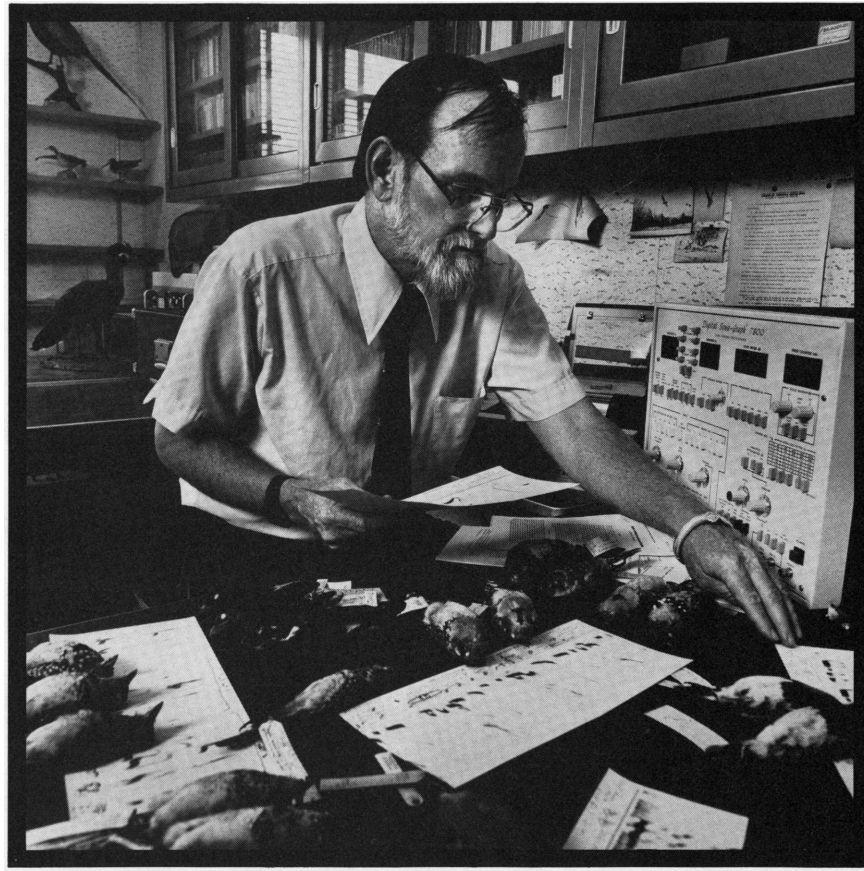
5. Investments: Investments at June 30, 1987, consist of short-term obligations in the amount of \$1,150,000 and fixed income securities in the amount of \$500,000. The aggregate market value was \$1,634,000.

6. Related Party Transactions: The Museum provides certain services, such as insurance, accounting and maintenance, to the Planetarium. The aggregate charges for these services in fiscal 1987 and 1986 were \$172,244 and \$187,862, respectively.

Admission fees paid to enter the Planetarium also include entrance fees to the Museum. For visitors who enter the Museum from the Planetarium, the Museum was compensated approximately \$58,000 and \$63,000 in fiscal years 1987 and 1986, respectively.

The Planetarium reimburses the Museum for actual payroll costs for its staff. In addition, the Planetarium reimburses the Museum for benefit costs, including pension. In 1987, these costs were calculated as a percentage of payroll, while in 1986, these benefits were individually calculated. The aggregate amounts charged to the Planetarium in 1987 and 1986 were \$152,941 and \$123,770, respectively.

When bird watchers hear "Teacher, teacher, teacher," they know an ovenbird is near, but distinguishing some species on the basis of their songs or calls is more difficult. Lester L. Short, Curator in the Department of Ornithology, uses an audiospectrograph to trans-



form recorded bird vocalizations into pictorial form, which then provides an objective means to differentiate between species or individuals. Scientists in the department studied the evolution, ecology and systematics of birds on four continents and in the laboratory.

Fish contributed 21 specimens and the New York Zoological Park, 14; others came from Novaks Aviary, the San Diego Zoo, Bosque del Apache Wildlife Refuge, Malcolm Coulter, Dr. Vuilleumier and Dr. Short. Bea Wetmore contributed a Louis Agassiz Fuertes painting of an avocet at Bear River marshes, Utah, that the artist had given to the late ornithologist Alexander Wetmore.

Scientific Publications:

Amadon, D.

1987. Synthesis. In Proceedings, Hawk Mountain 50th anniversary symposium. Raptor Research Reports, 5: 85-87.

1987. Comments on eagles of the genus *Hieraetus*. *Gabarr* 2: 18-19.

Bishop, K.D., and B. King

1986. The Sunda Serin *Serinus estherae* in Sulawesi. *Kukila*, 2: 90-92.

Chapin, J.P., R.T. Chapin, L.L. Short, and J.F.M. Horne

1987. Notes on the diet of the Least Honeyguide *Indicator exilis* in eastern Zaire. *Bull. Brit. Orn. Club*, 107: 32-35.

Dickerman, R.W.

1986. A review of the Red Crossbill in New York State. Part 1. Historical and nomenclatural background. *Kingbird*, 36: 73-78.

1986. A review of the Red Crossbill in New York State. Part 2. Identification of specimens from New York. *Kingbird*, 36: 127-134.

1986. Two hitherto unnamed populations of *Aechmophorus* (Aves: Podicipidae). *Proc. Biol. Soc. Washington*, 99: 435-436.

1987. Two new subspecies of birds from Guatemala. *Occas. Papers Western Foundation Vert. Zool.*, 3: 49-108.

1987. Notes on the plumages of *Diglossa duidae* with the description of a new subspecies. *Bull. Brit. Ornith. Club*, 107: 42-44.

1987. Type localities of birds described from Guatemala. *Proc. Western Foundation Vert. Zool.*, 3: 49-108.

Dorst, J., and F. Vuilleumier

1986. Convergences in bird communities at high altitude in the tropics (especially the Andes and Africa) and at temperate latitudes (Tibet). In F. Vuilleumier and M. Monasterio (eds.), *High altitude tropical biogeography*, pp. 120-149. New York: Oxford Univ. Press and American Museum of Natural History

Gnam, R.* (Sponsor: L.L. Short)

1986. Breeding biology of the Bahama Parrot. *American Fed. Aviculturists. Watchbird*, 12: 58-61.

Greenway, J.C.

1987. Type specimens of birds in the American Museum of Natural History, Part 4. *Amer. Mus. Novitates*, no. 2879, 54 pp.

Harding C.F.

1986. The role of androgen metabolism in the activation of male behavior. In B.R. Komisaruk, H.I. Siegel, M.F. Cheng and H.H. Feder (eds.), *Reproduction: A Behavioral and Neuroendocrine Perspective. Annals of the New York Academy of Sciences*, 474: 371-378.

1986. The importance of androgen metabolism in the regulation of reproductive behavior in the avian male. *Poultry Science*, 65: 2344-2351.

Keith, S., E.K. Urban, and C.H. Fry (eds.)

1986. *The birds of Africa*, Vol. II. London: Academic Press.

King, B.F., and T. J. Roberts

1986. Vocalizations of the owls of the genus *Otus* in Pakistan. *Ornis Scandinavica*, 17: 299-305.

Pitocchelli, J.* (Sponsor: W.E. Lanyon)

1986. Checklist of the birds of Caumsett State Park, pp. 1-5. New York: Queens College Printers.

Reynard, G.B., L.L. Short, O.H. Garrido, and G. Alayon G.

1987. Nesting, voice, status, and relationships of the endemic Cuban Gundlach's Hawk (*Accipiter gundlachi*). *Wilson Bull.*, 99: 73-77.

Rockwell, R.F., and J.C. Davies

1986. Polar bear deterrents: some current thoughts on an effective electrified fence. *Wildlife Soc. Bull.*, 14: 406-409.

Short, L.L., and J.F.M. Horne

1986. Roosting behaviour of Red-faced Crombec. *Scopus*, 10: 49-51.

Vuilleumier, F.,

1987. Colonisation des milieux insulaires. In *Universalia* 1987, pp. 209-214. Paris: Encyclopaedia Universalis.

Vuilleumier, F., and E. Mayr

1987. New species of birds described from 1976 to 1980. *Journ. für Ornithologie*, 127: 137-150.

Vuilleumier, F., and M. Monasterio (eds.)

1986. *High altitude tropical biogeography*, 649 pp. New York: Oxford Univ. Press and American Museum of Natural History.

Vuilleumier F., and M. Monasterio

1986. Introduction: High tropical mountain biota of the world. In F. Vuilleumier and M. Monasterio (eds.), *High altitude tropical biogeography*, pp. 3-7. New York: Oxford Univ. Press and American Museum of Natural History.

1986. Origins of the tropical avifaunas of the high Andes. In F. Vuilleumier and M. Monasterio (eds.), *High altitude tropical biogeography*, pp. 586-622. New York: Oxford Univ. Press and American Museum of Natural History.

Abstracts and Popular Publications:

Amadon, D.

1987. *Recollections of Miss Farida Wiley. Wake-Robin* (Newsletter of John Burroughs Association), February, 1987: 2-3.

1987. Foreword to reprint of "John James Audubon" by John Burroughs, pp. vi-vii. Woodstock, N.Y.: Overlook Press.

King, B.F.

1986. Report on pheasants at Jiuzhaigou and Baihe Panda Reserves in NW Sichuan, China. *World Pheasant Assn. News*, 11: 20-22.

1987. [Review of] *A guide to the birds of Nepal*. *Auk*, 104: 148-149.

Oliva-Purdy, J.* (Sponsor: C.F.

Harding), and C.F. Harding
1986. Monogamy as defined by the Zebra Finch. *American Zoologist*, 26: 97A.

Short, L.L.

1986. Aftermath of seeing an Ivory-bill. *Linnaean Newsletter*, 40: 1-2.

1987. *The birdwatcher's book of lists — Eastern region*, 128 pp. New York: A.A. Knopf.

1987. *The birdwatcher's book of lists — Western region*, 128 pp. New York: A.A. Knopf.

1987. *In the field: seeking the honeyguides*. *Rotunda* (Amer. Mus. Nat. Hist.), 12: 6-7.

- Short, L.L., and J.F.M. Horne
1986. The Ivory-bill still lives. *Natural History*, 95: 26-28.
1987. I saw it (account of Ivory-billed Woodpecker search). *Internat. Wildlife*, 17: 22-23.
- Vuilleumier, F.
1987. [Review of] *Guide des passereaux granivores emberizins*. *Wilson Bull.*, 99: 142-143.
- Walters, M.I.* (Sponsor: C.F. Harding), and C.F. Harding
1986. (Abstract) Cytosol and nuclear estrogen receptors in the male Zebra Finch brain. *Neuroscience Abstr.*, 12: 835.

Department of Vertebrate Paleontology

The wide-ranging activities of the Department of Vertebrate Paleontology reflect its diverse commitments to field exploration, collections maintenance and improvement, and systematic research. Expeditions to South America, Switzerland and China document the global scope of the department's field programs. On the systematic front, work on higher vertebrate phylogeny by departmental curators, postdoctoral fellows and students continues to have major impact on the international community.

Programs Supported Success of departmental programs relies heavily on support from various sources. The Childs Frick Laboratory Endowment continues to fund a spectrum of activities that center on the vast Frick collections of fossil vertebrates. This generous endowment was supplemented by contributions from the Frick family that allowed the purchase of capital equipment, such as field vehicles, which are difficult items to procure through

outside granting agencies.

The James Carter Memorial Fund supported a variety of research by the department's curators, postdoctoral fellows and students. The National Science Foundation awarded funding for field research in China and improvement of the storage facility for the fossil fish collection. The collection had dramatically increased with the acquisition of 12,000 Cretaceous fishes from Brazil donated by Herbert Axelrod during the 1984-1985 fiscal year.

Contributions from Dr. Axelrod continue to support Axelrod Fellow Stanley Blum's research on the Brazilian collection. Contributions from Museum President Goelet helped support the fieldwork of Argentinian colleagues who have strong research ties with this institution. The Eppley Foundation for Research has provided a generous two-year grant for paleontological exploration of the Andes of southern Chile.

Vertebrate Phylogeny Higher vertebrate paleontology touches on many aspects of biology, including molecular research. In the last few years this area has been the subject of growing interest and knowledge, and the department remains a leading center for research in this field.

Associate Curator John G. Maisey published a comprehensive review of chordate phylogeny in *Cladistics*, drawing very broadly from information on anatomy, embryology, physiology and biochemistry of the major chordate lineages. On the same subject is Curator Emeritus Bobb Schaeffer's recently published analysis of developmental patterns and chordate relationships. Dr. Maisey also investigated chondrichthyan systematics, continuing a project supported by the National Science Foundation. On another front, Dr. Maisey conducted studies with Mr. Blum on the Cretaceous fish collection from Brazil.

Dr. Schaeffer joined Brian Gardiner from the British Museum (Natural History) in a phylogenetic analysis of the lower actinopterygian fishes.

Tetrapods Curator Eugene S. Gaffney and Carter Research Fellow Peter Meylan collaborated in an unprecedented cladistic analysis of turtle relationships down to genus level. This work was presented at a symposium on tetrapod phylogeny in London in March, sponsored by the Linnean Society.

It is noteworthy that all the departmental curators specializing in tetrapods were selected to participate in the Linnean symposium. Curator Richard H. Tedford collaborated with Research Associate John J. Flynn and Nancy A. Neff (University of Connecticut) in a review of higher carnivoran relationships. Chairman and Associate Curator Michael J. Novacek joined forces with Frick Curator Malcolm C. McKenna and Columbia University graduate student André R. Wyss in a review of higher mammalian phylogeny. This contribution encompassed data reflecting separate contributions by Dr. McKenna and Mr. Wyss, the senior author of a more recent paper published in *Molecular Biology and Evolution*.

Dr. Novacek and Mr. Wyss also published a morphological analysis of mammalian relationships in *Cladistics*. Dr. McKenna continues forging a mammalian classification down to the genus level.

Mammals on Mountaintops

An expedition led by Dr. Novacek returned to the southern Andes of Patagonian Chile. His intentions were to follow up last year's discovery of an isolated fossil assemblage by Mr. Wyss and Mark Norell, a graduate student from Yale University. The project also involved the stratigraphic expertise of Dr. Flynn and the participation of Daniel Frassinetti, an invertebrate paleontologist from the Museo Nacional de Historia

Natural in Santiago. The logistic difficulties were greatly alleviated through the help of local businessman and amateur paleontologist Carlos de Smet de Olbeck de Halleux.

Expectations of finding an important collection were surpassed. Fossils were common throughout a 1000-foot escarpment representing the sequence of terrestrial change. The hundreds of mammal specimens collected represent animals that inhabited a 20-million-year-old coastal region, which was subsequently thrust up to high elevations with the rapid rise of the Andes. The discovery opens a new phase of paleontological exploration in South America and provides insights into the geotectonic history of this fascinating region of the continent.

Turtle Haven One of the most important localities in the world for fossil turtles is the late Jurassic of Solothurn, Switzerland. As a result of a proposal made to the authorities in Solothurn, Dr. Gaffney and Dr. Meylan were able to do fieldwork there. For the first time in more than 100 years a major quarry excavation was developed for the collection of fossils. As a result of the first season of work, three skulls and five shells were removed and partially prepared. The skulls are at the American Museum being prepared for study. It is hoped that excavations can be continued at Solothurn for at least five more years. All of the funding for the excavation is from the Canton of Solothurn and reflects the extent of popular interest in fossils in Switzerland.

Roads to China Over the years, the department has cultivated a collaborative research program with scientists from the People's Republic of China. Momentum for these activities increased dramatically this year. Dr. Tedford's two-year NSF grant for joint field

studies of the later Cenozoic in northwestern China is a project that will also involve scientists at the Institute of Paleontology and Paleoanthropology in Beijing. Focusing on an earlier phase of the geologic record, Dr. McKenna explored Mesozoic and earlier Cenozoic rocks in the Turfan Basin, China. He also completed, with Chinese colleagues, papers on early perissodactyls and erinaceid insectivores. In connection with these research activities, Dr. Gaffney is coordinating plans for a traveling exhibit from Beijing on fossil reptiles from China. The department is also sponsoring, in cooperation with Columbia University, the graduate training of Meng Jin, a student from China.

Diverse Activities Research

Associate Eric Delson's ideas on the early evolution of hominids have attracted widespread attention. He continued his studies on relationships of Old World monkeys. Curator Emeritus Edwin H. Colbert completed studies of the important Triassic dinosaur *Coelophysis*. The NSF awarded a grant of \$256,000 for collection management of the fossil fish collection. Other efforts by departmental affiliates included studies of rodent phylogeny, horse evolution, origin of birds, early Tertiary vertebrate faunas and Mesozoic reptiles.

Scientific Publications:

Baird, D.

1986. *Halisaurus* and *Prognathodon*, two uncommon mosasaurs from the upper Cretaceous of New Jersey. *The Mosasaur*, 3: 37-45.

1986. A skull fragment of the Cretaceous chelonid turtle *Osteopygis* from Atlantic Highlands, New Jersey. *The Mosasaur*, 3: 47-52.

1986. Upper Cretaceous reptiles from the Severn Formation of Maryland. *The Mosasaur*, 3: 63-85.

1986. Some upper Triassic reptiles, footprints, and an amphibian from New Jersey. *The Mosasaur*, 3: 125-153.

Colbert, E.H.

1986. Mesozoic tetrapod extinctions: a review. In D.K. Elliott (ed.), *Dynamics of extinction*, pp. 49-62. New York: John Wiley & Sons.

1986. Therapsids in Pangaea and their contemporaries and competitors. In N. Hotton, P.D. MacLean, J.J. Roth, E.C. Roth (eds.), *The ecology and biology of mammal-like reptiles*, pp. 133-145. Washington, D.C.: Smithsonian Inst. Press.

1986. Historical aspects of the Triassic-Jurassic boundary problem. In K. Padian (ed.), *The beginnings of the age of dinosaurs*, pp. 9-18. NY: Cambridge Univ. Press.

1987. The Triassic reptile *Prolacerta* in Antarctica. *Am. Mus. Novitates*, no. 2882, 19 pp.

Delson, E.

1986. Human phylogeny revised again. *Nature*, 322: 496-497.

1987. Fossil Man. In McGraw-Hill encyclopedia of science and technology, 6th ed., vol. 7, pp. 373-381.

1987. Monkey. In McGraw-Hill encyclopedia of science and technology, 6th ed., vol. 11, pp. 359-364.

1987. Evolution and palaeobiology of robust *Australopithecus*. *Nature*, 327: 654-655.

Delson, E., and I. Tattersall

1987. Primates. In McGraw Hill encyclopedia of science and technology, 6th ed., vol. 14, pp. 259-365.

Domning, D.P., C.E. Ray, and M.C. McKenna

1986. Two Oligocene desmostylians and a discussion of tethytherian systematics. *Smithson. Contrib. Paleobiol.*, no. 59: 1-56.

Emry, R.J., and C.E. Gawne

1986. A primitive early Oligocene species of *Palaeolagus* (Mammalia: Lagomorpha) from the Flagstaff Rim area of Wyoming. *J. Vert. Paleontol.*, 6: 271-280.

Flynn, J.J.

1986. Correlation and geochronology of middle Eocene strata from the western United States. *Palaeogeogr., Palaeoecol., Palaeoclimatol.*, 55: 335-406.

This fossil skull of Neoreomys, an extinct rodent roughly 18 million years old, was collected in Southern Chile on an expedition led by Michael Novacek, Curator and Chairman of the Department of Vertebrate Paleontology. Spon-



sored by the Eppley Foundation, the expedition found a rich Miocene fauna in the high Andes. The discovery will provide needed information on South American fossil mammals and on the processes of plate tectonics in the region.

1986. Faunal provinces and the Simpson coefficient. In K. Flanagan and J.L. Lillegraven (eds.), *Vertebrates, phylogeny, and philosophy*. G.G. Simpson Memorial Volume, Univ. Wyoming Contr. Geol., spec. paper 3: 317-338.
- Gaffney, E.S.
1986. Triassic and early Jurassic turtles. In K. Padian (ed.), *The beginnings of the age of dinosaurs*, pp. 183-187. NY: Cambridge Univ. Press.
- Hecht, M.K., B. Wallace, and G.T. Prance (eds.)
1986. *Evolutionary biology*, vol. 20. New York: Plenum Press.
1987. *Evolutionary biology*, vol. 21. New York: Plenum Press.
- Hecht, M.K., and A. Hoffman
1986. Why not Neodarwinism? A critique of the paleobiological challenges. In Oxford surveys in evolutionary biology, vol. 3, pp. 1-46. London: Oxford Univ. Press.
- Hecht, M.K.
1987. The snakes and crocodilians of the Sahabi Formation. In N.T. Boas, A. El-arnouti, A.W. Gaziry, and J. de Heinzelin (eds.), *Neogene paleontology and geology of the Sahabi*, pp. 101-106. New York: Alan R. Liss, Inc.
- Leakey, M., and E. Delson
1987. Fossil Cercopithecidae from the Laetoli Beds, Tanzania. In M.D. Leakey and J.M. Harris (eds.), *The Pliocene site of Laetoli, northern Tanzania*, pp. 91-107. London: Oxford Univ. Press.
- MacFadden, B.J.
1986. Fossil horses from "*Eohippus*" (*Hyracotherium*) to *Equus*: scaling, Cope's Law, and the evolution of body size. *Paleobiol.*, 12: 355-369.
1987. Systematics, phylogeny and evolution of fossil horses: a rational alternative to Eisenmann et al. 1987. *Jour. Vert. Paleontol.*, vol. 7: 224-229.
- Maisey, J.G.
1986. Anatomical revision of the fossil shark *Hybodus fraasi* (Chondrichthyes: Elasmobranchii). *Am. Mus. Novitates*, no. 2857, 16 pp.
1986. Coelacanths from the lower Cretaceous of Brazil. *Am. Mus. Novitates*, no. 2866, 30 pp.
1986. Heads and tails: a chordate phylogeny. *Cladistics*, 2: 201-256.
1987. Notes on structure and phylogeny of vertebrate otoliths. *Copeia*, 1987, no. 2: 495-499.
- McCune, A.R., and B. Schaeffer
1986. Triassic and Jurassic fishes: patterns of diversity. In K. Padian (ed.), *The beginnings of the age of dinosaurs*, pp. 171-181. NY: Cambridge Univ. Press.
- Meylan, P.A.
1987. Fossil snakes of Laetoli. In M.D. Leakey and J.M. Harris (eds.), *Laetoli: a Pliocene site in Tanzania*, pp. 78-82. London: Oxford Univ. Press.
1987. The phylogenetic relationships of soft-shelled turtles (Trionychidae) *Bull. Amer. Mus. Nat. Hist.*, vol. 186, pp. 1-101.
- Meylan, P.A., J.N. Layne, and T.J. Walsh
1986. New records for the mole snake, *Lampropeltis calligaster*, in peninsular Florida. *Fl. Sci.*, 49: 171-175.
- Meylan, P.A., and W. Auffenberg
1987. The chelonians from the Laetoli Beds. In M.D. Leakey and J.M. Harris (eds.), *Laetoli: a Pliocene site in Tanzania*, pp. 62-78. Oxford: Clarendon Press.
- Novacek, M.J.
1987. Characters and cladograms: Examples from zoological systematics. In H.M. Hoenigswald and L.F. Wiener (eds.), *Biological metaphor and cladistic classification*, pp. 181-192. Philadelphia: Univ. Pennsylvania Press.
1987. Auditory features and affinities of the Eocene bats *Icaronycteris* and *Palaeochiropteryx* (Microchiroptera, incertae sedis). *Am. Mus. Novitates*, no. 2877, 18 pp.
- Novacek, M.J., and A.R. Wyss* (Sponsor: M.C. McKenna)
1986. Origin and transformation of the mammalian stapes. In K. Flanagan and J.L. Lillegraven (eds.), *Vertebrates, phylogeny, and philosophy*. G.G. Simpson Memorial Volume, Univ. Wy. Contr. Geol., spec. paper 3: 35-53.
1986. Higher relationships of the recent eutherian orders: Morphological evidence. *Cladistics*, 2: 257-287.
1987. Selected features of the desmostylian skeleton and their phylogenetic implications. *Am. Mus. Novitates*, no. 2870, 8 pp.
- Novacek, M.J., J.J. Flynn, I. Ferrusquia-Villafranca, and R. M. Cippolletti
1987. An early Eocene (Wasatchian) mammal fauna from the Baja California Peninsula (Mexico). *Natl. Geogr. Soc. Res. J.*, vol. 3: 376-388.
- Olsen, P.E., and D. Baird
1986. The ichnogenus *Atreipus* and its significance for Triassic biostratigraphy. In K. Padian (ed.), *The beginnings of the age of dinosaurs*, pp. 61-87. NY: Cambridge Univ. Press.
- Ostrom, J.H.
1986. Social and unsocial behavior of dinosaurs. In M. Nitecki and J. Kitchell (eds.), *Evolution of animal behavior*, pp. 41-61. London: Oxford Univ. Press.
1986. The Jurassic "bird" *Laopteryx priscus* re-examined. In K. Flanagan and J.L. Lillegraven (eds.), *Vertebrates, phylogeny, and philosophy*. G.G. Simpson Memorial Volume, Univ. Wy. Contr. Geol., spec. paper 3: 11-19.
1986. The cursorial origin of avian flight. In K. Padian (ed.), *The origin of birds and the evolution of flight*. *Ca. Acad. Sci., Memoir* 8: 73-81.
- Ostrom, J.H., and P. Wellnhofer
1986. The Munich specimen of *Triceratops*, with a revision of the genus *Zitteliana*. *Abh. Bayer. Staatssammlung Paläontol. u. Hist. Geol.*, 14: 111-158.
- Schaeffer, B.
1987. Deuterostome monophyly and phylogeny. In M. K. Hecht, B. Wallace, and G. T. Prance (eds.), *Evolutionary biology*, vol. 21, pp. 179-235. New York: Plenum Press.
- Tedford, R.H., R.T. Wells, and D.L.G. Williams
1986. Late Cainozoic sediments and fossil vertebrates. In R.T. Wells and R.A. Callen (eds.), *The Lake Eyre Basin-Cainozoic sediments, fossil vertebrates and plants, landforms, silcretes and climatic implication*. Australasian Sedimentologists Group Field Studies, Series No. 4, pp. 42-72. *Geol. Soc. Australia*.
- Wahlert, J.
1986. The Sciuridae, a rodent family with research potential. *Ann. N.Y. Acad. Sci.*, 463: 238-240.
- Wyss, A.R.* (Sponsor: M.C. McKenna, M.J. Novacek, and M.C. McKenna)
1987. Amino acid sequence versus morphological data and the interordinal relationships of mammals. *Mol. Biol. Evol.*, 4: 99-116.

Abstracts, Reviews and Popular Publications:

- Baird, D.
1986. (Abstract) Middle Triassic terrestrial herpetofauna in Nova Scotia. Friends of the Newark Newsl., no. 5: 10.
- Dean, D.* (Sponsor: E. Delson)
1987. [Review of] Evolving hierarchical systems, by S. N. Salthe. Am. J. Phys. Anthropol., 72: 414-415.
- Delson, E.
1986. (Abstract) Dating the fossil record of southern African Cercopithecidae. Primate Rec., 14: 48-49.
1986. (Abstract) Dating the fossil record of southern European Cercopithecidae. Primate Rec., 14: 49-50.
- Emry, R.J.
1987. Mammalian fossil record incompletely drawn. [Review of] Mammal evolution: an illustrated guide, by R.J.G. Savage and M.R. Long. Naturalist Rev., winter 1987: 3.
1987. The course of evolutionary history. [Review of] Life pulse: episodes from the story of the fossil record, by N. Eldredge. The Scientist, 1: 22.
- McKenna, M. C.
1986. Edentates. [Review of] The evolution and ecology of armadillos, sloths, and vermilings, G.G. Montgomery (ed.). Science, 233: 1102-1103.
1986. Putting flesh onto the bones. [Review of] Mammal evolution: an illustrated guide, R.J.G. Savage and M.R. Long (eds.). Nature, 324: 186.
1986. (Abstract) Mammalian phylogeny. Twentieth international numerical taxonomical conference, State Univ. NY: Stony Brook, 1 p.
1986. (Abstract) A new lineage of primate-like mammals from the Eocene of Wyoming. Symposium: dawn of the age of mammals in the northern Rocky Mountain Region II, Geol. Soc. Am., Rocky Mountain Div., Abstr. with programs, 19: 320-321.
- Ostrom, J. H.
1986. Commentary on "The beginning of birds." Proceedings of the international *Archaeopteryx* conference. Anima, 9: 11-17.
1986. The Peale mastodon — guide to the Hessisches Landesmuseum. Darmstadt, West Germany, 2 pp.
1987. Romancing the dinosaurs. [Review of] The dinosaur heresies, by R.T. Bakker. The Sciences, May-June: 56-63.

- Strasser, E.* (Sponsor: E. Delson)
1986. [Review of] Functional morphology of the Miocene hominoid foot, by J.H. Langdon. J. Hum. Evol., 15: 229-231.
1987. (Abstract) Pedal evidence for the origin and diversification of cercopithecoid clades. Am. J. Phys. Anthropol., 72: 258-259.

Research Stations

Complementing the Museum's urban location is a set of research stations that provide curators, graduate students and visiting scientists with diverse field research opportunities. By attracting researchers to a single location, each station helps create a critical mass of established and beginning scientists who engage in a stimulating give-and-take.

Southwestern Research Station

For the 32nd year, the Southwestern Research Station provided research facilities, a living laboratory and year-round living accommodations for scientists from the Museum, universities, and other museums throughout the United States and around the world.

Located 5400 feet up the Chiricahua Mountains, the station provides access to a variety of habitats and a diverse assemblage of plants and animals, permitting scientists to study various ecological, behavioral and taxonomic problems. The elevational changes encountered within a few miles of the station are responsible for the occurrence of five life-zones (ecological groupings of plants and animals) compressed into a relatively short distance.

The biogeographical location of the Chiricahuas in a region of overlap between northern and southern biota contributes to the

species diversity of the area, as does the area's location in the east-west Cochise-Hidalgo Corridor, a region in which Chihuahuan Desert and Sonoran Desert species are intermixed.

More than 1000 people stayed at the station during the year, including 99 researchers, seven university and college classes and two U.S. Forest Service workshops. Many of the naturalists who visited the station during the year were attracted in large part by the diverse bird life of Cave Creek Canyon, where the station is located.

Life at the station is well suited to rich intellectual exchange. Researchers, graduate students and volunteers (many of whom are biology students contemplating careers in science) interact regularly in the dining hall and dormitories. A seminar series allows scientists to share their ideas with the station community. Curators from the American Museum and scientists and graduate students from many universities publish scientific papers based on research at the station. Wade Sherbrooke, the station's resident director, also found time to pursue his own research, dealing especially with desert lizards. He presented an invited paper at the annual meeting of the Animal Behavior Society on social communication in horned lizards and the behavioral consequences of diurnal foraging on exposed desert terrain.

St. Catherines Island This relatively undeveloped and unspoiled barrier island off the Georgia coast is available, thanks to the Edward John Noble Foundation, for scientists and advanced students to do field research in archeology, ecology, evolutionary biology and other aspects of the island's natural history.

The island was the site of archeological excavations by Dr.

Thomas, curator in the Department of Anthropology, and his research team. Dr. Thomas's research, which has been supported by the Edward John Noble and St. Catherines Island Foundations since 1974, focused on the 16th/17th century Mission Santa Catalina de Guale.

After spending several years excavating the church ruins and cemetery at Santa Catalina, Dr. Thomas recently redirected the project toward the monastery. Behind the monastery, nearly four dozen bronze bell fragments were found. Several pieces show punch and axe marks, indicating that the bells were deliberately destroyed. It seems that the bell fragments were broken by the rebellious Guale, probably during the uprising of 1597.

Under the auspices of the St. Catherines Island Research Program, administered by the Office of Grants and Fellowships, several scientists from around the country studied the island's zoology, geology and botany.

Great Gull Island After 18 years of continuous research at Great Gull Island in Long Island Sound, the colony of terns there contains the greatest concentration of individually marked birds in the world. More than 90 percent of the 8000 adults caught during 1986 had been banded previously, and 9000 young terns (a record) were newly banded.

The data being collected should prove biologically significant and useful for future tern management. Already, banding has documented immigration of terns from other areas, resulting in two large concentrations of 10,000 terns each, one on Great Gull Island and the other at Cedar Beach, in Nassau County. The success of the terns at these sites, coupled with their immigration from sites plagued by development and predation by rats, gulls or herons, highlights the need for

management of certain bird species along the coast if they are to be preserved in the region.

Archbold Biological Station

Scientists at the Archbold Biological Station, located in south-central Florida, conduct a broad research program that emphasizes ecology, evolutionary biology and animal behavior. Station staff, research associates and 39 visiting investigators (from 23 colleges and universities and three government agencies) conducted 55 projects during the year. Staff and visiting scientists published 49 papers during the year based on research at the station.

The station, a national research resource, received a National Science Foundation grant for a building addition. The new structure provides needed space for reference collections, offices, laboratories and seminars.

Some 1400 visitors to the station during the year included college and university classes, school groups, conservation organizations and scientists from other institutions and government agencies.

Characteristics of the acorns produced by oak species at the station were investigated by James N. Layne, Senior Research Biologist and Museum Research Associate, Wayne C. Packer, lecturer in zoology at the University of Western Australia and graduate student David Fleck of the University of South Florida in their study of how several mammal and bird species use acorns.

Executive Director James L. Wolfe conducted research on fishes inhabiting the littoral zone of the station's Lake Annie. This project is designed to provide information on the community structure of fishes in shallow waters of the lake and seasonal use of the zone by juvenile fishes.

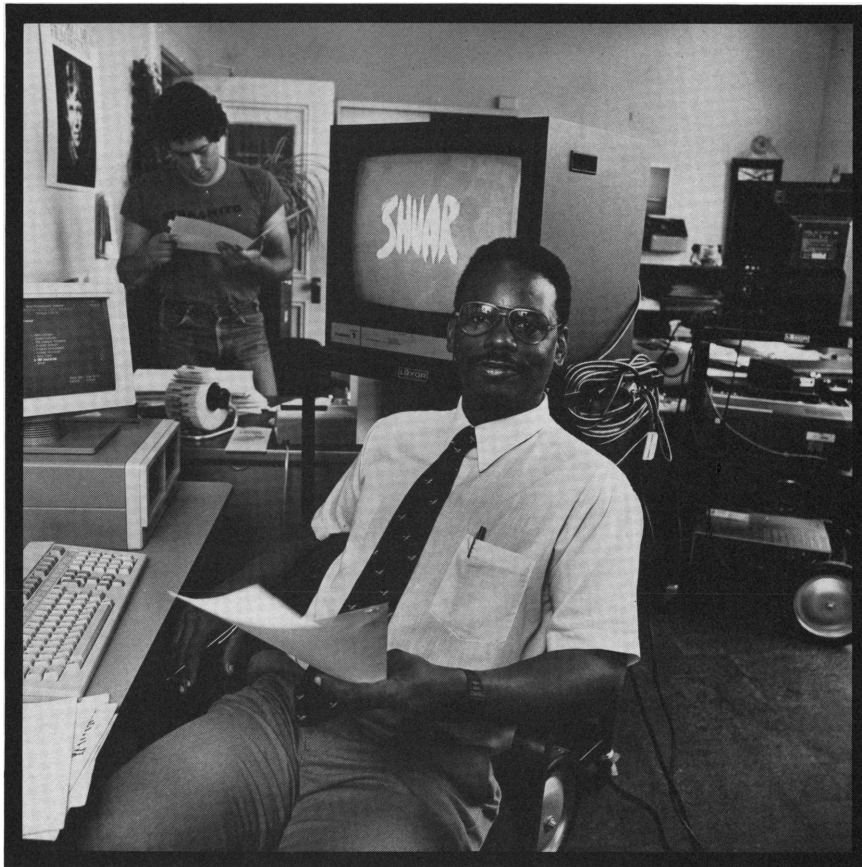
Department of Education

The Museum's educational mission is all-encompassing. It involves everything from a sophisticated scientific symposium to responding to a youngster's letter asking for assistance with a class paper. The department is perhaps best known for its morning programs for elementary and junior high school pupils. Yet more than half of its resources are devoted to other areas, including adult education, teacher training and the operation of three interpretive facilities: the Alexander M. White Natural Science Center, the Frederick H. Leonhardt People Center and the Discovery Room.

Programs for Adults Public programming for adults takes a number of forms. There are ticketed afternoon and evening lecture series, symposiums, local field trips and special events such as the Margaret Mead Film Festival. There is an equally varied selection of free public programs, which range from lecture and film to live performance. Close to 100,000 adults participate annually in these and other programs presented under the auspices of the department.

Afternoon and evening lecture series drew more than 5000 registrants. Forty lecture series and workshops were offered, covering topics that ranged across the spectrum of the Museum's disciplines from anthropology and paleontology to mammalogy and entomology. There was a limited enrollment class sketching animals in exhibition halls under supervision of an artist from the Department of Exhibition and Graphics, and 500 people in an auditorium listening to a series of lectures by distinguished anthropologist

Nathaniel Johnson, Jr., foreground, Coordinator of Special Programs for the Department of Education, and Jonathan Stack, Coprogrammer of the Margaret Mead Film Festival, review a film for possible inclusion in the annual gala of anthropological films. With the chairman of the event, Malcolm Arth, Chairman of the Department of Educa-



tion, they reviewed more than 400 films before selecting 51 for the festival. As the programming arm of the museum, the Department of Education offers events, lectures and classes for all ages. Programs range from a boat tour of New York City geology to a class on animal drawing and a performance by the Alvin Ailey Repertory Ensemble.

Ashley Montague. Some lecture series are designed to complement special exhibitions, such as one this year on "The Chaco Phenomenon."

Nearly 250 teachers registered for the department's program of College Courses for Teachers. Thirteen of these semester-long courses in the natural sciences and anthropology were presented by the department staff, and the participants received college credit from the College of the City of New York.

The Margaret Mead Film Festival celebrated its tenth anniversary and continues to be the largest single public education event for the adult audience, drawing more than 7000 people during its five evenings. Filmmakers and anthropologists from a dozen nations presented documentary films to capacity crowds in the Museum's four theaters. To mark its tenth anniversary, the Festival presented a retrospective of 16 films from previous years along with 47 new films. The Mead Festival is made possible in part by a grant from the New York State Council on the Arts.

Community Programming

Many of the activities of the department are intended to draw new audiences, particularly to make members of the African-American, Latin-American and Caribbean communities more aware of the Museum as an educational resource. Films, lectures, performances of music and dance, and workshops for adults and young people are supported by gifts from private foundations and corporations. Principal among these supporters are the William Randolph Hearst Foundation, the Henry Nias Foundation, and the Samuel and May Rudin Foundation. Others included the Sydney, Milton and Leoma Simon Foundation, the Evelyn Sharp Foundation, the Grumman Corporation and the

Most of the community activities are free to visitors, but a few are ticketed at a modest price. There were 149 days of community programming which attracted a total of more than 43,000 people. Those held on Saturday and Sunday afternoons are often aimed at family audiences, while those scheduled in the evening are intended mainly for adults. Among the outstanding programs this year were "A Salute to the Harlem Opera House," a performance by the Alvin Ailey Repertory Ensemble, and a series of lectures exploring the relationship of culture to violent behavior.

Programs for Young People

More than 18,000 youngsters in elementary and junior high school classes participated in programs selected by their teachers and taught by members of the Education Department. The experience includes instruction in the exhibition halls and a classroom period in which the youngsters may work with materials from the department's teaching collection — including artifacts and animal and mineral specimens — in hands-on learning situations. Teachers select one from among a dozen subjects in natural science or anthropology, and new topics are offered periodically. For example, this year a program on the Hudson River was added to the traditional fare of dinosaurs, endangered wildlife, geology, and peoples of Asia, Africa and the New World.

The Louis Calder Laboratory Classroom is the site of several science teaching programs. It is the setting for a program offered to junior high school classes during the week and workshops for young people on weekends. Nearly 1000 youngsters a year receive scientific learning experiences in this special place. While most of the activities held there are for young people, it is also used at times for adult workshops and teacher training. The facility is supported by grants

from the Louis Calder Foundation.

During the celebration of Black History Month, in February, nearly 11,000 youngsters in school classes came for a special series of programs, which included live drama, dance, music, lecture and film. This program was made possible in part by a grant from the New York State Council on the Arts. For this and other community oriented activities, some 200 lecturers and performers are contracted annually to assist regular staff members.

Special mention should be made of two other programs for young people which are likewise made possible by special funding. The Vidda Foundation supports the salary for a teacher for the disabled. This year some 1800 people with special needs were taught by this specialist. A gift from the Christodora Foundation, combined with income from a gift from Mrs. Harold Boeschstein, enabled the department to renew the Junior High School Natural Science Program for motivated youngsters from the inner city. Twenty students representing seven schools in upper Manhattan were selected for the program, in which they studied an intensive science curriculum at the Museum two afternoons a week. The program allows these boys and girls, at a critical stage in their schooling, to be exposed to science and scientists in a special way. The goal is to stimulate them to consider pursuing careers in science.

Interpretive Facilities After 14 years, The Frederick H. Leonhardt People Center is as much a part of the institution as any permanent exhibition. Unlike permanent exhibitions, however, it changes its focus every month from October through June. The People Center is a space for live performance demonstrations featuring a different cultural tradition each month. Regional themes this year ranged from Africa, China and Japan to African-American, Caribbean and

Native American cultures. Demonstrations of music, dance, crafts and the telling of legends from around the world helped to enlighten and entertain some 30,000 visitors. The Alexander M. White Natural Science Center which is especially designed for children focuses on nature in an urban environment. Together with the Leonhardt People Center and the Discovery Room, these three public facilities combined served more than 54,000 people during the year. The Discovery Room and the Natural Science Center cater mainly to family groups; the People Center, while numbering many family groups among its weekend visitors, has a larger proportion of adult visitors. All three facilities have hands-on materials which enable visitors to have learning experiences not available in most of the exhibition halls. These three facilities are utilized in other ways on school days when they become settings for programs for schools taught by staff.

The department is assisted by many dedicated volunteers. Under staff supervision, the volunteers assist weekend visitors in the Alexander M. White Natural Science Center, the Discovery Room and the People Center. The largest corps of volunteers, however, is the group that works with school classes on weekdays. Some 75 teaching volunteers are stationed in selected exhibition areas where they assist school groups visiting independently with their teachers.

Department of Exhibition and Graphics

The role of the Department of Exhibition and Graphics is to present exhibitions involving specimens, artifacts and concepts that illustrate the cultural, biological and geological history of the Earth. In an exhibition program that is one of the largest in the country, special exhibitions are scheduled and permanent halls planned to challenge the inquiring mind and provoke the imagination.

Special Exhibitions The major special exhibition of the year, "Dark Caves, Bright Visions: Life in Ice Age Europe," opened in Gallery 3 in October. This exhibition took more than a year to plan and execute, with Dr. Tattersall doing a great deal of the organizational work here and in Europe. "Dark Caves" reflected the origins of modern human culture through some 300 artifacts from museums in Europe and North America, including material from the American Museum's collections of paleolithic artifacts. The exhibition, which ran through January, featured a full-sized reproduction of a prehistoric shelter made of mammoth bones.

"Dark Caves" was followed in Gallery 3 by an exhibition organized by the Maxwell Museum in Albuquerque entitled, "The Chaco Phenomenon." It opened in March and was scheduled to close in August. The exhibition explored the prehistoric Anasazi culture of the Pueblo peoples living in the Chaco Canyon, New Mexico. It incorporated more than 200 artifacts, including turquoise-covered basketry, jewelry and ceramic pottery as well as

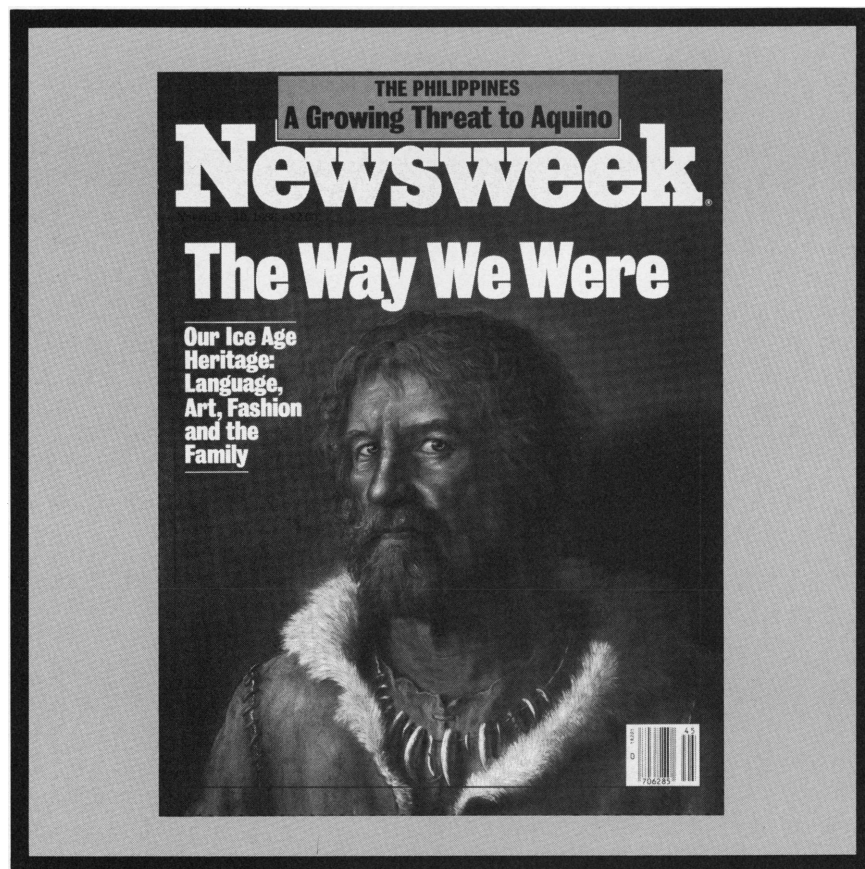
fiberglass replicas of masonry walls used in Anasazi architecture.

"On Tap: New York's Water Supply," which ran from December 1986 through August 1987 in Gallery 1, was created and built by the American Museum with the cooperation of the New York City Department of Environmental Protection. The exhibition was designed to illustrate the many sources from which New York's water is drawn and how it reaches the tap. Maps, drawings, lithographs, artifacts, photographs and four specially created video loops contributed to the success of this effort. The DEP worked with the New York City Board of Education to schedule numerous classroom visits to "On Tap."

Exhibitions in the Arthur Ross Exhibit-of-the-Month program included: "Benares, City of Light" in the Akeley Gallery, a photographic exhibit of the patterns of life and death in Benares, India; an exhibit in the Roosevelt Memorial Hall on the proposed high altitude round-the-world balloon flight by the Australian, Julian Nott; a reprise of the "Brazilian Princess" topaz, the world's largest cut gemstone; "Rooted in Ceremony," a display of unusual origami pieces; the annual "Origami Holiday Tree" in Roosevelt Memorial Hall, and a temporary exhibit of the Giant Panda. Using two mounted Panda specimens formerly on view elsewhere in the Museum, the Exhibition Department created a free-standing, natural setting in the Roosevelt Memorial Hall. It was designed as the basis for a possible future Panda diorama in the Hall of South Asiatic Mammals.

Permanent Halls The Hall of South American Peoples approached completion with its opening planned for the Spring of 1988. Hundreds of artifacts from the Museum's collections have

The special exhibition "Dark Caves, Bright Visions," featuring the art of Ice Age Europe, attracted widespread media attention and many visitors during its Oct. 23 to Jan. 19 run. Newsweek's



Nov. 10 cover story by science writer Sharon Begley spurred increased interest in the exhibition, in Ice Age life and in the Museum. Such media coverage increases the reach and impact of Museum exhibitions and programs.

been individually conserved and mounted for this permanent installation. An area in which continuous-run video loops will be presented was on the drawing board.

Research and planning for redesign of the Osborn Hall of Late Mammals continued and involved on-site inspection of three European museums by the designer and several curators to evaluate fossil exhibition halls.

A new Hall of Human Biology and Evolution is in the planning stage, with many innovative exhibition techniques being considered for inclusion.

Maintenance Program An Exhibit Maintenance Task Force was set up in the department with responsibility for the continued and routine repair and maintenance of exhibits throughout the Museum. Included in this program is the continuous refurbishment of dioramas. During the year the White Sheep, Jack Rabbit, Spotted Skunk, Striped Skunk, and Cottontail groups, all in the Hall of North American Mammals, were cleaned and rejuvenated.

The Replica Studio, which creates copies of American Museum dinosaurs from the Museum's molds, made full-size replicas for sale to the Denver Museum of Natural History, the University of Saskatchewan and the Takikawa City Museum in Japan.

Department of Library Services

The extensive collection of the Museum's natural history library — one of the largest in the world — is a major resource for the Museum staff and the international scientific and scholarly community. The Library's reach and scope are exceptionally wide because of its continued participation in cooperative programs and because its holdings are entered into an international database. Special care is given to its rare book, film, photographic and archival collections. In many cases, generous grants support the curation of these collections.

Cooperative Ventures Cooperation among libraries is a long-established tradition that opens a wide range of collections to scholars and scientists. It helps libraries select, catalog and conserve their collections. As libraries became automated, communication became instantaneous. Regional, national and international networks were formed, providing researchers with online access to published literature and to the nation's library collections.

The Museum library has actively participated in formal cooperative programs since 1968, when it became a natural history resource for the New York State Interlibrary Loan network, making its collections available to researchers throughout the state. In 1980, the Library joined OCLC, an automated national network of some 6000 libraries. The Library has entered all post-1960 holdings into the national database and continues to enter all new acquisitions.

Under a grant-supported project sponsored by the U.S. Department of Education LSCA program, administered by METRO (an organiza-

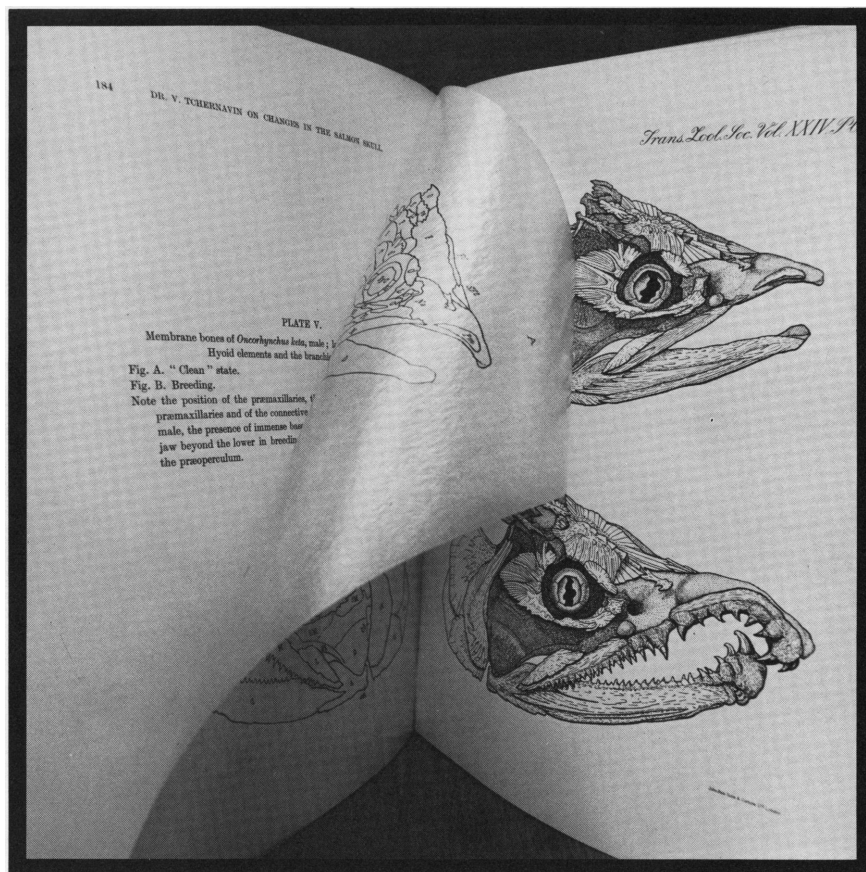
tion of New York City libraries), the Library has added 9347 of its serial titles to the OCLC database since 1985. An additional 4000 titles that are uniquely held by the Library remain to be entered. In 1986, through the same grant source, the Library began entering an additional 4000 monographic titles not previously entered into OCLC.



This bronze baby giraffe, donated to the Museum by Hope L. Bowen, is one of many gifts-in-kind received during the past year, including a 33-part Japanese bride's costume, 9500 scorpions and 350 deep-water sharks and other fish. The giraffe is an addition to the Museum's collection of artwork and architectural drawings curated by the Department of Library Services.

Grants In addition to the METRO-LSCA grants, the Library received a two-year grant from the U.S. Department of Education Title II-C program to microfilm for preservation and to catalog the important manuscript collections held by the Library and the Museum's scientific departments. The field diaries, notebooks and catalogs of American Museum scientists are important documentation for curation and research on the specimen collections. A grant to restore a second album of 805 prints from the Jesup North Pacific Expedition, 1897-1903, was received from New York State. The restoration and cataloging of the

This volume of the Transactions of the Zoological Society of London is among the important scientific works that have been protected as part of the Museum Library's ongoing book and journal



preservation efforts. The Transactions and other old scientific publications contain the first descriptions of many species and present stunning examples of the scientific illustrator's art.

rare film collection was successfully completed under a USDE Title II-C grant, and a catalog was published by Garland Publishing in New York.

Conservation Preservation of collections remains a major concern of the Library, since a large portion is pre-20th century imprints on acidic, deteriorating paper. Several important scientific titles in such poor condition that they could not be used by the scientific staff have been photocopied onto acid-free archival paper. By this method, the original can be preserved and the user has a clean, readable copy. Also, 11 architectural plans of the original 19th century Museum buildings, which are constantly used by the Plant Manager's Office, were conserved.

Exhibits and Loans Two exhibits were mounted. "Ladies in the Field: The Museum's Unsung Explorers," which was shown in the Library Gallery, chronicled through the display of photographs, diaries and mementos the contributions made by the women who participated in American Museum expeditions. "Friends from the Field" was mounted in the Library entrance hall. It was a collection of photographs depicting American Museum scientists with the animals they adopted in the field on various expeditions.

Sixty-three rare books and prints were loaned to The Charleston Museum in South Carolina for an exhibit, "Scientific Illustration, 1500-1900." (Nina J. Root, chairwoman of the Department of Library Services, was invited there to lecture on natural history illustration.) Nine books and paintings by Titian R. Peale were loaned to the Smithsonian Institution for its exhibition, "Magnificent Voyagers."

Statistics The Library served 8000 users, answered 12,000 reference questions, circulated 27,200 items to the scientific staff, photocopied

18,309 pages for the public, received 1838 interlibrary loan requests from other libraries and borrowed 499 items from other libraries. It processed 4613 photographic orders, realizing an income of \$48,601, and granted gratis permissions worth \$13,410. It filled 27 orders for film footage, realizing an income of \$3966; and sold 538 Museum slide packets.

The Library added 1528 volumes, 16,528 journal issues, 133 new serial titles, filed 13,611 cards into the public catalog, corrected 220 records in the OCLC database, distributed 24,111 scientific publications and 13,761 issues of *Recent Publications in Natural History*.

In June, the Library extended its hours to 8:30 p.m. on Wednesday evenings.

Publications:

AMNH Department of Library Services
1986. *Recent Publications in Natural History*, 4(2) (3) (4).

1987. *Catalog of the American Museum of Natural History Film Archives*, xxiv, 410 pp. New York: Garland Publishing.

Bodry-Sanders, P., and B. R. Johnson

1987. Carl Akeley: the man who put Africa on display. *Sports Afield*, 197: 78-81, 133-135.

Genett, M. E.

1987. Conservation of research library materials at the American Museum of Natural History. *Sci. & Tech. Libraries*, 7(3): 15-28.

Root, N. J., and B. R. Johnson

1987. *Transactions of the Zoological Society of London: an index to the artists, 1835-1936*, xix, 444 pp. New York: Garland Publishing.

Collections Management

Collections management has been facilitated by the computerization of many of the departments' collections, making the Museum's 36 million artifacts and specimens more readily available for research, exhibition and conservation purposes. New storage facilities preserve specimens better than those used previously and provide increased storage space for large collections.

The Department of Anthropology's installation of ethnographic collections into its new two-level compact storage facility on the fourth floor proceeded steadily. All Tibetan materials were carefully transferred into the climate-controlled area, which provides excellent preservation and security features. An adjoining research area is available to scholars for examination of the Tibetan and other ethnographic collections. The entire Siberian collection was inventoried and installed into the storage facility, and the transfer of African collections continued. Fragile Abelam bark paintings from New Guinea were inventoried, photographed and placed in storage.

The new textile storage units, all-metal cabinets with screen supports, have proved extremely successful. Additional units will soon be available to complete the storing of South American archaeological textiles. Funds from the Museum's Junior Committee will support the acquisition of a large storage unit that will house the department's important collection of blankets from Mexico and the American Southwest. Additional trays for the compact storage were purchased with funding from the Natural Heritage Trust.

Humidity control systems for the fourth floor storage area were

retrofitted, significantly refining and improving the protective environment. The Anthropology Department's conservation staff collaborated with the exhibition staff of the Department of Exhibition and Graphics, and engineers from the Department of Plant Operations, to plan and monitor the environmental control system for the new Hall of South American Peoples.

The Anthropology collection management staff devoted much attention to the preparation of artifacts for exhibit. More than 600 archeological and ethnographic objects have been prepared for the new Hall of South American Peoples. Conservation work was also done on approximately 80 Hidatsa Indian objects, which served as the major portion of an exhibition sponsored by the Minnesota Historical Society. About 600 African objects of the Mangbetu are currently being selected and conserved for installation in a special exhibition, "African Reflections: Art for Northeastern Zaire," to be curated by the American Museum. Collections of Northwest Coast Indian artifacts have been reviewed and prepared for a museum publication and for continuation of the special exhibition, "Objects of Bright Pride," created by the American Museum.

A collaborative exhibition, "Crossroads of Continents," is being planned by the Smithsonian Institution in conjunction with the Field Museum of Natural History, the Ottawa National Museum of Man, and the Moscow Institute of Ethnography. Extensive review of the American Museum's Siberian and Northwest Coast collections was carried out. More than 125 specimens from the American Museum's Jesup Expeditions will be included in this important exhibition.

The Department of Vertebrate Paleontology began a comprehensive improvement of the storage

facility for its fossil fish collection. Tracks are being installed for a compact storage unit, which will allow for 60 percent more storage space. The work is supported by a grant from the National Science Foundation to Dr. Maisey. The storage facility will house the current collection of 35,000 fossil fish specimens, including the recently acquired 12,000 Cretaceous fishes from Brazil donated by Herbert Axelrod. Plans to computerize the collection will allow for easy access to specimen location, taxonomy and loans.

The Department of Herpetology completed incorporating part of its collections into new storage space, which was recently renovated and modernized with funding from the National Science Foundation. The space is essential to housing the department's burgeoning collection, which now totals about 280,000 specimens. During the renovation project, clay crocks that had held oversized specimens were replaced with new stainless steel tanks, improving specimen preservation.

The Department of Ichthyology completed the transfer of collections into its new 4500-square-foot storage facility on the first floor. The cataloged collection of specimens in alcohol now occupies double the space that was previously available. Uncataloged specimens were placed in a newly installed compact storage system. The new space also will be used for radiography, mixing of alcohol, skeletal preparation and offices.

Interdepartmental Facilities

The Interdepartmental Facilities are available to all Museum departments. They include the central computer system, a scanning electron microscope laboratory and a darkroom.

The computer memory was doubled to four megabytes of main memory and the total device capacity was increased by 16 to a total of 64. The memory was upgraded in anticipation of increased demands on system resources by the addition of an inhouse fundraising database which will be used by the Office of Development. The increased device capacity was needed to handle the 11 workstations/PCs and three printers added to the system over the year. Departments receiving the devices included Development, Guest Services, Public Affairs, Volunteers, Mammalogy and Ornithology. New database applications for the Office of Public Affairs, the American Museum-Hayden Planetarium and the Museum Computer Network, and a budget maintenance program used by the Department of Entomology, Interdepartmental Facilities, the Department of Mammalogy and Micropaleontology Press were developed and put into operation.

The scanning electron microscope (SEM) laboratory is available to outside researchers as well as to Museum staff members. Much of the systematic and taxonomic work done by curators in the Departments of Invertebrates, Entomology, Mammalogy, and Ichthyology requires use of the SEM. It is used, too, by the Departments of Anthropology and Mineral Sciences.

In addition to its value as a research tool, the SEM has educational value. Local school classes and their teachers visit the laboratory and are instructed

in the microscope's use and applications. The educational benefits to younger students will be further explored.

Grants and Fellowships

The Office of Grants and Fellowships administers the Museum's programs of fellowships and research grants available to the scholarly community. The Doctoral Training Program, newly administered by this office, is a joint educational venture with universities with which the Museum has a formal relationship and it is dedicated to the training of Ph.D. candidates in the scientific disciplines represented in the Museum. This year agreements were finalized with two universities: Columbia, enabling students to study in vertebrate paleontology and mineral sciences, and Cornell, in entomology. Other joint programs are the Evolutionary Biology Program with the City University of New York, and the Animal Behavior-Biopsychology Program also with CUNY. The Doctoral Training Program, an important complement to the postdoctoral Fellowship Program, reinforces the Museum's commitment to the education and training of scientists.

The Grants Program supported 176 predoctoral candidates and postdoctoral investigators. The program awarded 70 Frank M. Chapman Memorial Grants (Ornithology); 36 Lerner-Gray Grants for Marine Research; 49 Theodore Roosevelt Memorial Grants (North American zoology and paleozoology); and 6 Lincoln

Ellsworth Grants for research in the near arctic.

Collection Study Grants, which enable graduate students and recent postdoctoral investigators to visit the Museum to study the scientific collections, supported 15 researchers visiting the departments of Entomology, Herpetology, Ichthyology, Mammalogy, Ornithology, Vertebrate Paleontology and Anthropology.

The Research and Museum Fellowship Program provides support to recent postdoctoral 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. This year, four Research Fellows were in residence. Jill Neitzel was appointed the Boeschstein Research Fellow in Anthropology and investigated the organization of a prehistoric urban center in Chaco Canyon, New Mexico, based on a reanalysis of the previous Museum excavations at Pueblo Bonito.

Charles Griswold, a Kalbfleisch Research Fellow in Entomology, devoted his time to the revisions of the spiders of the Subfamily Phyxelidinae (Araneae; Amaurobiidae). Peter Meylan accepted a second year fellowship, the Thorne Research Fellowship, in Vertebrate Paleontology to continue the revision of the fossil Trionychidae (family of soft-shelled turtles) of North America. Christopher Fridrich, a Kalbfleisch Research Fellow in Mineral Sciences, conducted research on the evolution of the Sierrita caldera and the underlying cogenetic Ruby Star batholith in southeastern Arizona. An oblique section through a mineralized silicic magmatic system from surface to mid-crustal levels exposes the caldera and batholith.

The Curatorial Fellowship Program brings to the Museum people holding doctoral degrees or equivalents to assume all the duties and responsibilities of members of the curatorial staff for a limited

term appointment not to exceed five years.

Michael Smith completed his second year as Kalbfleisch Assistant Curator (Fellow) in the Department of Ichthyology. As part of an ongoing National Science Foundation-sponsored project, he inferred relationships of goodeid fishes based on osteological and female reproductive characters. He also estimated relationships among six genera related to *Cyprinodon* (pupfishes).

This year, the Museum began recruiting for a second curatorial fellow whose appointment would begin in the 1987-88 academic year.

The programs for Grants and Fellowships are made possible through the generosity of many donors to the following funds: Boeschstein Fund, Frank M. Chapman Memorial Fund, Greenwall Fund, Franklin H. Kalbfleisch Endowment Fund, Lerner-Gray Fund for Marine Research, Lincoln Ellsworth Fund, Theodore Roosevelt Memorial Fund, Thorne Fund, and Weatherhead Fund for Asian Studies.

At mid-year, the Office of Grants and Fellowships was transferred to the Department of Development and Public Affairs, as an adjunct to the Development Office.

Publications, Membership and Marketing

Natural History "The First Americans," a series of articles in which archeologists, linguists, paleontologists and geneticists present evidence of when, where and how humans may have entered the New World, was inaugurated by *Natural History*. The magazine also revived "Postscripts," a short news section of updates on subjects that previously received treatment as feature articles.

The subject matter of the magazine's articles was, as usual, international in scope; yet many of the articles were written by scientists doing fieldwork in their (and our) own backyards. In a detailed study of the common Blue Jay's habit of transporting and burying acorns, botanist W. Carter Johnson and zoologist Curtis Adkisson shed light on how the hardwood forests made their comeback after the last Ice Age. And Jerry Wolff's study of two of the most common types of woodland mice challenged a time-honored theory of interspecies competition.

In many cases *Natural History* authors came up with interesting pieces that fit into current environmental puzzles. By analyzing the proportions of key elements and compounds in air samples, atmospheric chemists Kenneth A. Rahn and Douglas Lowenthal discovered how many of the pollutants linked to acid rain travel in pulses from midwestern industrial centers to the East Coast.

Robert Alvo, a Canadian graduate student in ornithology, told the acid-rain story from another perspective; he correlated the reproductive success of one of North America's best known water birds, the Loon, with the acidity of Ontario's lakes. Similar-

ly, ichthyologist Branley Allen Branson's studies of mountain creeks showed that 14 years after surface mining had stopped, the animal life in affected Appalachian streams remains drastically altered.

In "What Are Friends For?" primatologist Barbara Smuts reported new insights into the evolution of primate social behavior. She showed that some opposite-sex associations among baboons are nonsexual, lasting alliances. Ornithologist Kathy Martin and zoologist Daniel Townsend explored apparent exceptions to evolutionary rules: paternal care of young birds and frogs, respectively.

The economic underpinnings of human ecology and culture were elucidated by anthropologist Caroline Brettell, who wrote of the lives of contemporary Portuguese women whose menfolk are still emigrating to the New World, and by Mervyn Goldstein, who explained why Tibetan brothers may marry the same woman. In "Foul Shots and Rifle Fire," R. Lincoln Keiser compared male competition in Pakistan and Connecticut.

The October issue presented "Mappers of the Deep," a memoir in which Marie Tharp told the story of the discovery of the Mid-Atlantic Ridge, perhaps the most significant oceanographic find of the century. She had an important role in the discovery.

The April issue highlighted the Canadian arctic and subarctic. The issue also included a special supplement, "Life, the Great Chemistry Experiment," in which researcher Sandra Postel detailed the human-induced chemical changes that may be reshaping the conditions of life on Earth.

As in past years, Museum scientists were important contributors. A narrative of the rediscovery of the supposedly extinct Ivory-billed Woodpecker was coauthored by Dr. Short. Dr. Topoff authored a feature on army ants, and Ms.

Feinberg identified ichthyological oddities at New York's Fulton Fish Market, chronicling them in "The Living Museum," a column that follows Museum-related scientific activity.

The last few months of fiscal 1987 saw a new focus on newsstand sales. The newsstand cover now regularly displays five prominent coverlines aimed at attracting a new group of first-time readers. First indications are that newsstand sales are running well above those for the same months in recent years.

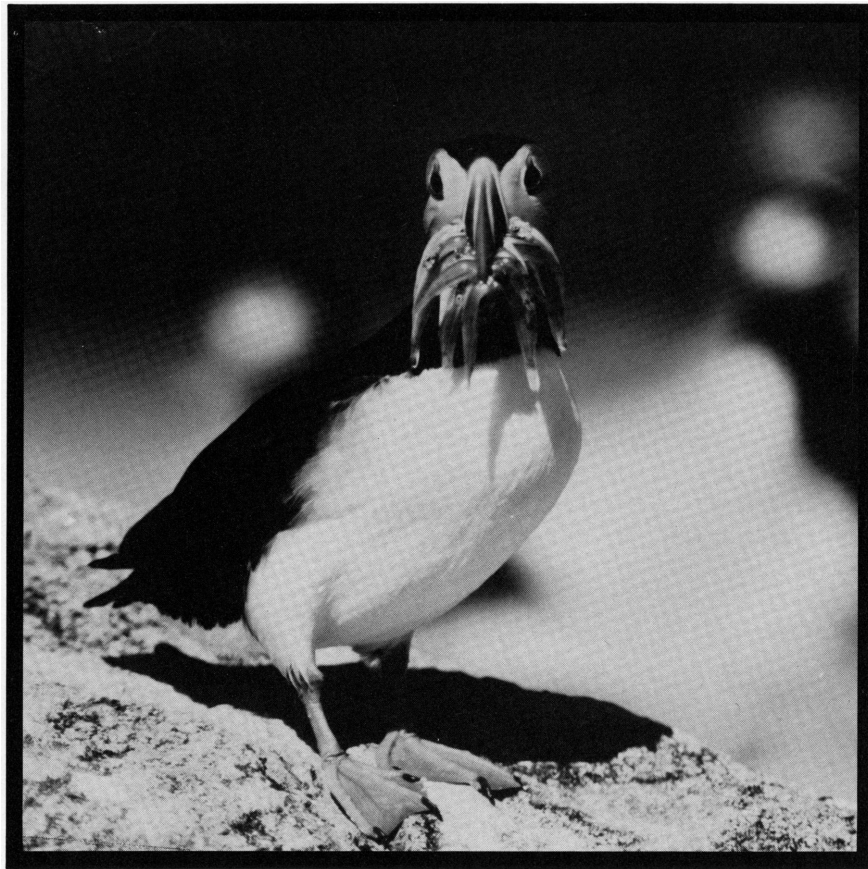
Total revenue from *Natural History* Magazine operations and Associate Membership exceeded \$10 million for the fiscal year.

Natural History's advertising revenues in 1986-87 were \$4.9 million, as measured by The Publishers Information Bureau. Average paid circulation remained nearly 503,000, as measured by the Audit Bureau of Circulations. The magazine continues to serve as the primary advertising medium for Discovery Tours, The Members Book Program, and other Museum activities. As such, it plays an important role in communicating with Museum members.

Discovery Tours For the first time, Discovery Tours took participants to all seven continents. The Antarctica cruise at the height of the austral summer was a tremendous success, with the weather so kind that the notorious Drake Passage was renamed the "Drake Pond!"

The Museum's first cruise along the eastern seaboard of Canada and the United States was also well received. On the safari to Zambia, Zimbabwe and Botswana, travelers viewed big game from open vehicles and during exciting walking excursions. Discovery Tours also launched its first cruises of the Islands of Japan, taking participants from Korea through the Inland Sea of Japan

Natural History fills the bill for nearly a half-million Museum members, who receive the magazine monthly. The Natural Moment feature displays outstanding nature photography, such as



this shot by Wayne Wegner of a puffin with a mouthful of fish. The magazine is a showcase for color photography and for readable essays by scholars and scientists.

and on to Japan's northern island of Hokkaido.

Discovery Tours returned to many exciting destinations such as China, Norway, Britain, Kenya, Mexico, Easter Island, Peru, Tahiti, the Amazon, Indonesia, the Great Barrier Reef, France (including the original cave of Lascaux) and the Galapagos Islands.

Discovery Tours itineraries reflect specific "study themes" related to the Museum. The department selects lecture teams and lecture series to enhance travel experiences. The staff creates and produces comprehensive educational materials for each participant, including guide information, glossaries, chronologies, checklists of wildlife and reading lists. Discovery Tours' representatives accompany and monitor the operation of each program to assure the satisfaction of participants.

The travel program of the American Museum provided more than 940 participants with special study tours to more than 40 countries. Fifty-nine Museum and guest lecturers served as tour leaders, providing formal slide-illustrated lectures and informal discussions during each trip. A ratio of one lecturer to 16 travelers was maintained.

Membership The Membership Office drew on the institution's vast resources to inform members about the natural world and the research that is conducted at the Museum. Highlights included talks by Anthropology Department Research Associate Helen Fisher on the Evolution of Human Sexuality and Dr. Topoff on slave-making ants; behind-the-scenes tours of the Departments of Exhibition and Mammalogy; and a historical look at the Museum's great expeditions with Doug Preston, author of "Dinosaurs in the Attic." Guides from the Volunteer Office led

more than 2400 members on tours of the Museum's halls and special exhibitions.

Collaborative programs with the American Museum-Hayden Planetarium were extremely successful. Dr. Gutsch's lecture on recent discoveries about Uranus, the annual holiday concerts, and a concert by Paul Winter attracted capacity audiences. Members' children made cardboard rockets at a special Members' preview of "The Secret of the Cardboard Rocket."

The "Rotunda" newsletter, in addition to informing members of Museum events and exhibitions, also told them about research activities. In "Palmer Station Diary," Dr. Winston discussed her research on bryozoans in the Antarctic; Dr. Short wrote a Letter from the Field on his work with African Honeyguides. The December issue featured Museum fieldwork in North America.

The Membership Office also presented programs with outstanding speakers from outside the Museum, including Jane Goodall, who lectured to 2000 members on her recent research on the chimpanzees of Gombe. The office also coordinated the Mack Lipkin Man and Nature Lectures, in which fall and winter series were given by Stephen Jay Gould and Garrett Hardin.

Family programs continued to be very popular. "The Ice Age and Its Mammoth Hunters," presented in conjunction with the "Dark Caves, Bright Visions" exhibition; the Annual Origami Holiday Workshop taught by the Friends of the Origami Center of America, and the "All New Dinosaur Revue" were among the year's highlights. The first full year of the Members' Birthday Program was an outstanding success. Members, 5 to 10 years old, could choose either a "Dinosaur," "Safari" or "Star" party. By the end of the year, the Membership Office had given 150 parties at-

tended by more than 2500 children. The Members' Birthday Program quickly became a new source of revenue.

The Participating and Donor Membership program had its best year. The program reached a new high of 24,000 members. For the first time total revenue from these classes of membership exceeded \$1 million. Attendance at the members' events also reached record numbers. Over the last five years, Participating and Donor Membership income has more than doubled while net income has almost tripled.

Special Publications Members' Book Program offerings were well received. Fine quality books, calendars and audio tapes are offered to the Museum's members and friends through an annual catalog, direct mail and advertisements in *Natural History*. Especially popular are science-oriented children's books, Museum products such as calendars and notecards, and the publications of the Museum's staff members.

The 1987 Museum calendar, "John Gould's Exotic Birds of Asia," has proved so popular that more of his bird images will appear in the 1988 calendar, "John Gould's Exotic Birds." The 1988 calendar, produced with Universe Books Inc., will feature a variety of bird images taken from volumes in the Museum Library's Rare Book Room.

New and exciting projects were launched by Special Publications. One of the most successful endeavors was the production of a catalog to accompany the exhibition, "Dark Caves, Bright Visions: Life in Ice Age Europe." The entire print run of the catalog, a large-format, four-color book with more than 100 photographs of prehistoric sites and artifacts, was sold during the exhibition period.

An agreement was reached with the University of Washington Press to copublish a book on the

*Dinosaurs can be a girl's best friend . . .
and a boy's best friend, too. The Museum
Shop has everyone's favorite animals
on T-shirts, jewelry and ties, as puzzles,*



*or as cuddly stuffed toys. In addition to
dinosaur paraphernalia, the shop has
a well-stocked natural history bookshop
and a variety of gifts related to the themes
of the Museum's exhibition halls.*

Museum's Northwest Coast Indian collections. Author of the book is Aldona Jonaitis, a Research Associate in the Department of Anthropology. Beautiful color photographs, newly created for the project, will be used to illustrate outstanding artifacts from the collection. The text will describe their history. Funding for the publication was received from the National Endowment for the Humanities.

Sales of Audubon portfolios, the new edition of six prints from Audubon's "Birds of America," continue to be very strong. Royalties from this project will endow a research fund in the name of John James Audubon and will help the Museum carry on research in the areas of natural history with which Audubon was so deeply concerned.

Curator The four 1986-87 issues of *Curator* covered a wide range of topics. One issue, devoted entirely to the use of computers in and by museums, carried a collection of papers presented at the Museum Computer Network Conference in Mexico City in 1985. Topics covered in the special issue were the development of a stolen art archive that enables non-professionals to identify, and hopefully return, priceless objects to museums; development of a film catalog on a personal computer at the Museum of Modern Art, and the computerization of both small and large collections—from the Clement Frye Collection at the Yale Medical Library to the vast holdings of the National Park Service in more than 300 locations throughout the United States. The issue also listed *Curator's* previous articles in this field, an impressive collection dating back to the journal's first year of publication.

Three other issues published during the year included a survey of halls of fame (a rapidly expanding museum area), studies on ex-

hibition evaluation during and after development, and technical articles with detailed instructions and drawings to help exhibitors handle such specific problems as mounting delicate garments. A cumulative index of 30 years of *Curator* was in preparation.

Curator is increasingly becoming an international journal, sending subscriptions to, and receiving manuscripts from other continents. There are about 1000 subscribers worldwide. Its authors have come from Germany, Canada, India and Great Britain, as well as most of the states of this country. *Curator* is clearly seen as a prestigious publication by the museum world; it is the journal to which professionals submit their work first.

Micropaleontology Press

Academic and professional paleontologists are served by Micropaleontology Press in their studies of microscopic fossils from ancient seafloors and lakes. It offers special applications in petroleum exploration.

Four issues of supplement pages for the world standard *Ellis and Messina Catalogues of Micropaleontology* were delivered. These included two issues of the *Catalogue of Foraminifera*, with original type descriptions of 645 genera and species; one issue of the *Catalogue of Ostracoda*, with 232 genera and species; and one issue of the new *Catalogue of Diatoms*, with 345 genera and species. The quarterly research journal, *Micropaleontology*, and the monthly information service, *Bibliography and Index of Micropaleontology*, were published in their 32nd and 15th years, respectively.

The Press received important contributions from Agip (the national oil company of Italy), Amoco Production and Research Company, Arco Research, Chevron USA, Marathon Oil Company, Mobil Oil Company, and

Shell Oil Company. The contributions support its work and helped in developing a prototype image/text program that will display any of the 65,000 fossils in its files in a desktop computer.

Museum Shop This was a record year for the Museum Shop. Last year, for the first time, shop sales exceeded \$2 million. Sales this year surpassed last year's by 28 percent. Increased demand reflected, in part, the national interest in the dinosaur, making 1987 "The Year of the Dinosaur" for the Museum Shop.

The new surge of interest in dinosaurs among all age groups was met by the addition of more educational and decorative merchandise to the sales areas in the Museum. The heightened interest also boosted mail-order sales, particularly in exclusive dinosaur ties, plush and scale models. Media coverage, both print and broadcast, contributed to the success of the dinosaur merchandise, including a front-page photograph of the Museum's Junior Shop in The New York Times.

Gems and minerals continued to be a fast growing classification, sold as specimens, jewelry and specialty items. The interest of the public in mineralogy has helped to more than double Museum Shop sales in this category.

The Gallery Three Shop presented merchandise groups related to exhibitions. Items linked to the "Dark Caves, Bright Visions" exhibition included a wide range of merchandise representative of Ice Age Europe, highlighted by cave art and the highly successful catalog, "Dark Caves, Bright Visions," published by the Museum. In conjunction with the "Chaco Phenomenon" exhibition the shop offered a wide range of books, native American crafts and jewelry.

The Junior Shop, a significant contributor to the record year,

was very popular with families as well as school groups. In the past year, Junior Shop sales have increased more than 30 percent.

Six new display cases were placed in locations around the Museum to highlight the variety of merchandise available in the shops and reflect the various exhibition halls.

Administration

Plant Operations, Construction, Maintenance and Building Services The Construction Department installed a new employee dining room and renovated the school reception lunchrooms. Designs are on the board for improvement of exterior lighting of the Central Park West facade and installation of an elevator for the handicapped in the Hall of Ocean Life. For the American Museum-Hayden Planetarium, designs in progress include roof replacement, facade restoration and installation of a "Celestial Plaza" in which bronze representations of astronomical objects are embedded. New doors and a canopy were fabricated and installed to restore the look of the Art Deco architecture of the era during which the Planetarium was built.

The Construction Department worked with the Exhibition Department on the installation of the Hall of South American Peoples. The work for the Hall included electrical design and installation of special lighting to prolong the life of artifacts, creative woodworking, metal and glass for case construction and painting. Construction services were also provided for the year's special exhibitions.

Scientific and administrative office renovations included the Departments of Anthropology, Entomology, Ichthyology, and the

Museum Shop. A new conference room was completed for the Department of Education, and new admissions desks and counting mechanisms were fabricated for Theodore Roosevelt Memorial Hall. Renovation work in the Photographic Archives Library was completed.

The department's professional staff monitored major projects funded by the New York City Department of Cultural Affairs and the Department of General Services. These included the rehabilitation of flat roofs and exterior facades; construction of fire stairs; security and fire alarm consolidation, and restoration of Theodore Roosevelt Memorial Hall. A project is planned for the demolition and restoration of the stairs, terrace and plaza on 77th Street. Restoration of the Museum's plaza and steps on Central Park West has been substantially completed.

The Maintenance Department provided services such as heating, ventilation, air conditioning, plumbing, cleaning and lighting. The department significantly reduced the number of service calls by completing a comprehensive location and status survey of heating, ventilating and air conditioning equipment, water lines, and steam and leader lines, and then utilizing the information to systematically upgrade the facilities. Projects are underway for the replacement of water and steam lines that had become corroded, as well as replacement of outdated heating, ventilating and air conditioning equipment. Several water lines have already been replaced. Heating, ventilating and air conditioning units for Gallery 3 and storage areas for the Anthropology Department were upgraded to provide temperature and humidity controls.

A new heating, ventilating and air conditioning system, air filtration system and hood exhaust were installed in the office of Micro-paleontology Press. Designs for air

conditioning systems in the Hall of South American Peoples and in storage areas of the Ichthyology Department were completed. A program of group relamping of halls and exhibit cases proved more efficient than spot relamping and resulted in substantial labor savings by the department. Marble was cleaned and sealed in the subway entrance, basement and stairways. Painting was completed in the Hall of Eskimos, the Hall of Indians of the Eastern Woodlands, the Hall of Indians of the Plains, the Hall of Primates, 77th Street Foyer and the north and south stairways within the Theodore Roosevelt Memorial Hall building.

The Building Services department is responsible for Museum security. The staff also participates in the transportation and protection of special exhibition materials from their arrival at the airport to installation in the galleries. The department began a program of intensive training of its personnel who provide services to the Museum's many visitors.

Naturemax Theater "The Dream Is Alive" completed a highly successful two-year run in the Naturemax Theater, attracting a total of 450,610 visitors since its premier in June, 1985. Another 200,000 visitors saw "Nomads of the Deep," "Skyward" and "On the Wing," which were introduced during the year.

In April, the Naturemax Theater was highlighted in a New York Times article by film critic Vincent Canby, which focused on IMAX and large screen formats. It is anticipated that this exposure will have the effect of heightening interest and increasing Naturemax attendance.

Beginning July 1, "Grand Canyon — The Hidden Secrets" and "Chronos" were scheduled in the Naturemax Theater. The two new features are expected to have long and successful runs.

A new employee dining room, brightened by nine backlit Mochi murals, opened in March. The cafeteria is managed by Restaurant Associates, Inc., which also manages the Museum's



two public restaurants. The American Museum Restaurant served lunch, brunch or dinner to 54,400 visitors. Food Express, a 900-seat fast-food facility with a diverse menu, served more than 700,000 visitors.

Museum Attendance Museum attendance for the 1986-1987 fiscal year totaled 2,744,220. This figure includes 2,164,799 to the Museum and 579,421 to the Planetarium.

Development and Public Affairs

Development The international business community and the Museum are partners in mutual efforts to expand understanding of the natural sciences and present the sciences and human cultural diversity to the public. Trustee Donald C. Platten's leadership has generated strong corporate support for the Museum's General Fund. Despite corporate mergers and difficult times in many businesses, corporate contributions this year were in excess of \$1 million. More than 300 businesses are now corporate donors to the Museum, but the cornerstones of this prospering partnership are the Museum's longtime and generous corporate contributors: Reader's Digest (through the Wallace Funds), Bristol-Myers, Chemical Bank, Consolidated Edison Company of New York, Exxon, and International Business Machines Corporation.

Once again, the Museum was able to remain open free of charge on Friday and Saturday evenings as the result of a generous grant from the Mobil Corporation. This program allows people, who might otherwise be unable to come to the Museum, to visit at more convenient times. The Exxon Education Foundation provided funds for internships and work-study opportunities for college students, undergraduate and graduate student research in collaboration with Museum curators, and also supported in-service programs for teachers. Helena Rubinstein Foundation, through the personal interest of Roy V.

Titus, is helping to underwrite the installation of a new plaza at the entrance to the Planetarium. The Du Pont Company and its energy subsidiaries, Conoco and Consolidated Coal Company, provided assistance for the production and installation of a new video presentation on plate tectonics in the Hall of Earth History. A natural science education program for junior high school students was established with a grant from Christodora Incorporated.

Corporations that participate in employee matching gift programs are especially important in the Museum's scientific, educational and cultural advancement. Contributions in this program provided more funds to the Museum than ever before.

Private foundations have a vital role in supporting the Museum in a wide variety of programs. The Andrew W. Mellon Foundation awarded a very generous three-year grant of \$725,000 to carry out conservation work on the collection in the Department of Anthropology and to provide conservation treatment for objects in Museum exhibitions. The school class facilities were enlarged and improved through a grant of \$250,000 from the Charles Hayden Foundation. The Foundation's award allowed the Museum to increase the capacity of these facilities from 2400 to 3800 students each day. The Howard Phipps Foundation continued its generous support of the Roosevelt Renovation Project with a gift of \$250,000.

The research project on St. Catherines Island, under the leadership of Dr. Thomas, continued with the generous support of the Edward John Noble Foundation. The Ruth U. and Sanford Samuel Foundation provided assistance to undergraduate and graduate students to conduct research at the the Museum under the training of Museum curators. The Eppley Foundation for Research sponsored Dr. Novacek's paleontology research

in Southern Chile. Dr. Tattersall's research on the lemurs of Madagascar was supported by the Richard Lounsbery Foundation and Richard Zweifel's fieldwork in New Guinea was supported by the Sabin Conservation Fund.

The Ambrose Monell Foundation, The G. Unger Vetlesen Foundation, the Helen Clay Frick Foundation, the Gladys and Roland Harriman Foundation and the J.M.R. Barker Foundation all contributed to the Museum's operation.

Overflow audiences for programs in the auditorium can now see the programs in the Henry Kaufmann Theater on closed circuit television; a grant from the Henry Kaufmann Foundation provided for the installation of equipment in the theater.

The Education Department's programs were funded through many sources, including the Samuel & May Rudin Foundation, William Randolph Hearst Foundation, The Vidda Foundation and Henry Nias Foundation. The Lucius N. Littauer Foundation assisted in the presentation of the exhibition "On Tap: New York's Water Supply."

Friends have a very special relationship with the Museum and have access to its scientists and facilities in a manner that is not possible for other members and the public. This year the number of Friends and the generosity of their support reached their highest levels. Friends were invited to several events, including a champagne reception and preview for the new Imax film, "Chronos," and a special showing of the exhibition, "Dark Caves, Bright Visions."

Government agencies help support various projects. The NSF awarded grants for collection maintenance of the fossil fish collection, which is the largest and most diverse collection of its kind in the United States, and to the Department of Mammalogy for care of its collection.

The National Endowment for the Humanities awarded a major grant in support of "Carthage: A Mosaic of Ancient Tunisia." This traveling 67

exhibition of Punic, Greek and Roman artifacts will premiere at the Museum in December, 1987, before beginning a national tour. The United States Department of Education awarded a two-year grant to the Museum's Department of Library Services for the micro-filming and cataloging of 200 historical and scientific documents, including field journals, specimen catalogs and letters of Museum scientists, explorers and collectors. The National Endowment for the Arts supported the purchase of equipment to meet the specialized conservation needs in the Hall of South American Peoples which will open in 1988. The Institute of Museum Services awarded a grant toward the general operation of the Museum. The IMS also provided funding for conservation of a collection from the Mangbetu peoples of northeastern Zaire in preparation for a major traveling exhibition which will premiere in 1990.

The New York State Council on the Arts provided generous support for the general operation of the Museum and for various projects. Project grants were awarded for new educational materials to be used by visiting school classes; a collaborative effort between the Museum and New York School District 4 for workshops that introduce teachers and students to the variety of cultures in the city; a survey of the Department of Anthropology's flat paper object collection; additional programs for the Education Department during Black History Month; the Margaret Mead Film Festival, and the exhibition, "Dark Caves, Bright Visions."

New York State support was also received through the Natural Heritage Trust to assist in the collection management program in Anthropology and from the New York State Library for the conservation and preservation of vintage gelatin photographs taken during the Jesup Expedition to the North Pacific from 1897-1903.

The Museum is fortunate to have the support of many contributors who help assure its future through bequests. The late George Willett's generous gift has established the George Willett Curatorship and helped underwrite the graduate/undergraduate research training program. The Museum is especially thankful to Mr. Willett's nephew, Bernard Willett, for his interest and assistance in these efforts. The estate of Ruth B. Somerville provided for the establishment of the Somerville Expeditions for field research in the natural sciences and anthropology. Bequests from longtime friends Clara Peck and Richard Shields help assure the future operation of the Museum. Alice A. Hay was a steadfast contributor, especially to research in Central and South America during her lifetime. Her estate continued these generous gifts by supporting work in the Department of Anthropology.

Benefit Events The year started with the formation of a Special Events committee, which comprised both members of former benefit committees and new members. There were a wide variety of events planned throughout the year. Stephen Jay Gould spoke at a lecture and attended a reception with committee members. A Christmas Shopping Night was held in the Museum Shop. In addition, a special tour of the exhibition, "Dark Caves, Bright Visions," was given by Ian Tattersall, and later in the season Jane Goodall met committee members at a reception following a Museum lecture.

The children's Halloween party took place in the Dinosaur Halls and again sold out.

On Oct. 21, under the patronage of His Excellency the Ambassador of France to the United States, and Mrs. Emmanuel de Margerie, "Dark Caves, Bright Visions" was opened with a benefit dinner.

Mrs. Bruce Wilcox and Mrs. James Luse chaired a most successful

evening entitled "Celestial Fantasy" in the Planetarium. More than 400 people arrived in every possible mode of headress to dance the night away in the Black Light area. They raised more than \$20,000 for the Department of Education teachers' guide books.

The "Open House" party on May 19 was enjoyed by more than 500 guests of varying ages. Thanks to the special help of Trustee Mrs. Ottavio Serena di Lapigio, the scientific staff brought some of the Museum's most interesting hidden treasures to the event.

None of these events could take place without the generous and enthusiastic help of all of the committees.

Public Affairs Media placement for the Museum's exhibitions, programs and scientific research was expanded. New media were introduced to the Museum and established media relationships were strengthened. Numerous meetings with editors, reporters and producers, resulted in print and broadcast publicity which enhanced the Museum's visibility.

Broad-based coverage was generated for the major exhibition "Dark Caves, Bright Visions: Life in Ice Age Europe." The exhibition, which was originated by the Museum, was featured as a cover article in *Newsweek*. Among the other magazines which discussed its importance as a scientific and artistic event were *The New York Times Magazine*, *Smithsonian*, *Science*, and *The New Yorker*. Newspapers which carried stories about the exhibition included *The New York Times*, *The Wall Street Journal*, *Christian Science Monitor*, *Daily News* and *New York Post*. "Dark Caves" was also covered by A.P., U.P.I., CBS Network's "Sunday Morning," Cable News Network and National Public Radio.

Other exhibitions that received national media attention included "The Chaco Phenomenon," "On Tap: New York's Water Supply,"

A retired teacher who says she has been a member of the Museum for "as long as I can remember," Volunteer Bernice Stein gives directions to visitors from all over the world from her station in the Theodore Roosevelt Memorial Hall.



More than 500 volunteers serve throughout the Museum, leading Museum Highlights Tours, assisting in the scientific departments or teaching school groups in the Department of Education.

and "Benares: City of Light." This was accomplished through the dissemination of press materials, photos and color transparencies, followed by personal presentation of story ideas and picture possibilities. Media contacts were also established to generate publicity for the special exhibition "Carthage: A Mosaic of Ancient Tunisia."

Public Affairs produces a radio series that is distributed to 600 stations nationwide. The 13-week segments are produced three times a year. The spring and fall radio series featured brief scientific interviews between the Director and Museum researchers. A new winter series, focusing on topics from *Natural History* magazine, and featuring interviews of authors by Editor Alan Ternes, was released in January.

The office concluded the fiscal year with a press preview and extensive advertising campaign for two new Naturemax films, "Grand Canyon — The Hidden Secrets" and "Chronos." It had opened the year with a major press preview for "On the Wing."

The third annual "Legislators Night" took place in January for New York City and New York State legislators and their families. Some 500 persons became better informed about the Museum during an evening that included the presentation of special programs and tours, as well as dining and dancing.

Public Affairs expanded its role in disseminating the Museum's scientific research with the addition of a staff science writer. Research, including Judith Winston's work on bryozoans, Jeremy S. Delaney's theoretical reconstruction of a planetoid and Michael Novacek's explorations of Patagonia, were publicized.

Exhibitions and other programs were also extensively promoted through the annual campaign of advertisements produced by

Museum is a public service client. Full-page advertisements highlighting special exhibitions and describing other features of the Museum were run quarterly in *The New York Times*. Ads also appeared in *New York Magazine* on a semi-annual basis. Three-week radio ad campaigns, targeted toward a cross section of potential Museum visitors, supplemented the print media advertising.

Guest Services Among Guest Services' responsibilities is the scheduling of use of space by Museum departments as well as by corporate and nonprofit groups and organizations. Numerous Museum programs, including social and press events, meetings, lectures, classes, screenings and performances were planned and coordinated by the Office.

Events planned and executed for outside groups included an introduction by the VF Corporation of Pepsi Apparel, the Centennial Celebration of Cornell University's School of Law, and Scenic Hudson Foundation's Water Resources Conference.

Other events were arranged for corporations and organizations, including Weil, Gotshal & Manges; the American Stock Exchange; The College Board; Stroock, Stroock & Lavan; Financial Guaranty Insurance Company; Boy's Athletic League; Tiger Management Company; The Association of the Alumni of the Columbia University College of Physicians and Surgeons; American Bar Association; New York Telephone Company; Willkie, Farr & Gallagher; New York Urban Coalition; New York Fashion Council; Davis Polk & Wardwell; Cravath Swaine and Moore; the Mergentine Corporation; Lever Brothers; Digital Corporation; St. Bernards School; Chemical Bank's Financial Services Division; Thursday Evening Club; Manomet Bird Observatory; The Johns Hopkins University Center for the Advancement of Academically

Talented Youth; the Meteoritical Society; the Willie Hennig Society; International Business Machines; American Littoral Society, and the New York City Department of Parks Urban Natural Resources Conference.

Commercial filming and photography projects included an ad for Apple Computers, a documentary for Brazilian TV featuring Antonio Carlos Jobim, an interview with Bill Moyers and Joseph Campbell, and a taping for the "Out of Africa" segment of *Make It Fashion*.

In conjunction with other Museum offices, Guest Services developed a Museum Group Tour Package. The package includes a Museum Highlights Tour, attendance at the Naturemax Theater, lunch in the American Museum Restaurant and a Planetarium Sky Show. The program is designed for group tour operators as well as for senior citizen and other community groups and organizations.

In March, a new dining room was opened for Museum employees and their guests. The facility was most favorably received and served 24,950 meals by June 30. By providing a separate dining area for employees, service lines in the Food Express were freed up, expediting service to Museum visitors. The Food Express served approximately 711,772 visitors. The American Museum Restaurant provided a pleasant setting for lunch, dinner and brunch for 59,419 members and other visitors. Renovations to the school lunchrooms were completed, and the facility reopened in November with an increased seating capacity of more than 900 seats per lunch period.

Distribution of general information brochures increased to 355,778. Tourist outlets, such as convention and visitors' bureaus, airlines, bus lines, parks, Y's, and community centers are supplied with the brochures in English as well as in several other languages.

Floor plans were redesigned and updated, and 495,013 copies in

English and other languages were distributed to visitors. Topical information was provided for the closed circuit television system, and recorded telephone information messages which reached 221,386 potential visitors.

Volunteer Office Among those first met by Museum visitors are the volunteers who work at the Information Desks. Information Desks are staffed by volunteers seven days a week, Wednesday evenings, and on all holidays. Some 98,900 person hours were contributed to this important activity.

Other highly visible volunteers work as Museum Highlights Tour guides. This program was in its 10th year. During its first year, 567 Museum Highlights Tours were given, compared with 2664 this year. Over the years, emphasis has been placed on improving the quality and scope of the program. In addition to the regularly scheduled daily tours, Museum Highlights Tour guides took groups through the temporary exhibitions. They also gave tours to members' groups on minerals and gems, dinosaurs, and primate evolution and social strategies. The Volunteer Office participated in planning for the new group tour program, which includes reserved Highlights Tours.

Another highly visible involvement of volunteers occurs during the Education Department's Annual Margaret Mead Film Festival. Fifty-one volunteers donated time to this project during its five-evening run.

In addition to highly visible jobs, volunteers also work behind the scenes. Teams of volunteer archivists worked in the Departments of Mammalogy and Herpetology, as well as in the Library and the Planetarium where they sorted files, preparing material for easy access and safe storage.

In scientific departments, volunteers assisted staff members on research projects. For example, in the Department of Vertebrate

Paleontology volunteers helped with the preparation and curation of fossil fishes.

In the Department of Invertebrates, the Volunteer Basic Research Support Team worked on identification, distribution and evolution of an unparalleled collection of bryozoans. This volunteer group was honored at a recognition ceremony at City Hall hosted by Manhattan Borough President, David N. Dinkins.

During National Volunteer Week the Museum's Director, Dr. Nicholson, especially recognized 108 volunteers who have given in excess of 1000 hours of service to the institution. He also lauded the efforts of the more than 500 volunteers Museum wide.

Volunteers were seen on TV selling at the Museum Shop on 4, touring through "Dark Caves, Bright Visions," and teaching paperfolding near the Origami Holiday Tree. *Town & Country* magazine featured the Museum's volunteer program among 200 in museums nationwide, making special reference to the Museum Highlights Tour program.

The volunteer program attracted substantial financial support through an anonymous donation by two volunteers. The Volunteer Office Support Fund, open to further contributions, is for the general operation and projects of the volunteer program. The Museum Highlights Tour program was given a tape recorder, numerous reference books for its library and the photocopying costs for training materials for a class of 20 Museum Highlights Tour guide trainees.

Mitzi Bhavnani, Program Chair of the American Association for Museum Volunteers, planned three sessions on volunteerism for the American Association of Museums annual meeting, and chaired one of the sessions. She gave the keynote address at the Utah Museum Volunteers Association Annual Meeting in Salt Lake City. She was a panelist discussing recruitment at a meeting of Volunteer

Administrators in New York City Cultural Institutions, an organization started last year at this Museum. She was named to the Steering Committee of the New York Voluntary Enterprise Commission, a committee charged with planning the first statewide conference on volunteerism to be held in 1988.

OFFICERS

PRESIDENT

Robert G. Goelet

VICE PRESIDENTS

William T. Golden

Plato Malozemoff

Frederick A. Klingenstein

Henry G. Walter, Jr.

SECRETARY

L.F. Boker Doyle

TREASURER

Charles H. Mott

BOARD OF TRUSTEES

ELECTIVE

Class of 1987

Charles J. Hedlund

Lansing Lamont

Mrs. John Macomber

William F. May

Gerard Piel

Jack Rudin

Alfred R. Stern

Oscar S. Straus, II

Henry G. Walter, Jr.

Class of 1988

William T. Golden

Arthur Gray, Jr.

Frederick A. Klingenstein

Mrs. Ottavio Serena di Lapigio

Mrs. Constantine Sidamon-Eristoff

Class of 1989

Robert R. Barker

Thomas D. Barrow

Robert G. Goelet

Earl G. Graves

Mrs. John E. Hutchinson, III

Frank Y. Larkin

Donald C. Platten

Arthur Ross

Carroll L. Wainwright, Jr.

Class of 1990

L.F. Boker Doyle

Henry Clay Frick, II

Caryl P. Haskins

Frank G. Lyon

Plato Malozemoff

Barnabas McHenry

Edwin H. Morgens

William Murray

Frederick Seitz

Class of 1991

Philip F. Anschutz

Howard L. Clark

Mrs. Hart Fessenden

Elbridge T. Gerry

Jerome Kohlberg, Jr.

Marshall Manley

Frank A. Metz, Jr.

Charles H. Mott

Lawrence G. Rawl

EX OFFICIO

Edward I. Koch, Mayor of the City of New York

David N. Dinkins, President of the Borough of Manhattan

Harrison J. Goldin, Comptroller of the City of New York

Henry J. Stern, Commissioner, Department of Parks and Recreation

Diane Coffey, Acting Commissioner, Department of Cultural Affairs

Nathan Quinones, Chancellor, Board of Education, City of New York

HONORARY

William S. Beinecke

August Belmont

Robert E. Blum

Benjamin S. Clark

Joseph F. Cullman, 3rd

James S. Rockefeller

Edwin Thorne

Thomas J. Watson, Jr.

COUNSEL

Milbank, Tweed, Hadley & McCloy

COMMITTEES OF THE BOARD*

MANAGEMENT COMMITTEE

ELECTED MEMBERS

Robert R. Barker

Mrs. Hart Fessenden

Caryl P. Haskins

Mrs. John E. Hutchinson, III

Frank Y. Larkin

Frank G. Lyon

Mrs. John Macomber

Barnabas McHenry

Arthur Ross

Mrs. Constantine Sidamon-Eristoff

Alfred R. Stern

Oscar S. Straus, II

Carroll L. Wainwright, Jr.

EX OFFICIO MEMBERS

L.F. Boker Doyle

Robert G. Goelet

William T. Golden

Plato Malozemoff

Charles H. Mott

Henry G. Walter, Jr.

Frederick A. Klingenstein

Diane Coffey

AUDIT AND EXAMINING COMMITTEE

Frank Y. Larkin, Chairman

Howard L. Clark

Arthur Gray, Jr.

Frederick A. Klingenstein

Frank G. Lyon

Charles H. Mott

FINANCE COMMITTEE

Charles H. Mott, Chairman

Robert R. Barker

Elbridge T. Gerry

Jerome Kohlberg, Jr.

Oscar S. Straus, II

Carroll L. Wainwright, Jr.

L. F. Boker Doyle, Alternate

NOMINATING COMMITTEE

Howard L. Clark, Chairman

William F. May

Donald C. Platten

COMMITTEES OF THE MUSEUM*

BUDGET COMMITTEE

Henry G. Walter, Jr., Chairman
Mrs. Hart Fessenden
Frank Y. Larkin
Frank G. Lyon
Marshall Manley
William F. May
Pauline G. Meisler, Ex Officio
Charles H. Mott
Thomas D. Nicholson, Ex Officio
Carroll L. Wainwright, Jr.

SPECIAL ADVISORY COMMITTEES*

ANNUAL CORPORATE DRIVE COMMITTEE

Donald C. Platten, Chairman
Thomas D. Barrow
Howard L. Clark
Frank G. Lyon
William F. May
Jack Rudin

DEVELOPMENT COMMITTEE

Robert G. Goelet, Chairman
Howard L. Clark, Ex Officio
William T. Golden
Frederick A. Klingenstein
Frank Y. Larkin
Plato Malozemoff
Charles H. Mott
Jack Rudin
Mrs. Constantine Sidamon-Eristoff
Oscar S. Straus, II
Henry G. Walter, Jr.

EDUCATION POLICY COMMITTEE

Mrs. John Macomber, Chairman
Malcolm J. Arth
Charles J. Cole
Mrs. Hart Fessenden
Stanley A. Freed
Earl G. Graves
William A. Gutsch, Jr.
Mrs. John E. Hutchinson, III
Lansing Lamont
Neil H. Landman
William F. May
Edwin H. Morgens
Gareth Nelson
Thomas D. Nicholson
Demetrius Pohl
Arthur Ross
Robert Voss
Judith Winston

EXHIBITION POLICY COMMITTEE

Frank G. Lyon, Chairman
Sydney Anderson
Malcolm J. Arth
Norene L. Brooks
Robert L. Carneiro
Howard L. Clark
R. Niles Eldredge
George S. Gardner
George E. Harlow
Frank Y. Larkin
Mrs. John Macomber
Ann Breen Metcalfe
Gareth Nelson
Thomas D. Nicholson
Steve Quinn
Arthur Ross
Jerome G. Rozen, Jr.
Joseph M. Sedacca
Mrs. Ottavio Serena di Lapigio
Richard Slawski
Alfred R. Stern
Richard Tedford
Bal Raj Vohra
Mrs. Halsted W. Wheeler

PLANETARIUM POLICY COMMITTEE

Oscar S. Straus, II, Chairman
Malcolm J. Arth
Mrs. Hart Fessenden
Mrs. Maurice Goodgold
William A. Gutsch, Jr.
Charles J. Hedlund
Dorritt Hoffleit
Lansing Lamont
Mrs. James Magid
William A. May
Gareth Nelson
Thomas D. Nicholson
Richard T. Perkin
Daniel W. Seitz
Benjamin S. P. Shen
Henry G. Walter, Jr.
Mrs. Jacqueline Bograd Weld

SCIENCE POLICY COMMITTEE

Caryl P. Haskins, Chairman
R. Niles Eldredge
Mrs. Hart Fessenden
Henry Clay Frick, II
William T. Golden
Jerome L. Greene
Plato Malozemoff
Frank A. Metz, Jr.
Guy G. Musser
Charles W. Myers
Gareth Nelson
Thomas D. Nicholson
Michael Novacek
Gerard Piel
Donald C. Platten
Norman I. Platnick
Martin Prinz
Lawrence G. Rawl
Jerome G. Rozen, Jr.
Frederick Seitz
Mrs. Constantine Sidamon-Eristoff
Mrs. Constance Spahn
David Hurst Thomas
Robert S. Voss
Henry G. Walter, Jr.
Richard G. Zweifel

SPECIAL ADVISORY BOARDS*

FRANK M. CHAPMAN MEMORIAL COMMITTEE

Lester L. Short, Chairman
George F. Barrowclough
A. H. Brush
James C. Greenway, Jr.
Wesley E. Lanyon
Frank Y. Larkin
Thomas D. Nicholson
Jerome G. Rozen, Jr.
Francois Vuilleumier
Richard G. Zweifel

LERNER-GRAY FUND ADVISORY COMMITTEE

Arthur Gray, Jr., Chairman
Arland L. Carsten
R. Niles Eldredge
William K. Emerson
Nixon Griffis
Thomas D. Nicholson
Jerome G. Rozen, Jr.
Jack Rudin
Frederick Seitz
Mrs. Constantine Sidamon-Eristoff
Carol Simon
Michael Smith

SANFORD COMMITTEE

Lester L. Short, Chairman
Edward C. Childs
Thomas D. Nicholson
William F. Sanford

THEODORE ROOSEVELT MEMORIAL COMMITTEE

Arthur Ross, Chairman
Charles J. Cole
John Gable
The Hon. Theodore R. Kupferman
Mrs. John Macomber
Guy G. Musser
Gareth Nelson
Thomas D. Nicholson
Frederick Rindge
Anna C. Roosevelt
Elizabeth Roosevelt
Jerome G. Rozen, Jr.
Frederick Seitz
Mrs. Constantine Sidamon-Eristoff
Richard H. Tedford
Ethel Toback

THE STAFF

July 1, 1987

Thomas D. Nicholson, Ph.D., Director
 Charles A. Weaver, Jr., B.A.
 Deputy Director for Administration
 and Assistant Treasurer
 Pauline G. Meisler, M.B.A.
 Assistant Director for
 Financial Operations
 Walter J. Kenworthy, Ph.D.,
 Executive Assistant to
 the Director
 L. Thomas Kelly, M.B.A.
 Assistant Director and Publisher
 Albert E. Parr, Sc.D.
 Director Emeritus

SCIENCE, EDUCATION AND EXHIBITION DEPARTMENTS

ANTHROPOLOGY

Craig Morris, Ph.D.,
 Chairman and Curator
 Robert L. Carneiro, Ph.D., Curator
 Stanley A. Freed, Ph.D., Curator
 Enid Schildkrout, Ph.D., Curator
 Ian M. Tattersall, Ph.D., Curator
 David Hurst Thomas, Ph.D., Curator
 Laurel Kendall, Ph.D., Assistant Curator
 Gordon F. Ekholm, Ph.D., Curator Emeritus
 Harry L. Shapiro, Ph.D., Curator Emeritus
 Bella Weitzner, Curator Emerita
 Jaymie L. Brauer, M.A., Scientific Assistant
 Carol Gelber, B.A., Scientific Assistant
 Joseph A. Jimenez, M.A., Scientific Assistant
 Phillip C. Gifford, Jr., Ph.D., Senior
 Scientific Assistant Emeritus
 Robert L. Bettinger, Ph.D., Research
 Associate
 Gertrude E. Dole, Ph.D., Research
 Associate
 Ruth S. Freed, Ph.D., Research Associate
 Donald K. Grayson, Ph.D., Research Associate
 Paula Brown Glick, Ph.D., Research Associate
 Richard A. Gould, Ph.D., Research Associate
 Aldona C. Jonaitis, Ph.D., Research
 Associate
 Grant D. Jones, Ph.D., Research Associate
 Shepard Krech, III, Ph.D., Research
 Associate
 Frederica de Laguna, Ph.D., Research
 Associate
 Clark Spencer Larsen, Ph.D., Research
 Associate
 J. Alan May, Ph.D., Research Associate
 Rhoda Metraux, Ph.D., Research Associate
 Anna Roosevelt, Ph.D., Research Associate
 Jeffrey H. Schwartz, Ph.D., Research
 Associate
 Colin M. Turnbull, M.A. (Oxon.), D.Phil.,
 Research Associate
 Donald S. McClain, M.S., Field Associate
 Carin Burrows, Associate
 Helen E. Fisher, Ph.D., Associate

ASTRONOMY AND THE AMERICAN MUSEUM-HAYDEN PLANETARIUM

William A. Gutsch, Jr., Ph.D., Chairman
 and Associate Astronomer
 Franklyn M. Branley, Ed.D., Astronomer
 Emeritus
 Kenneth L. Franklin, Ph.D., Astronomer
 Emeritus
 David S. Roth, Planetarium Shop Manager
 Noel Guerrero, Assistant Manager
 Joseph Maddi, Chief Technician
 Helmut K. Wimmer, Art Supervisor
 Lynne B. Azarchi, M.B.A., Public Affairs
 Coordinator
 Clinton W. Hatchett, B.A., Astronomical
 Writer/Producer
 Brian P.M. Sullivan, B.S., Production
 Designer

ENTOMOLOGY

Norman I. Platnick, Ph.D., Chairman and
 Curator
 Lee H. Herman, Ph.D., Curator
 Frederick H. Rindge, Ph.D., Curator

Jerome G. Rozen, Jr., Ph.D., Curator
 Randall T. Schuh, Ph.D., Curator
 David A. Grimaldi, Ph.D., Assistant Curator
 Mont A. Cazier, Ph.D., Curator Emeritus
 Willis J. Gertsch, Ph.D., Curator Emeritus
 Sarfraz Lodhi, M.Sc., Senior Scientific
 Assistant
 Mohammad Umar Shadab, Ph.D., Senior
 Scientific Assistant
 Louis N. Sorkin, M.S., Senior Scientific
 Assistant
 Darlene Judd, B.S., Scientific Assistant
 Marjorie Statham Favreau, Scientific
 Assistant Emerita
 Alice Gray, M.S., Scientific Assistant
 Emerita
 Sixto Coscaron, D.Nat.Sc., Research
 Associate
 Frederick Coyle, Ph.D., Research Associate
 James S. Farris, Ph.D., Research Associate
 Raymond R. Forster, Ph.D., Research
 Associate
 Richard L. Hoffman, Ph.D., Research
 Associate
 Kurt Johnson, Ph.D., Research Associate
 Kumar Krishna, Ph.D., Research Associate
 Charles D. Michener, Ph.D., Research
 Associate
 Mary F. Mickevich, Ph.D., Research
 Associate
 A. F. Millidge, Ph.D., Research Associate
 Alfred F. Newton, Jr., Ph.D., Research
 Associate
 Philip D. Perkins, Ph.D., Research
 Associate
 William A. Shear, Ph.D., Research
 Associate
 James A. Slater, Ph.D., Research Associate
 Gary M. Stonedahl, Ph.D., Research
 Associate
 Howard T. Topoff, Ph.D., Research
 Associate
 Quentin D. Wheeler, Ph.D., Research
 Associate
 Raymond Mendez, Field Associate
 James Reddell, B.A., Field Associate
 R. T. Allen, Ph.D., Associate
 Robert C. Dalgleish, Ph.D., Associate
 Noel L.H. Krauss, Ph.D., Associate
 Bryant Mather, D.Sc., Associate
 Charles Mitter, Ph.D., Associate
 John A. Murphy, M.Sc., Associate
 John T. Polhemus, Ph.D., Associate
 Kathleen A. Schmidt, M.S., Associate
 Walter C. Sedgwick, B.A., Associate
 John Stamatov, D.D.S., Associate

HERPETOLOGY AND ICHTHYOLOGY

Gareth Nelson, Ph.D., Chairman and
 Curator
 Charles J. Cole, Ph.D., Curator
 Charles W. Myers, Ph.D., Curator
 C. Lavett Smith, Ph.D., Curator
 Michael L. Smith, Ph.D., Kalbfleisch
 Assistant Curator (Fellow)
 Richard G. Zweifel, Ph.D., Curator
 Lester Aronson, Ph.D., Curator Emeritus
 James W. Atz, Ph.D., Curator Emeritus
 Charles M. Bogert, A.M., LL.D., Curator
 Emeritus
 M. Norma Feinberg, A.B., Senior Scientific
 Assistant

Michael W. Klemens, M.S., Senior Scientific Assistant
 Carol R. Townsend, B.A., Senior Scientific Assistant
 Barbara Brown, Ph.D., Scientific Assistant
 Philip Light, B.S., Scientific Assistant
 Margaret S. Shaw, B. Mus., Assistant to the Chairman
 Reeve M. Bailey, Ph.D., Research Associate
 Archie F. Carr, Jr., Ph.D., Research Associate
 Roger Conant, Sc.D., Research Associate
 Madeline L. Cooper, M.S., Research Associate
 Martha L. Crump, Ph.D., Research Associate
 John W. Daly, Ph.D., Research Associate
 Herbet C. Dessauer, Ph.D., Research Associate
 Carl Gans, Ph.D., Research Associate
 P. Humphrey Greenwood, D.Sc., Research Associate
 Klaus D. Kallman, Ph.D., Research Associate
 Richard Lund, Ph.D., Research Associate
 Francisco Mago-Leccia, Ph.D., Research Associate
 Linda R. Maxson, Ph.D., Research Associate
 Sherman A. Minton, Ph.D., Research Associate
 Peter Moller, Ph.D., Research Associate
 John A. Moore, Ph.D., Research Associate
 Lynne R. Parenti, Ph.D., Research Associate
 Colin Patterson, Ph.D., Research Associate
 Joseph W. Rachlin, Ph.D., Research Associate
 Janis A. Roze, Ph.D., Research Associate
 Carol Ann Simon, Ph.D., Research Associate
 James C. Tyler, Ph.D., Research Associate
 Paulo E. Vanzolini, Ph.D., Research Associate
 Richard P. Vari, Ph.D., Research Associate
 P.J.P. Whitehead, Ph.D., Research Associate
 Dannie A. Hensley, Ph.D., Field Associate
 Victor Martinez C., Lic., Field Associate
 Alfredo Paolillo O., Lic., Field Associate
 James Van Tassel, Field Associate
 Itzhak Gilboa, B.A., Associate
 Norman Macbeth, Ph.D., Associate
 Anne B. Meylan, Ph.D., Associate
 Jacques Serrier, Ph.D., Associate

INVERTEBRATES

Niles Eldredge, Ph.D., Chairman and Curator
 William K. Emerson, Ph.D., Curator
 Judith E. Winston, Ph.D., Associate Curator
 Neil H. Landman, Ph.D., Assistant Curator
 Dorothy E. Bliss, Ph.D., Sc.D., Curator Emerita
 Norman D. Newell, Ph.D., Curator Emeritus
 Harold S. Feinberg, B.A., Senior Scientific Assistant
 Sidney S. Horenstein, A.B., Senior Scientific Assistant
 Walter E. Sage, III, B.S., Scientific Assistant

John Arnold, Ph.D., Research Associate
 William A. Berggren, Ph.D., Research Associate
 Donald W. Boyd, Ph.D., Research Associate
 J. Kirk Cochran, Ph.D., Research Associate
 Howard R. Feldman, Ph.D., Research Associate
 Stephen Jay Gould, Ph.D., Research Associate
 James D. Hays, Ph.D., Research Associate
 Jeremy Jackson, Ph.D., Research Associate
 John J. Lee, Ph.D., Research Associate
 Linda Habas Mantel, Ph.D., Research Associate
 Leslie F. Marcus, Ph.D., Research Associate
 Harold B. Rollins, Ph.D., Research Associate
 John D. Soule, Ph.D., Research Associate
 Horace W. Stunkard, Ph.D., Sc.D., Research Associate
 Elisabeth S. Vrba, Ph.D., Research Associate
 Joel Cracraft, Ph.D., Kalbfleisch Research Fellow
 Marjorie Grene, Ph.D., Boechenstein Research Fellow

MICROPALAEONTOLOGY PRESS

John A. Van Couvering, Ph.D., Editor
 Norman S. Hillman, M.S., Production Editor
 Susan E. Carroll, M.S., Assistant Editor

MAMMALOGY

Guy G. Musser, Ph.D., Chairman and Curator
 Sydney Anderson, Ph.D., Curator
 Ethel Tobach, Ph.D., D.Sc., Curator
 Robert S. Voss, Ph.D., Assistant Curator
 Karl Koopman, Ph.D., Curator Emeritus
 Marie A. Lawrence, M.S., Senior Scientific Assistant
 Michael D. Carleton, Ph.D., Research Associate
 Louise Emmons, Ph.D., Research Associate
 Robert Goodwin, Ph.D., Research Associate
 Thomas A. Griffiths, Ph.D., Research Associate
 Stuart O. Landry, Jr., Ph.D., Research Associate
 James N. Layne, Ph.D., Research Associate
 M. Raymond Lee, Ph.D., Research Associate
 James L. Patton, Ph.D., Research Associate
 George B. Schaller, Ph.D., Research Associate
 Kathleen M. Scott, Ph.D., Research Associate
 James L. Wolfe, Ph.D., Research Associate
 Terry L. Yates, Ph.D., Research Associate
 Thomas L. Blakemore, Field Associate
 Timothy J. McCarthy, Associate
 Jose Ramirez-Pulido, Ph.D., Associate
 Esteban E. Sarmiento, Ph.D., Associate

MINERAL SCIENCES

Martin Prinz, Ph.D., Chairman and Curator
 George E. Harlow, Ph.D., Associate Curator
 Edmond Mathez, Ph.D., Assistant Curator
 Demetrius C. Pohl, Ph.D., Assistant Curator
 Silvester Sterbal, M.Sc., Technical Specialist
 Joseph J. Peters, M.S., Senior Scientific Assistant
 Gregory J. Cavallo, B.S., Scientific Assistant
 Michael R. Weisberg, M.S., Scientific Assistant
 Robert T. Dodd, Ph.D., Research Associate
 Klaus Keil, Ph.D., Research Associate
 Arthur M. Langer, Ph.D., Research Associate
 C. E. Nehru, Ph.D., Research Associate
 J. V. Smith, Ph.D., Research Associate
 Jeremy S. Delaney, Ph.D., Research Fellow
 Thomas A. Peters, M.S., Associate
 Anna S. Sofianides, M.S., Associate
 Julius Weber, Hon. D.Sc., Associate

ORNITHOLOGY

Francois Vuilleumier, Ph.D., Chairman and Curator
 Wesley E. Lanyon, Ph.D., Lamont Curator of Birds
 Lester L. Short, Ph.D., Curator
 George F. Barrowclough, Ph.D., Associate Curator
 Dean Amadon, Ph.D., Sc.D., Lamont Curator Emeritus of Birds
 Ernst Mayr, Ph.D., Curator Emeritus
 Charles E. O'Brien, Curator Emeritus
 Mary LeCroy, B.S., Senior Scientific Assistant
 Allison Andors, M.A., M.Phil., Scientific Assistant
 Helen Hays, B.A., Chairwoman, Great Gull Island Committee
 Robert Bleiweiss, Ph.D., Research Associate
 Walter J. Bock, Ph.D., Research Associate
 Jared Diamond, Ph.D., Research Associate
 Robert W. Dickerman, Ph.D., Research Associate
 Crawford H. Greenewalt, Sc.D., Research Associate
 James C. Greenway, Jr., A.B., Research Associate
 Cheryl F. Harding, Ph.D., Research Associate
 G. Stuart Keith, M.A. (Oxon.), Research Associate
 William H. Phelps, Jr., B.Sc., Research Associate
 Robert F. Rockwell, Ph.D., Research Associate
 Mary McKittrich, Ph.D., Chapman Research Fellow
 Nina Pierpont, Ph.D., Chapman Research Fellow
 John Bull, Field Associate
 John Eleuthere du Pont, Sc.D., Field Associate

Ruth Trimble Chapin, M.S., Associate
Sadie L. Coats, Ph.D., Associate
Ruth DeLynn, Associate
Lois H. Heilbrun, A.B., Associate
Richard Sloss, Associate

VERTEBRATE PALEONTOLOGY

Michael Novacek, Ph.D., Chairman and Associate Curator
Eugene S. Gaffney, Ph.D., Curator
Malcolm C. McKenna, Ph.D., Frick Curator
Richard H. Tedford, Ph.D., Curator
John G. Maisey, Ph.D., Associate Curator
Edwin H. Colbert, Ph.D., Sc.D., Curator Emeritus
Bobb Schaeffer, Ph.D., Curator Emeritus
Morris F. Skinner, Sc.D., Frick Curator Emeritus
Beryl E. Taylor, Frick Curator Emeritus
Susan Koelle Bell, A.B., Senior Scientific Assistant
Charlotte P. Holton, B.A., Senior Scientific Assistant
John P. Alexander, B.A., Scientific Assistant
Ellen J. Garvens, M.S., Scientific Assistant
Donald Baird, Ph.D., Research Associate
Eric Delson, Ph.D., Research Associate
Robert Emry, Ph.D., Research Associate
John J. Flynn, Ph.D., Research Associate
Lance Grande, Ph.D., Research Associate
Max K. Hecht, Ph.D., Research Associate
Robert M. Hunt, Jr., Ph.D., Research Associate
Bruce J. MacFadden, Ph.D., Research Associate
Paul E. Olsen, Ph.D., Research Associate
John H. Ostrom, Ph.D., Research Associate
John H. Wahlen, Ph.D., Research Associate
Peter Meylan, Ph.D., Carter Research Fellow
Peter Lewis, Field Associate

COUNCIL OF THE SCIENTIFIC STAFF

Gareth Nelson, Ph.D., Dean
Niles Eldredge, Ph.D., Assistant Dean
George E. Harlow, Ph.D., Secretary
The Chairmen of the Scientific and Educational Departments and Six Elected Members at Large

SOUTHWESTERN RESEARCH STATION

Wade C. Sherbrooke, M.S., Resident Director

EDUCATION

Malcolm J. Arth, Ph.D., Chairman and Curator
Kenneth A. Chambers, M.S., Assistant Chairman
Marcia White, B.A., Manager of Teaching Programs
Gloria Davis, B.A., Education Registrar
Ismael Calderon, M.A., Coordinator of Community Programming
Nathaniel Johnson, Jr., M.A., Special Programs Coordinator

Keith M. Brown, B.A., Assistant to Community Programming Coordinator
Marjorie M. Ransom, M.A., Supervising Museum Instructor
Paul J. Sanfacon, M.A., Senior Museum Instructor
Helmut W. Schiller, B.S., Senior Museum Instructor
Frances C. Smith, B.S., Museum Instructor
Jenny C. Breining, B.A., Museum Instructor
Lisa Bresloff, B.S., Museum Instructor
Janice B. Durant, B.A., Museum Instructor
Andrea M. Thaler, B.S., Museum Instructor
Christopher Hoffman, B.S., Museum Instructor
Mary Kim, B.A., Museum Instructor
Elizabeth A. Guthrie, B.A., Associate in Nature Education
Robin Lehman, Associate in Photography

EXHIBITION AND GRAPHICS

George S. Gardner, B.I.D., B.F.A., Chairman

Exhibition

Ralph J.T. Bauer, B.F.A., Manager
Eugene B. Bergmann, B.I.D., Senior Exhibit Designer
John Whitson, M.F.A., Exhibit Designer
Lowell Dingus, Ph.D., Exhibition Coordinator
Arlene Jangaard, B.A., Exhibition Maintenance Coordinator

Graphics

Joseph M. Sedacca, B.A., Manager

Audio-Visual

Larry Van Praag, Chief Projectionist

LIBRARY SERVICES

Nina J. Root, M.S.L.S., Chairwoman
Miriam Tam, M.S.L.S., Assistant Librarian for Technical Services
Valerie Wheat, M.L.S., Assistant Librarian for Reference Services
Diana Shih, M.S.L.S., Senior Cataloging Librarian
Carol W. Tucher, M.L.S., Senior Reference Librarian
Russell Rak, M.A., Administrative Assistant
Barbara Rhodes, M.S.L.S., Conservation Manager
Penelope Bodry-Sanders, B.A., Manager, Special Collections
Mary E. Genett, M.L.S., Library Associate

PUBLICATIONS

Curator

Thomas D. Nicholson, Ph.D., Editor-in-Chief

Scientific Publications

Jerome G. Rozen, Jr., Ph.D., Managing Editor
Joseph M. Sedacca, B.A., Manager
Brenda E. Jones, B.A., Editor

DEVELOPMENT AND PUBLIC AFFAIRS

Ann Breen Metcalfe, B.A., Chairwoman
Marilyn Badaracco, Manager for Guest Services
Marjorie Bhavnani, B.A., Manager for Volunteers and Information Desk Services
Herbert Kurz, B.A., Manager for Public Affairs
Thomas A. Lesser, M.A., Manager for Development
Marcia Schaeffer, B.A., Manager for Benefit Events
Margaret Fretz, Assistant Volunteer Manager
Sheila Greenberg, M.S., Assistant Volunteer Manager
Diane M. Menditto, B.A., Assistant Administrator for Grants and Fellowships
David Crandall, B.A., Development Associate
Melvin Elberger, M.A., Public Affairs Associate
William Goodman, M.S., Public Affairs Associate
Adele Meyer, M.A., Development Associate
Laura Mogil, B.A., Public Affairs Associate
Renee Perry, B.A., Development Associate
Susan Pollak, M.P.A., Development Associate
Amy Rudnick, B.A., Guest Services Associate
Lorraine Airall, Contributors' Assistant
Tamara Jenkins, B.A., Development Assistant
Connie Puswald, B.A., Public Affairs Assistant
Naomi Weinstein, B.A., Guest Services Assistant

NATURAL HISTORY MAGAZINE

L. Thomas Kelly, M.B.A., Publisher
Alan Ternes, M.Ph., Editor
Ruth D. McCrea, Jr., M.B.A., General Manager
Cary Castle, B.B.A., Circulation Manager
Ellen M. Goldensohn, M.A., Managing Editor
Mark Abraham, B.A., Production Manager
Thomas Page, Designer
Florence Edelstein, Copy Chief
Rebecca Finnell, B.A., Senior Editor
Sally Lindsay, M.F.A., Senior Editor
Bruce D. Stutz, B.A., Senior Editor
Vittorio Maestro, B.A., Associate Editor
Ernestine Weindorf, Assistant to the Publisher
Ramon Alvarez, B.A., Promotion Manager
Colleen Mehegan, B.A., Manager of Special Publications
Lee Ewing, M.B.A., Assistant Business Manager
Timothy Thom, B.S., Assistant Circulation Manager

Mary Anne Hayes, B.A., Production Assistant
Cerene Christian, B.S., Advertising Production Coordinator

DISCOVERY TOURS

R. Todd Nielsen, B.A., Manager for Discovery Tours
Richard Houghton, M.S., Discovery Tours Associate
Elizabeth DeGaetano, B.S., Tour Coordinator

MEMBERSHIP

Henry Schulson, B.A., Manager of Membership Services
Donna Bell, B.A., Membership Associate

MUSEUM SHOP

Martin Tekulsky, A.B., Marketing Manager
Maren Ryan, Senior Assistant Manager
Craig Neglia, B.A., Operations Manager
Charles L. Hopkins, B.S., Assistant Manager
Charles Kanarick, B.A., Assistant Manager
Barbara J. Voss, B.F.A., Assistant Manager

ADMINISTRATIVE AND SCIENTIFIC RESEARCH SERVICES

Pearlie Tillman, B.P.S., Assistant to the President
Valerie Hrebicek, Assistant to the Director
Robert M. Acker, B.S., Assistant to Deputy Director for Administration
Janet L. Shipley, Administrative Secretary and Assistant Executive Secretary
Barbara M. Conklin, B.A., Collections Registrar
Paul F. Beelitz, M.A., Associate Collections Registrar
Joan Whelan, M.A., Interdepartmental Facilities Coordinator
Andrew Simon, B.S., Scientific Assistant
Belinda Kaye, B.A., Assistant Registrar for Loans
William B. Weinstein, B.A., Assistant Registrar for Data Management
Barbara Jacob, B.B.A., Internal Auditor

GENERAL SERVICES

Richard P. Sheridan, B.A., Manager
Olivia Bauer, B.A., Assistant Manager

OFFICE OF THE

ASSISTANT DIRECTOR FOR FINANCIAL OPERATIONS AND CONTROLLER

Pauline G. Meisler, M.B.A., Assistant Director for Financial Operations
Frances M. Dunleavy, B.S., Controller
Jason S. Lau, M.B.A., Assistant Controller
Donald R. Kossar, B.S., Chief Budget Accountant and Senior Grants Accountant
Fred R. Quijano, B.S., Computer Auditor and Accountant

Charles Urban, Manager, General Accounting
Ugo E. Marini, Assistant Manager, General Accounting
Maria A. Luna, B.S., Accounts Payable Supervisor
Audrey Yuille, Computer Coordinator
Robert Applebaum, Payroll Manager
Jeffrey Maer, B.A., Purchasing Manager
David E. Csuray, Purchasing Associate
Jerome Williams, M.A., Admissions Control Manager
Barbara Armond, Senior Assistant Manager, Admissions Control
Rita Barclay, Assistant Manager, Admissions Control
Janet Mazeika, B.A., Assistant Manager, Admissions Control
Bernice Salik, B.A., Assistant Manager, Admissions Control

PERSONNEL

Geraldine M. Smith, B.A., Personnel Manager
Lewis Vilensky, M.Ed., Senior Personnel Assistant
Susan L. Kroll, Personnel Assistant

PLANT OPERATIONS

Norene L. Brooks, B.B.A., Plant Manager

Construction

Richard Slawski, B.S., Construction Manager
Julio A. Correa, B.A., Assistant Manager
Albert Grenzign, B.E.E., Assistant Manager
Carl Hilgers, Assistant Manager
Klaus A. Wolters, Assistant Manager
William A. Graham, Assistant to the Manager

Maintenance

Bal Raj Vohra, B.E.E., M.B.A., Maintenance Manager
Andrzej M. Witek, M.S., Assistant Manager
Mary Dillon, Cleaning Supervisor
Edwin Garcia, Cleaning Supervisor

Building Services

Charles L. Miles, Manager
Sankar Gokool, Associate Manager
Martha A. Meegan, B.A., Senior Assistant Manager
Joseph Arguinizoni, Assistant Manager
Carol Grant, Assistant Manager
Robert B. Hill, Assistant Manager
Richard Homere, Assistant Manager
Frank P. Masavage, Assistant Manager
Erin J. O'Reilly, B.A., Assistant Manager
Joyce Wallach, Assistant to the Manager
Trenton Chapman, Supervising Museum Attendant-Guard
Albert Pontecorvo, Supervising Museum Attendant-Guard

MEMBERS ELECTED BY THE BOARD OF TRUSTEES TO HIGHER CATEGORIES OF MEMBERSHIP

ENDOWMENT

Herbert R. Axelrod
Dr. and Mrs. Henry Clay Frick, II

BENEFACTOR

Joseph F. Cullman, 3rd

ASSOCIATE FOUNDER

Mr. and Mrs. Herbert L. Abrons

ASSOCIATE BENEFACTOR

Jerome M. Bijur
Dr. and Mrs. Caryl P. Haskins
Mr. and Mrs. Charles J. Hedlund
Mr. and Mrs. Jerome Kohlberg, Jr.

PATRON

Admiral W.S. Bitler, U.S. Navy Ret.
Helen DuShane
Dr. Barbara Stoler Miller
Dr. James A. Slater
Dr. Judith P. Sulzberger
Edward R. Swoboda

ASSOCIATE PATRON

Dr. Sarah Bekker
Drake Darrin
Allan H. Fine
Mr. and Mrs. Arnold Gumowitz
Sarah D'Harnoncourt
Mrs. Robert Earll McConnell
Mr. and Mrs. Frank A. Metz, Jr.
Mrs. Donald M. Ornslager
Robert Richardson
Dr. Walter E. Sage, III
Morris L. Wade
Patricia J. Wynne

HONORARY LIFE MEMBERS

Jean M. Augustin
Farrell F. Carney
Steven Medina
Miranda Nadel
Thomas J. Page
William Schiller
Edna E. Szmodis

CORRESPONDING MEMBERS

David Attenborough, Richmond, Surrey, England
Ronald M. Bernier, Professor of Art History, University of Colorado, Boulder, Colorado
William G. Conway, General Director, New York Zoological Society, Bronx, New York
G. Arthur Cooper, Department of Paleobiology, National Museum of Natural History, Smithsonian Institution, Washington, D.C.
Frank K. Edmonson, Astronomy Department, Indiana University, Bloomington, Indiana
Clifford Frondel, Department of Geological Sciences, Harvard University, Cambridge, Massachusetts
Caryl P. Haskins, Former President, Carnegie Institution of Washington, Washington, D.C.

Claude Levi-Strauss, 2 Rue de Marronniers,
Paris, France
Benjamin S.P. Shen, Professor of Astronomy,
University of Pennsylvania,
Philadelphia, Pennsylvania
Ethelwynn Trewavas, British Museum
(Natural History), London, England
T.S. Westoll, Department of Geological
Sciences, University of Durham at
King's College, Newcastle-upon-Tyne,
England

CONTRIBUTORS

July 1, 1986-June 30, 1987

UNRESTRICTED GIFTS

INDIVIDUALS, FOUNDATIONS, AND CORPORATIONS

\$50,000 and over

Chemical Bank
Cravath, Swaine & Moore
Mr. and Mrs. Robert G. Goelet
IBM Corporation
The Ambrose Monell Foundation
The New York Racing Association

\$25,000 and over

Bristol-Myers Company
Citicorp/Citibank
Exxon Corporation
Gladys and Roland Harriman Foundation
Joseph Klingenstein Charitable Trust
Mr. and Mrs. Jerome Kohlberg, Jr.
The G. Unger Vetlesen Foundation
Pepsi Apparel America

\$10,000 and over

AT&T Foundation
Mr. and Mrs. Herbert L. Abrons
American Bar Association
The Anschutz Foundation
Winfield Baird Foundation
The Bank of New York
Bankers Trust Foundation
J.M.R. Barker Foundation
Helen W. Buckner
CIBA-GEIGY Corporation
Carter-Wallace, Inc.
The Chase Manhattan Bank, N.A.
Liz Claiborne Inc.
Consolidated Edison Company of
New York, Inc.
Cornell University
Joseph F. Cullman, 3rd
Du Pont and its energy subsidiaries,
Conoco and Consolidation Coal
Company
Engelhard Hanovia, Inc.
The Helen Clay Frick Foundation
General Foods Fund, Inc.
Sibyl and William T. Golden Foundation
Mr. and Mrs. Henry B. Guthrie
International Paper Company Foundation
Johnson & Higgins
F.M. Kirby Foundation, Inc.
Lansing Lamont
Mr. and Mrs. Frank G. Lyon
Marsh & McLennan Companies, Inc.
McGraw-Hill Inc.
Mercedes-Benz of North America, Inc.
Merrill Lynch & Company Inc.
Metropolitan Life Foundation
Morgan Guaranty Trust Company of
New York
The William T. Morris Foundation, Inc.
New York Telephone Company
The New York Times Company
Foundation, Inc.
The Pfizer Foundation

Philip Morris Companies Inc.
Sarah I. Schieffelin Residuary Trust
Schlumberger Foundation, Inc.
Mrs. Gardner D. Stout
Tiger Management Co.
Time Inc.
United States Trust Company of
New York
Warner Communications, Inc.
Weil, Gotshal & Manges
John Wiley & Sons, Inc.
Willkie Farr & Gallagher

\$5,000 and over

Allied-Signal Inc.
American Stock Exchange
American-Standard Foundation
Mr. and Mrs. Alan J. Blinken
CBS Inc.
CPC International Inc.
The Carter Fund
The Chubb Corporation Charitable Trust
The Coach Dairy Goat Farm
Colgate-Palmolive Company
The College Board
Coopers & Lybrand
Daily News Foundation
Davis, Polk & Wardwell
Irene Diamond
Mrs. Hart Fessenden
Financial Guaranty Insurance Company
Allan H. Fine
GTE Foundation
Mr. and Mrs. Arnold Gumowitz
Mary W. Harriman Foundation
Mr. and Mrs. Caryl P. Haskins
Hoechst Celanese Corporation
Dr. and Mrs. John E. Hutchinson, III
Lever Brothers Company
Lutin & Company
Mergentime Corporation
Frank A. Metz, Jr.
Edward S. Moore Foundation
Morgan Stanley Foundation
Charles H. Mott
New York Fashion Council
New York Urban Coalition
Newsweek
Ogden American Corporation
Peat Marwick Main & Co.
Mr. and Mrs. Thomas M. Peters
Primerica Foundation
The Procter & Gamble Fund
RKO General, Inc.
Rockefeller Group Inc.
The Salomon Foundation Inc.
The Seth Sprague Educational and
Charitable Foundation
Sterling Drug Inc.
Mrs. Arthur Hays Sulzberger
Dr. Judith P. Sulzberger
Swiss Bank Corporation
Union Pacific Foundation
Morris L. Wade
Lawrence A. Wien Foundation, Inc.

\$2,500 and over
Automatic Data Processing, Inc.
The Theodore H. Barth Foundation

The Howard Bayne Foundation
 Bunge Corporation
 Capital Cities/ABC, Inc.
 Mr. and Mrs. Hamilton M. Chase
 The Coca-Cola Bottling Company of
 New York, Inc.
 Dextra Baldwin McGonagle Foundation, Inc.
 Cleveland H. Dodge Foundation
 The Dyson Foundation
 Freeport-McMoRan, Inc.
 Gulf + Western Foundation
 Mr. and Mrs. Ralph E. Hansmann
 Mr. and Mrs. Charles J. Hedlund
 Hoffmann-LaRoche Inc.
 Irving One Wall Street Foundation, Inc.
 The Henry J. Kaiser Family Foundation
 Thomas J. Lipton Foundation, Inc.
 Leon Lowenstein Foundation, Inc.
 Mr. and Mrs. John D. Macomber
 R. H. Macy & Co., Inc.
 Mobil Foundation, Inc.
 The NCR Foundation
 Nabisco Brands, Inc.
 National Westminster Bank USA
 Newmont Mining Corporation
 North American Philips Corporation
 Ogilvy & Mather
 Mr. and Mrs. Donald C. Platten
 Price Waterhouse
 Restaurant Associates Industries, Inc.
 R.J. Reynolds Industries, Inc.
 James S. Rockefeller
 S.H. and Helen R. Scheuer Family
 Foundation
 Sony Corporation of America Foundation Inc.
 Squibb Corporation
 Unilever United States, Inc.
 Wertheim Schroder & Co. Inc.
 Westvaco Foundation
 The Widder Foundation
 The H.W. Wilson Foundation, Inc.
 The Xerox Foundation

\$1,000 and over

Allied Stores Foundation, Inc.
 Mr. and Mrs. Howard Alper
 Mr. and Mrs. Arthur G. Altschul
 Amax Foundation, Inc.
 American Brands, Inc.
 American Diversified Enterprises, Inc.
 American International Group, Inc.
 Ametek, Inc.
 Amstar Corporation
 Arthur Andersen & Co.
 The Hon. Walter H. Annenberg
 The Association of the Alumni, College of
 Physicians and Surgeons of Columbia
 University
 Mr. and Mrs. Douglas Auchincloss
 Mr. and Mrs. Robert Bach
 Mr. and Mrs. Thomas D. Barrow
 The Morris S. and Florence H. Bender
 Foundation, Inc.
 Mrs. F. Henry Berlin
 Robert B. Betts
 Mr. and Mrs. John C. Bierwirth
 Mrs. William R. Biggs
 Mrs. Harry Payne Bingham
 Edward E. Block

Block Drug Company Inc.
 Bloomingdale's
 Mr. and Mrs. Robert E. Blum
 Booz, Allen & Hamilton Inc.
 Bowne and Company Inc.
 Mr. and Mrs. Alfred Brittain, III
 Joan Bull
 Mr. and Mrs. Thomas P. Caine
 Percilla A.L. Chappell
 Chevron U.S.A. Inc.
 Chiquita Brands, Inc.
 Clabir Corporation Foundation
 Mr. and Mrs. Howard L. Clark
 Paul G. Clifford
 Frederick Cohen and Diane Feldman
 Cynthia Green Colin
 Collins & Aikman Corporation
 Colt Industries, Inc.
 Constans Culver Foundation
 The Cowles Charitable Trust
 Elizabeth Cressman
 Crum & Forster, Inc.
 Crystal Channel Foundation
 DFS Dorland Worldwide
 Lillian Butler Davey
 Mr. and Mrs. Michel David-Weill
 The Hon. and Mrs. Douglas Dillon
 Mr. and Mrs. Strachan Donnelley
 R. R. Donnelley & Sons Company
 Mr. and Mrs. L.F. Boker Doyle
 Drexel Burnham Lambert
 Mr. and Mrs. A. Whitney Ellsworth
 Epstein Philanthropies
 The Equitable Life Assurance Society of
 the United States
 Ernst & Whinney
 Essex Chemical Corporation
 Federated Department Stores Foundation
 Laurence and Laurie Fink
 Andrea Finkelstein
 The First Boston Corporation
 Ford Motor Company Fund
 The Fribourg Foundation, Inc.
 Mr. and Mrs. H.S. Galbraith
 Gannett Foundation
 Mr. and Mrs. Richard L. Gelb
 Mr. and Mrs. Elbridge T. Gerry
 Goldfarb & Fleece
 Mr. and Mrs. Henry B. Griswold
 Grow Tunneling Corp.
 The Guardian Life Trust
 Mrs. Melville W. Hall
 Mr. and Mrs. Gordon Hanes
 Hanson Industries
 Harcourt Brace Jovanovich, Inc.
 Mr. and Mrs. John C. Head, III
 Mr. and Mrs. Laurin Hall Healy
 Robert H. Heilbrunn
 The Henley Group, Inc.
 Margaret Brodrick Hicklin
 George C. Hixon
 Home Life Insurance Company
 Mr. and Mrs. Jack R. Howard
 Helen Imperatore
 International Flavors & Fragrances, Inc.
 Mr. and Mrs. Peter Iselin
 William K. Jacobs, Jr.
 Jaros, Baum & Bolles
 Mrs. B. Brewster Jennings

Joyce Leslie, Inc.
 Kane Lodge Foundation, Inc.
 Mr. and Mrs. Mark N. Kaplan
 Daniel C. Kaye
 Mr. and Mrs. Robert W. Kean, Jr.
 Mr. and Mrs. Stephen M. Kellen
 Helen L. Kimmelman
 Frank Y. Larkin
 Mr. and Mrs. Alexander M. Laughlin
 Mrs. Thomas LeBoutillier
 Mr. and Mrs. M. William Levy
 Mr. and Mrs. Troland S. Link
 Leonard Litwin
 Mr. and Mrs. John L. Loeb
 Loehmann's Inc.
 Laurence Dow Lovett
 James A. Macdonald Foundation
 The MacMillan Foundation
 Mr. and Mrs. James I. Magid
 George W. Maker
 Mr. and Mrs. Plato Malozemoff
 Marine Midland Bank, N.A.
 Michael T. Martin
 Robert Earll McConnell Foundation
 Melville Corporation
 Mr. and Mrs. Henry H. Meyer, Jr.
 Seymour Milstein
 Mitsubishi International Corporation
 The Leo Model Foundation
 Benjamin Moore & Co.
 Mrs. Henry L. Moses
 The NL Industries Foundation Inc.
 Mr. and Mrs. John C. Nelson
 Neuberger & Berman
 Newsday Inc.
 North American Reinsurance
 Corporation
 Mrs. Donald M. Oenslager
 Mr. and Mrs. Gordon B. Pattee
 Irene H. Perkins
 Mr. and Mrs. Robert W. Purcell
 Harold K. Raisler Foundation, Inc.
 Robert K. Raisler Foundation, Inc.
 Judith S. Randal
 Lawrence G. Rawl
 Maurice A. Reichman
 Mr. and Mrs. Charles A. Reinhardt
 Reliance Group Holdings, Inc.
 Republic National Bank of New York
 Richardson-Vicks Inc.
 Mrs. William C. Ridgway, Jr.
 Mr. and Mrs. David Rockefeller
 Mrs. Laurance S. Rockefeller
 Mrs. John D. Rockefeller 3rd
 Mrs. Richard Rodgers
 Rollins Burdick Hunter of New York, Inc.
 Mr. and Mrs. Frederick P. Rose
 Mr. and Mrs. Milton F. Rosenthal
 Mrs. Axel G. Rosin
 Mr. and Mrs. Steven J. Ross
 John Richard Royall
 Sasco Foundation
 Dorothy Schiff
 The William P. & Gertrude Schweitzer
 Foundation, Inc.
 Scudder, Stevens & Clark Ltd.
 Seaboard Surety Company
 Mr. and Mrs. Norman M. Segal
 Frank C. Shattuck

Gil Shiva and The Doris Jones Stein Foundation
 Silverman Charitable Trust
 Mr. and Mrs. Alexander B. Slater
 Ada Slawson
 Mr. and Mrs. Richard A. Sloss
 Mr. and Mrs. R. Neil Smith
 The Smith, Barney Foundation
 Dr. and Mrs. Walter F. Stafford, Jr.
 Mrs. Foye E. Staniford, Jr.
 Mr. and Mrs. Alfred R. Stern
 J.P. Stevens and Co., Inc., Foundation
 Oscar S. Straus, II
 Mr. and Mrs. Arthur Ochs Sulzberger
 Syms Corporation
 Tambrands Inc.
 Teachers Insurance and Annuity Association
 Thomas & Betts Charitable Trust
 The Oakleigh L. Thorne Foundation
 Mr. and Mrs. Robert M. Topol
 Mr. and Mrs. Eugene Tuck
 Col. and Mrs. John A. Ulrich
 Universal Leaf Tobacco Company
 Uris Brothers Foundation, Inc.
 Mr. and Mrs. Carroll L. Wainwright, Jr.
 The Weiler-Arnoff Family
 Mrs. John Campbell White
 Mr. and Mrs. James H. Wiborg
 Mrs. Orme Wilson
 Mr. and Mrs. Ramsay Wilson
 Winfield Foundation
 Robert Winthrop
 The Witco Foundation
 Cynthia Wood
 Ann Eden Woodward Foundation

\$500 and over

AKC Fund, Inc.
 Mr. and Mrs. Walter R. Abbott, Jr.
 Mr. and Mrs. Joseph C. Abeles
 Mrs. Lester S. Abelson
 Alexander's, Inc.
 American District Telegraph Co.
 American Home Products Corporation
 The William H. Anderson Foundation, Inc.
 Arthur Young and Company
 Atlantic Bank of New York
 Isabel H. Ault
 Mr. and Mrs. Ned W. Bandler, Jr.
 William R. Berkley
 Mr. and Mrs. H.P. Bingham, Jr.
 Mrs. Albert C. Bostwick
 Mr. and Mrs. Robert L. Bridges
 Mr. and Mrs. Peter L. Chapin
 Donald K. Clifford, Jr.
 Russell S. Codman, Jr.
 Columbia Foundation
 Mr. and Mrs. Henry G. Corey
 Corning Glass Works Foundation
 Mrs. Cornelius Crane
 Louise B. and Edgar M. Cullman Foundation
 Catherine G. Curran
 Jo Ann Czekalski and James P. Stokes
 Dan River Foundation
 Jean Browne Scott Darby
 Anne E. Delaney

Mr. and Mrs. Jean Paul Delmas
 Discount Corporation of New York Foundation
 Mrs. Robert N. Downs, III
 The Dun & Bradstreet Corporation Foundation
 Mrs. Camillo D'Urso
 The T.M. Evans Foundation, Inc.
 The Eugene and Estelle Ferkauf Foundation
 Elias and Bertha Fife Foundation, Inc.
 Forbes Foundation
 Mr. and Mrs. George A. Fox
 The AE Fund
 Edwin F. Gamble
 John A. Garver
 Drs. William H. and Joanna S. Gerber
 Edward H. Gerry
 Benjamin D. Gilbert
 Francis A. Goodhue, Jr.
 Mr. and Mrs. Thomas W. Goodnow
 Mark A. Gordon
 Mr. and Mrs. William C. Graustein
 Grolier Incorporated
 Mr. and Mrs. Geoffrey Gund
 Henry S. Hall, Jr.
 Handy & Harman Foundation
 Mrs. M.R. Hanna
 David Hausmann
 Haven Travel Interests Inc.
 Mr. and Mrs. R. Allen Hermes
 Mabel S. Ingalls
 Israel Discount Bank of New York
 Mr. and Mrs. Henry J. Jacoby
 Mr. and Mrs. Edward H. Judson
 Max Kade Foundation, Inc.
 Dr. William M. King
 Jane P. and Charles D. Klein Foundation
 Marianne and Frank Lester
 Mr. and Mrs. Bruce A. Lieberman
 Susan E. Linder
 Mr. and Mrs. James M. Lober
 Lord and Taylor
 Sue McClary
 Mr. and Mrs. Bruce J. McCowan
 Mrs. Kenneth H. McNeil
 Mitsui & Company (U.S.A.), Inc.
 Mr. and Mrs. Thomas Bruce Morgan
 William Morrow & Company, Inc.
 Herbert J. Neuman
 OSG Foundation
 Mr. and Mrs. Walter H. Page
 Creighton Peet
 Mrs. George W. Perkins
 Conrad Raker
 Mr. and Mrs. Peter B. Read
 Mr. and Mrs. Willis L.M. Reese
 William W. Reese
 Mr. and Mrs. Dudley Roberts
 Mr. and Mrs. Jack A. Russell
 Allan A. Ryan III
 Mr. and Mrs. Peter A. Salm
 John T. Sargent
 Mrs. Charles M. Scott
 Marilyn Hawrys Simons
 John C. Sluder
 Mrs. Sydney Snyder
 Mr. and Mrs. George B. Sprick
 John W. Straus

Sugar Foods Corporation
 Swiss American Securities
 Syska & Hennessy Inc.
 TBG Inc.
 Mr. and Mrs. Jeff Tarr
 Mr. and Mrs. C. Harold Taylor
 Mrs. James Eldric Teague
 Isabel Kellers Tobzer
 The Travelers Companies Foundation, Inc.
 Union Bank of Switzerland
 Clarence E. Unterberg
 Mr. and Mrs. Jephtha H. Wade
 Mr. and Mrs. Charles F. Wallander, Jr.
 Mr. and Mrs. Stephen Walters
 Mr. and Mrs. John B. Watkins
 Pierre J. Wertheimer Foundation Inc.
 Marilyn B. Wilson
 Young & Rubicam Inc.
 Carl Zeiss, Inc.
 William Zinsser & Company Inc.

RESTRICTED GIFTS

Donor Project

\$250,000 and over

Annie Laurie Aitken Charitable Trust
Annie Laurie Aitken Charitable
Trust Fund
Charles Hayden Foundation
School Reception Center
The Andrew W. Mellon Foundation
Conservation - Anthropology and
Exhibition
Howard Phipps Foundation
Roosevelt Renovation Project

\$100,000 and over

Edward John Noble Foundation, Inc.
St. Catherines Island Archaeology
Project - Anthropology

\$50,000 and over

Du Pont and its energy subsidiaries,
Conoco and Consolidation Coal Company
Hall of Earth History Video
Presentation
Exxon Education Foundation
Exxon Educational Training Program
Mobil Corporation
Friday and Saturday Evening Free
Admission Program
Helena Rubinstein Foundation, Inc.
Celestial Objects Plaza - American
Museum-Hayden Planetarium
Community Programming - Education
Ruth U. and Sanford Samuel Foundation
Undergraduate and Graduate
Training Program
Wallace Funds (established by the
founders of Reader's Digest)
Roosevelt Renovation Project

\$25,000 and over

Scott A. Belair
Australian Ornithology Research -
Ornithology
The Clark Foundation
Computerization Project
Digital Equipment Corporation
American Museum-Hayden Planetarium
The Eppley Foundation for Research, Inc.
Chile Paleontology Research -
Vertebrate Paleontology
William Randolph Hearst Foundation
Community Programming - Education
Richard Lounsbery Foundation, Inc.
Lemur Research - Anthropology
NCR Corporation
Audio/Visual Equipment - American
Museum-Hayden Planetarium
The Perkin Fund
Richard S. Perkin Library - American
Museum-Hayden Planetarium
The Reed Foundation, Inc.
Celestial Objects Plaza - American
Museum-Hayden Planetarium
Arthur Ross Foundation
Exhibit of the Month

Samuel and May Rudin Foundation, Inc.
Community Programming - Education
Internship Program - Education
William F. Sanford
Ornithology Research - Ornithology
Sun Microsystems, Inc.
American Museum-Hayden Planetarium

\$10,000 and over

Anonymous
Volunteer Office Support Fund -
Volunteer Office
Anonymous
Volunteer Office Support Fund -
Volunteer Office
Herbert R. Axelrod
Axelrod Fish Collection - Vertebrate
Paleontology
Christodora, Inc.
Junior High School Natural Science
Program - Education
The Greenwall Foundation
Undergraduate-Graduate Training
Program
Henry Kaufmann Foundation
Henry Kaufmann Theater Simulcast
Karl F. Koopman
Taxonomic Research - Mammalogy
The Lucius N. Littauer Foundation
"On Tap: New York's Water Supply"
The Sabin Conservation Fund, Inc.
Herpetology Research - Herpetology
Thayer Lindsley Trust
"Lindsley Hall of Earth History"
Vidda Foundation
Community Programming - Education
Special Instructor - Education

\$5,000 and over

Mr. and Mrs. Sydney Anderson
Bolivian Research Expeditions -
Mammalogy
ARCO Oil and Gas Company
Micropaleontology Press Modernization
Drake Darrin
Chile Paleontology Research -
Vertebrate Paleontology
Dr. Henry Clay Frick II
Vehicle Purchase - Vertebrate
Paleontology
Gold Fields American Corporation
Economic Mineralogy - Mineral
Sciences
Bryant Mather
Lepidoptera Research - Entomology
New York Urban Coalition Inc.
Community Programming - Education
Henry Nias Foundation, Inc.
Community Programming - Education
Phelps Dodge Foundation
Economic Mineralogy - Mineral
Sciences
Theodore Roosevelt Association
Theodore Roosevelt Memorial Fund
Shell Oil Companies Foundation
Micropaleontology Press Modernization
The Sidney, Milton and Leoma Simon
Foundation
Community Programming - Education

Texasgulf Inc.
Economic Mineralogy - Mineral Sciences

\$1,000 and over

Amax Foundation, Inc.
Economic Mineralogy - Mineral
Sciences
Amoco Production Company
Micropaleontology Press Modernization
Astra Lakemedel AB
Poison Dart Frog Research -
Herpetology
Avon Products Foundation Inc.
Community Programming - Education
Howard J. Barnett
Middle America Research - Anthropology
Joan Bull
Volunteer Office Support Fund -
Volunteer Office
Charles J. Cole
Lizard Systematics Research -
Herpetology
Marianna L. Collins
African Ornithology Research -
Ornithology
John de Cuevas
Great Gull Island Project - Ornithology
Margarita V. Delacorte
Textile Conservation - Anthropology
Dr. Walter Barton Elvers
Fossil Fish Research - Vertebrate
Paleontology
Exxon Corporation
Osborn Library - Vertebrate
Paleontology
Ruth and Stanley Freed
Anthropology Research - Anthropology
The Griffis Foundation Inc.
Ichthyology Research - Ichthyology
Grumman Corporation
Community Programming - Education
Nathan L. Halpern
Malacology Research - Invertebrates
Mrs. Douglas Hays
Great Gull Island Project - Ornithology
Mr. and Mrs. Frank Walker Johnson
Osborn Library - Vertebrate
Paleontology
Kurt Johnson
Theclid Research Fund - Entomology
Janet K. Kremer
Malacology Research - Invertebrates
Mr. and Mrs. Frederick E. Landmann
Junius B. Bird Research Project -
Anthropology
Mr. and Mrs. Sidney Liberman, Jr.
Rare Book Room - Library
Mrs. Alfred Lee Loomis, Jr.
Rare Book Room - Library
Entomology Research - Entomology
Pamela Manice
Great Gull Island Project - Ornithology
Marathon Oil Company
Micropaleontology Press Modernization
Margot W. Marsh
Indonesia Research - Mammalogy
Mobil Foundation Inc.
Micropaleontology Press Modernization
Mr. and Mrs. Howard A. Newman
Sibyl Golden Fund

The Palisades Educational Foundation, Inc.
 Special Courses – Education
 Pechiney Corporation
 Economic Mineralogy – Mineral
 Sciences
 Pittway Corporation Charitable Foundation
 Malacology Research – Invertebrates
 Frederick H. Rindge
 Lepidoptera Research – Entomology
 Randall Tobias Schuh
 Heteroptera Book – Entomology
 Mrs. George Cole Scott
 Junius B. Bird Research Project –
 Anthropology
 The Evelyn Sharp Foundation
 Community Programming – Education
 Lester L. Short
 African Ornithology Research –
 Ornithology
 Louis Slavitz
 Peru Research – Anthropology
 Frank B. Smithe
 Ornithology Research – Ornithology
 Texaco Inc.
 Economic Mineralogy – Mineral
 Sciences
 Cynthia Wilder
 Asian Research – Anthropology

\$500 and over

George and Valerie Delacorte Fund
 Textile Conservation – Anthropology
 Harold A. Dundee
 Herpetology Research – Herpetology
 Mr. and Mrs. Henry B. Guthrie
 Great Gull Island Project – Ornithology
 Lois Heilbrun
 Great Gull Island Project – Ornithology
 Mrs. Eugene B. Hotchkiss
 Ichthyology Research – Ichthyology
 Mr. and Mrs. David E. Lapham
 Great Gull Island Project – Ornithology
 Beatrice Miller
 Discovery Room – Education
 Mrs. George G. Montgomery
 Alexander M. White Natural Science
 Center – Education
 Moriches Bay Audubon Society
 Great Gull Island Project – Ornithology
 Ruth Norton Oliver
 Herpetology Research – Herpetology
 Mr. and Mrs. Gale G. Pasley, Jr.
 Margaret Mead Anthropology Research –
 Anthropology
 Elizabeth E. Roosevelt
 Theodore Roosevelt Memorial Fund
 Time-Life Books Inc.
 Photographic Collection – Library

OPEN HOUSE BENEFIT

Mr. and Mrs. Ralph Blume
 Mr. and Mrs. Thomas M. Evans
 John M. Forelle
 Mr. and Mrs. Robert G. Goelet
 William T. Golden
 Mr. and Mrs. Arthur Gray, Jr.
 Mr. and Mrs. Frederick A. Klingenstein
 Mr. and Mrs. S. Christopher Meigher

Edwin Morgens
 Sandra Wright Ohrstrom
 RPM Securities Company, Inc.
 Jack Rudin
 Dr. and Mrs. Frederick Seitz
 Mr. and Mrs. Oscar S. Straus, II
 Mr. and Mrs. Wm. M. Weaver, Jr.
 Mr. and Mrs. Alan Weeden
 Mr. and Mrs. John Zuccotti

DARK CAVES BENEFIT

Benefactors

Mr. and Mrs. Hart Fessenden
 Mr. and Mrs. Robert G. Goelet
 Mrs. Enid Haupt
 Mr. and Mrs. Constantine
 Sidamon-Eristoff

Sponsors

Mr. and Mrs. Ray Auel
 Dr. and Mrs. Henry Clay Frick, II
 Dr. and Mrs. John E. Hutchinson, III
 Mr. and Mrs. Frederick A. Klingenstein
 Mr. and Mrs. Anthony K. Moulton
 Mr. and Mrs. Donald Zucker

Patrons

Mr. and Mrs. Robert R. Barker
 Guy F. Cary
 Adelaide de Menil
 Mr. and Mrs. L.F. Boker Doyle
 Mr. and Mrs. Patrick Gershel
 Mr. and Mrs. Nathan L. Halpern
 Mr. and Mrs. Richard E. Metz
 Francis X. Morrissey, Jr.
 Mr. and Mrs. Milton Petrie
 Mr. and Mrs. Laurence S. Rockefeller
 Mr. and Mrs. Oscar S. Straus, II
 Mr. and Mrs. Gerrit P. Van de Bovenkamp
 Mr. and Mrs. Vance Van Dine
 Mr. and Mrs. John Zuccotti

Contributors

Mrs. Vincent Astor
 Joan Bull
 Mr. and Mrs. Benjamin Coates
 Mr. and Mrs. C. Douglas Dillon
 Doll Foundation, Inc.
 Mr. and Mrs. Henri Doll
 Steven M. Jacobson
 Arthur Goodman
 John S. Hilson
 Leonard Litwin
 Mrs. Alfred L. Loomis
 Mr. and Mrs. William F. May
 Mr. and Mrs. Marshall Rose Foundation
 Alvin Schwartz
 Mr. and Mrs. Alan B. Slifka
 Alan B. Slifka Foundation, Inc.
 Mr. and Mrs. Henry G. Walter

GOVERNMENT GRANTS AND SUPPORT

Source Amount/Purpose

Department of Health, Education and
 Welfare Title II C
 \$161,160/Microfilm and Catalog
 Scientific Manuscripts-Library
 Institute of Museum Services
 \$75,000/General Operating Support
 \$21,721/Mangbetu Conservation
 Project – Anthropology
 National Endowment for the Humanities
 \$224,500/“Carthage: A Mosaic of
 Ancient Tunisia”
 National Endowment for the Arts
 \$20,000/Conservation Laboratory
 Equipment – Anthropology
 National Science Foundation
 \$256,531/Fossil Fish Collection
 Management – Vertebrate Paleontology
 \$186,000/Collection Management –
 Mammalogy
 \$6,691/Marajo Island Archaeological
 Research – Anthropology
 New York State Council on the Arts
 \$585,000/General Operating Support
 \$10,000/Collection Management –
 Anthropology
 \$8,000/“Dark Caves, Bright Visions”
 \$8,000/“Margaret Mead Film Festival” –
 Education
 \$7,000/Black History Month –
 Education
 \$4,000/City of New York, School
 District 4, Teacher Workshops –
 Education
 \$4,000/Pre & Post Visit Materials –
 Education
 New York State Department of Parks,
 Recreation and Historic Preservation
 \$2,000/Community Programming –
 Education
 New York State Library, The State
 Department of Education
 \$7,475/Preservation of Photographs
 from Jesup Expedition – Library

BEQUESTS

Estate of Malcolm P. Aldrich
Estate of Louly Baer
Estate of Cyril dos Passos
Estate of Alice Hay
Estate of Frances J. McCoy
Estate of Janet Croll Morgan
Estate of Jane E. Negbaur
Estate of Jean Pearlstein
Estate of Clara S. Peck
Estate of John Sclavi
Estate of Richard T. Shields
Estate of Ruth B. Somerville
Estate of George Willett

GIFTS-IN-KIND

Department of Anthropology

Four Ethnographic Artifacts; including a fish trap, a carved wood crocodile figure, a carved and painted wood shield, and a wood stool carved to depict a crocodile; Manambu, Alamlak, and Iwam Peoples; New Guinea; 20th Century; 60014
Douglas Newton

Bride's Costume; in 33 parts; Japan; 20th Century; 60013
Japan National Tourist Organization

One Ethnographic and Seven Pre-Columbian Artifacts; including a shell pendant with turquoise and jet mosaic; Zuni; New Mexico; 19th–20th Century; two stone figures; Mezcala Culture; Mexico; ca. A.D. 200; three Post-Classic stone figures; Mixtec Culture; Mexico; ca. A.D. 900–1501; one head carved in stone; Teotihuacan Style; Mexico; ca. A.D. 200–700; one Pre-Classic ceramic figure; ca. 200 B.C.; 60021
Sarah D'Harnoncourt

Woman's Costume, silk; including a blouse, skirt, and coat, each with embroidered wheatsheaf motif; Armenian People; Turkey; ca. 1910; 60019

Alice Hachgontz and Hermine Manigian

Necklace, silver and turquoise; composed of 46 round beads, 12 squash blossom beads, and one pendant; Navajo People; Arizona; 20th Century; 60026
C. Allan Dietrich, Jr.

One Hundred and Thirteen Pre-Columbian Artifacts; including ceramics: 34 vessels, 26 whistles, four figures, two stamps, one rattle, and one ornament; stone artifacts: five figures, four vessels, one spoon, and one club head; shell artifacts: one necklace, and eight ornaments and figures; wood artifacts: six balance beams, two containers, one trumpet, one box, four earspools, and one kero; bone artifacts: one spatula and one plaque; one gourd vessel; two textiles; three copper knives; two atlats; representing the following Andean Cultures: Chavin (1000–400 B.C.); Tembladera (900–500 B.C.); Paracas (700–100 B.C.); Vicus (500–100 B.C.); Moche (400 B.C.–A.D. 500); Cajamarca (250 B.C.–A.D. 800); Recuay (200 B.C.–A.D. 500); Nazca (100 B.C.–A.D. 600); Wari (A.D. 600–1000); Lambeyeque (A.D. 1000–1400); Chimú (A.D. 1200–1532); Inka (A.D. 1450–1532); Peru; 60031
Mr. and Mrs. Frederick Landmann

Department of Entomology

Collection of 9500 scorpion specimens; 59979
Oscar F. Francke

Collection of 7108 specimens of Speyeria (Lepidoptera: Nymphalidae) from North America; 60050
Paul Grey

Insects in the order Heteroptera: Miridae and semiaquatic and aquatic families from all parts of the world; 60077
James A. Slater

Collection of 52 amber fossilized insects, mostly Diptera; from Dominican Republic; 60167
Robert G. Goelet

Collection of 2325 specimens of Miridae and 26 specimens of Corixidae; 60087
Gary M. Stonedahl

Department of Ichthyology

Collection of 350 specimens from deep water; near Canary Islands, Bahamas and Mid-Atlantic ridge; 60165
AT&T

Collection of 69 books, one journal and 1200 reprints; 60169
Carmela Rosen

Department of Invertebrates

Collection of marine mollusks: 228 paratypes, 74 hypotypes; 60010
Helen DuShane

Collection of worldwide marine and land mollusks; 1593 lots of various families and genera; 60057
Admiral W.S. Bitler (USN ret.)

Collection of marine mollusks; 200 lots of family Olividae (Ancilla and related genera); 60059
Stephen E. Sage

Collection of marine mollusca; 265 lots of family Conidae; 60058
Walter E. Sage, III

Collection of marine mollusks; 1416 lots; from various localities in the Caribbean marine molluscan province; 60081
Jerome M. Bijur

Collection of marine mollusks; 875 lots; from the Philippines, California and various other localities; 60085
Edward R. Swoboda

Department of Library Services

Large portfolio of original drawings and copies of the four science books in which they were published; 59998
Patricia J. Wynne

Various books and clippings; 59997
Mrs. Bryce Metcalf

Videotape (16 hours) with narration of the 1985 AMNH tour Great Expedition II; 60086
Robert Richardson

Original printing material for film "Shark Research," and folders of research and script notes; 60150
V. Fae Thomas

Department of Mineral Sciences

Ordinary Condrite meteorite; 3900 grams; from Utah; 60168
Robert G. Goelet

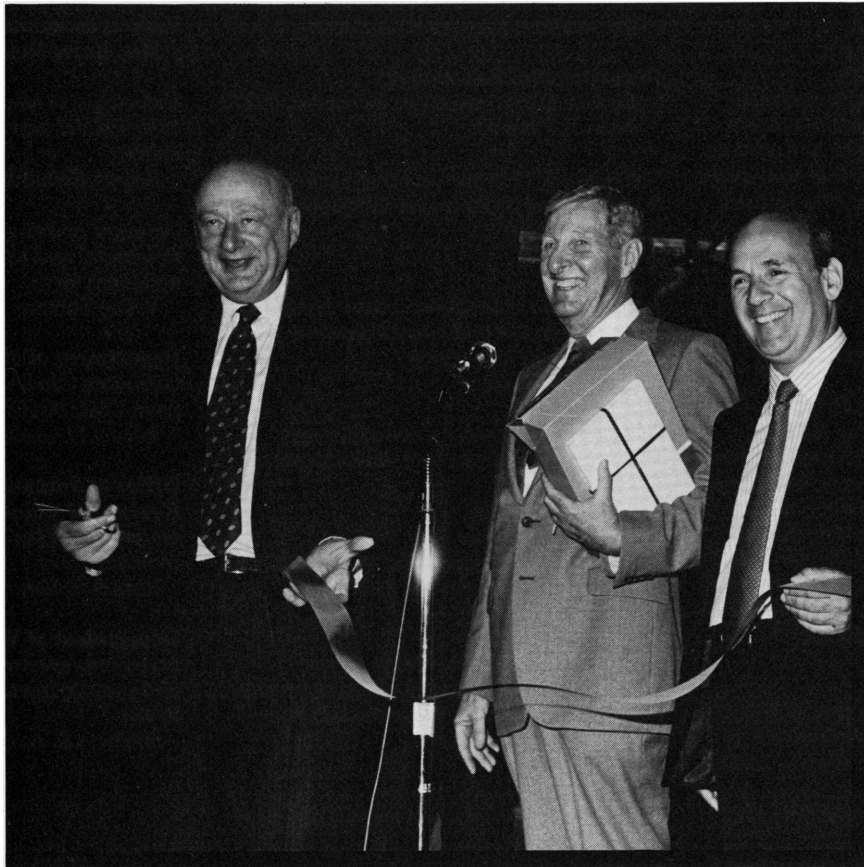
Office of Volunteer Services

Equipment and photocopying of training materials for the Museum Highlights Tour trainees
Ross & Cohen

Department of Vertebrate Paleontology

Numerous specimens of fossil vertebrates and insects; from Ceara, N.E. Brazil; 59953, 59954
Herbert R. Axelrod

Mayor Edward I. Koch cuts the ribbon marking the reopening of the Museum's main entrance on Central Park West. Director Nicholson, center, and New York City Comptroller Harrison J. Goldin join in the ceremony. The en-



trance, a City landmark and State memorial to Theodore Roosevelt, was closed for 18 months for restoration of its plaza and steps. The multiphase rejuvenation program for the Museum's physical plant will continue over the next several years.

BEQUESTS AND CHARITABLE TRUSTS

You may establish a gift that will perpetuate your memory and help assure that the fruits of the American Museum's research, education and exhibition programs are handed down to future generations.

If you wish to support the American Museum, you may make a grant through a charitable trust or through a bequest in your will.

To discuss opportunities for support of the Museum and its programs, contact Robert G. Goelet, President, or Thomas A. Lesser, Manager for Development, American Museum of Natural History, Central Park West at 79th Street, New York, New York 10024-5192. Telephone: (212) 769-5151.

COVER: The Venus of Lespugue – its name and exaggerated female form suggestive of fertility – was sculpted from mammoth ivory about 26,000 years ago during the Gravettian period of the late Ice Age. Loaned by the Musée de l'Homme in Paris, the statuette was one of several venus figures included in the Museum's major special exhibition, "Dark Caves, Bright Visions: Life in Ice Age Europe." Artifacts from 19 lenders in Europe and North America and from the Museum's own collections documented the birth of modern *Homo sapiens* culture in Europe beginning 35,000 years ago. More than 100 small art objects like this six-inch venus were part of the exhibition, which also featured full-size reproductions of the famous European cave paintings and a reconstruction of a 15,000-year-old dwelling made of mammoth bones.