





## **American Museum of Natural History**

Central Park West at 79th Street, New York, NY 10024-5192

The American Museum of Natural History is the largest natural history museum in the world. Through 120 years, it has excelled in exhibition, education and research and is today a leader in elucidating the anthropological, mineralogical and zoological sciences.

Fifty curators backed by a strong support staff conduct research at the Museum and in the field. Their findings are shared with other scientists through technical publications and with the general public through symposia, articles, books, lectures, media appearances and exhibitions.

Much of the research is centered on the Museum's collections totaling 36 million artifacts and specimens. The collections are managed under technologically advanced conservation procedures to ensure their stability and perpetuation.

The Museum's 22 interconnected buildings house 40 exhibition halls, five theaters, a 400,000-volume library, classrooms, laboratories, offices, retail shops and food service facilities. Its visitorship averages 2.7 million a year and there are 520,000 members.

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, 250 corporations, 100 private foundations, numerous individual contributors and members.

### **HIGHLIGHTS OF 1988-1989**

#### **July**

- Museum ichthyologists discovered a new species of cichlid fish from Madagascar.

#### **August**

- Thousands of visitors saw a Tibetan sand mandala—representing Buddha's teachings about time and space—being created by attendants to the Dalai Lama.

#### **September**

- The Margaret Mead Film Festival celebrated its 12th season with 37 New York premieres.

#### **October**

- "Drawn from the Sea: Art in the Service of Ichthyology," an exhibition of fish illustrations, opened in the Akeley Gallery.

#### **November**

- Caribbean Month was celebrated with performances and demonstrations on Caribbean culture.

#### **December**

- The New York State Council on the Arts awarded a grant of \$646,000.

#### **January**

- The Hall of South American Peoples, a large exhibition of Andean artifacts and Amazonian culture, opened.

#### **February**

- The National Science Foundation awarded \$500,000 for development of the Hall of Human Biology and Evolution, which opens in 1991.

#### **March**

- "Madagascar: Island of the Ancestors," an exhibition exploring the culture of the Malagasy people of Madagascar, opened in Gallery 3.

#### **April**

- "Gary Larson: The Far Side of Science," an exhibition of 400 cartoons about natural science, opened in Gallery 77.

#### **May**

- A new exhibit depicting the history of Asian Jews opened in the Hall of Asian Peoples.

#### **June**

- "From the Land of Dragons," the Museum's traveling exhibition from the People's Republic of China, opened in Los Angeles following successful runs in New York and Boston.



# 120th ANNUAL REPORT 1988/89

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# Annual Report of the Chairman of the Board of Trustees

to the Trustees of the American Museum of Natural History, to the Municipal Authorities of the City of New York, and to our Members

*Look abroad through Nature's range:  
Nature's mighty law is Change*

Robert Burns

It is my privilege and responsibility to submit this report for the fiscal year ended June 30, 1989, the 120th year of the Museum. On May 9, I was honored by election to the Chairmanship by our Board of Trustees, concurrently with the election of Robert G. Goelet as Chairman Emeritus. This, my first report, while saluting the achievements of the past, aims to emphasize the future. In succeeding my friend, our friend, friend of nature and society, Bobby Goelet, I am exquisitely mindful of the distinction and responsibilities of the office, and of the challenges and opportunities that lie ahead.

Mr. Goelet has served the Museum with devotion, generosity and creativity. Quality and good taste marked his unique style for the 31 years, thus far, of his Trusteeship. That period includes his recent year as the first Chairman of our Board, following the 13 years of his Presidency in which he succeeded the redoubtable Gardner D. Stout. It is well that he remains with us as an active Trustee so that his knowledge and dedication will continue to benefit our Museum.

Recognizing the increasing scale, scope and complexity of the Museum's activities, and of the world of which we are a part, Mr. Goelet, with the aid of a Long Range Planning Committee of his selection (under the chairmanship of Anne Sidamon-Eristoff), and with the full approval of the Board of Trustees, modernized our organization by providing for a full-time, salaried, professional President and Chief Executive Officer, reporting to the Board and to its Chairman. As announced in last year's report, we are fortunate to have in this post George D. Langdon, Jr., who left the Presidency of Colgate University to join us on July 1, 1988. Concurrently, Mr. Goelet, who was the eighth President of the Museum, became the first Chairman of the Board.

On behalf of all in our Museum community, I express praise and gratitude in highest terms to our recently retired Director, Thomas D. Nicholson, who served with remarkable versatility, devotion and prudence in that leadership post for 20 years,

and for a total of 35 years on the Museum staff. Happily, he will remain as an active consultant. Tom is a warmly admired and loyal friend of the entire Museum family. And I welcome with greatest enthusiasm, as successor Director and Vice President, William J. Moynihan, who, in his first year in office, has won the respect and confidence of all of us. Cheers to Tom; welcome to Bill.

President Langdon, as Chief Executive Officer, presides over the Museum's unparalleled collections (we have some 36 million specimens!) and a total staff of 750, which comprises curatorial, administrative and custodial personnel, in addition to approximately 500 invaluable volunteers. In his first year in office, he has greatly expanded and strengthened our administrative organization and has initiated modernization of our accounting system and other procedures. He has created the new position of Dean of Science and, after an extended outside search, has made a popular and promising appointment of one of our own young curators, Michael J. Novacek, to that very important post. Working with President Langdon and Director Moynihan has been a congenial and rewarding experience for the curators and ancillary staff, and for the Chairman and the Trustees in their policy guidance roles.

Change in leadership facilitates review and innovation. Study and planning have been initiated in many areas, under President Langdon's direction. Priorities and emphases are being evaluated. In due course, programs for action and funding will be presented to the Board of Trustees for consideration and ultimate approval.

We are poised for progress, both in the Museum and in its Hayden Planetarium. Changing conditions in our city, our country and the one world in which we live, call for a review of programs in our three major areas of responsibility: research, education and exhibition. The growing needs for space and the condition of our noble but aging buildings, are being reexamined carefully. Study has begun of a program for stimulating public awareness of the Museum and for improving its public image.

Progress will require increased funding: from our Trustees, from New York City and New York State, from federal sources, from foundations, from corporations, and from our members and the general public. These sources have been supportive in the past; we must demonstrate to their satisfaction that increased generosity will prove to be a sound investment to benefit society and in enlightened self-interest. With some \$200 million in well-managed endowment funds, we are not poor; but we cannot consume the seed corn by using endowment principal for capital expenditures,



and we need all income from the endowment to maintain a balanced budget.

Increased Trustee participation is being encouraged; and encouragement has met a warm response. Committee structure has been reorganized. We have a distinguished Board, a diverse orchestra of men and women of varied talents: devoted, dedicated and intensely interested. We are adding to our Board and are fortunate to have welcomed as new Trustees Samuel Butler, Presiding Partner of the law firm of Cravath, Swaine & Moore; Deborah Kessler, formerly an officer at Citibank with numerous business and cultural interests, and Peter J. Solomon, Chairman of Peter J. Solomon Company, who was formerly Vice Chairman of Shearson Lehman Brothers and was a Deputy Mayor of New York City from 1978 to 1980.

Careful consideration is being given to analysis of the desiderata of the multiple constituencies we serve and of our responsibilities and objectives:

**Collections** Our collections and our Library are irreplaceable national and international treasures. For the enhancement of science and of human welfare, they must be preserved with care, expanded with foresight, and kept accessible for our own curatorial staff and for other scientists, scholars and students worldwide. This has been our tradition.

**Education** We are a unique resource for education and inspiration of children and of adults of all ages. It is important that, in the Darwinian spirit of our institution, we adapt to changing population trends, advancing science and changing technology. The Museum is a major adjunct to the public and private school systems of New York City and of the extended metropolitan area of New York, New Jersey and Connecticut. There are almost a million children in the New York City public school system alone, close to two million in all our area schools combined. Our relationships with the universities and colleges of our area and worldwide have been fruitful and may be expanded symbiotically. We will seek opportunities to improve the achievements of the past.

**Exhibition** By our exhibits are we known to the great majority of our visitors, who this year numbered 2.5 million (plus 586,500 to our Hayden Planetarium). Our visitors are varied in ages, in interests, and in ethnic and educational backgrounds. Most are from New York City and the extended metropolitan area, but many come from all over the United States and from more than 100 foreign countries. The Museum is a major tourist attraction to New York City.

Here are some issues we are addressing in our self-questioning: How can we make our exhibits interesting to all groups? On what groups should we place emphasis? Should there be more specialized exhibits for elementary school children? Is our signage sufficiently legible, intelligible, scientifically accurate and up to date? Is our illumination adequate? Can we take pride in the interiors of our buildings, in the appearance of the exteriors, and in the surrounding grounds, fencing and sidewalks? We have done well; we aim to do better.

We begin a new era under George Langdon's creative leadership. The American Museum of Natural History is a principal global repository of the knowledge and understanding of the history of the system of life that distinguishes our small planet in the immensity of the cosmos. Only now, our species is learning that we, *Homo sapiens*, are the trustees of that system. It is a great mission of the Museum to extend the understanding essential to the management of planet Earth, and to accelerate the recognition and protection of species that are under threat from its mismanagement. All who come to our doors, from all parts of the world, are invited to join us in the advancement of learning and understanding necessary to progress toward our goals. There will be joy in our undertaking; and both spiritual and tangible rewards.

*William T. Golden*

William T. Golden  
Chairman of the Board of Trustees



## Report of the President and Chief Executive Officer

Six months from the end of the Museum's fiscal year described in this report we will enter the last decade of this tumultuous century. Already we know that the decade ahead will be a time of increasing attention to what is happening in the natural world and what can be done to reestablish an equilibrium between humans and nature.

I am pleased to report that the Museum is preparing for its role in this critical task. Threats to the earth's future—expressed in alarm about pollution, spoiled water systems, global warming, destruction of rain forests and the extinction of species—now call dramatic attention to its natural history. While the attention of the Museum has always been and will continue to be focused on understanding evolution, there is growing momentum here to apply our knowledge toward helping ensure the long-term survival of life as we know it.

—We welcome participation in this task. Many of the curators at the American Museum of Natural History study systematic zoology, which is the science of life, its diversity, its evolution through time and its distribution throughout the planet. Their research evaluates what has happened and is happening to the world's biota; it establishes a standard against which change in the natural world can be measured. Other curators work with the physical evolution of the earth and solar system, and still others with complexities of human societies. All deal with change, its causes and its results.

Important internal changes are taking place to bring new strength and vitality to the Museum. A reorganization of the Board of Trustees, the restructuring of the administration, and the development of long-range financial planning demonstrate this effort. A crucial study of space and building needs is underway to provide for long-term needs in research, collection management and exhibition.

The Museum's 40th permanent exhibition hall opened in January. The Hall of South American Peoples displays the talents of the curatorial and exhibition staffs and the wisdom of long-established collection policies. It is a presentation, both beautiful and meticulous, of the history of Andean peoples and the culture of Amazonian peoples.

Another permanent exhibit, which opened in the Hall of Asian Peoples, annotates the varied history of Asian Jews. An interactive display and historical grid illustrate a saga which covers 25 centuries and 13 lands. The exhibit was supported

by a grant from the Henry G. Kaufmann Foundation.

The Museum's special exhibitions achieved success in public attention and attendance. "Madagascar: Island of the Ancestors," explored the culture of the Malagasy people of Madagascar. "From the Land of Dragons" highlighted the evolutionary relationships of fossil reptiles and mammals found in China. Both exhibitions arrived after detailed negotiations with their foreign sponsors; the fact that they were shown here is a credit to the international reputation of this Museum and its staff.

Other special exhibitions demonstrated sacred art forms. A Tibetan Buddhist sand mandala—a seven-foot-square spiritual offering to the Kalachakra deity—was created by an attendant to the Dalai Lama. Another rare Tibetan art form, butter sculpting, was demonstrated by 10 Tibetan Buddhist monks. These were among the diverse programs developed by the Education Department, which also include teaching, lectures and films. The Membership Office also contributed many public programs, including lectures by marine biologist Eugenie Clark and behaviorist Jane Goodall.

The Museum greatly appreciates the broad base of support it receives from both the public and private sectors. During the past year, total New York City support for general operations amounted to \$8,493,517. The city contributed an additional \$2,259,452 in support of capital projects. The Trustees thank Mayor Edward I. Koch, Comptroller Harrison J. Goldin, City Council President Andrew J. Stein, Manhattan Borough President David N. Dinkins, Cultural Affairs Commissioner Mary Schmidt Campbell, and members of the City Council for their support.

The New York State Council on the Arts awarded \$653,500 for general operating support and special projects. We are grateful to Governor Mario M. Cuomo, members of the New York State Legislature and Kitty Carlisle Hart, Chairwoman of the New York State Council on the Arts. We want to express our thanks to State Senator Roy M. Goodman who secured a grant from the Natural Heritage Trust for additional support of the Margaret Mead Film Festival.

The federal government continues to provide important support for the exhibition and research programs. The National Endowment for the Humanities awarded \$453,000 for "Chiefly Feasts: the Kwakiutl Indian Potlatch," an exhibition of the festivals of the Northwest Coast Indians opening in 1991, and for the publication of a catalog on the archeological section of the Hall of South American Peoples. The National Science Foundation awarded \$500,000 for development of the new



Hall of Human Biology and Evolution, and several grants totaling \$708,827 for scientific research and collection management. The Institute of Museum Services sent word of a 1990 grant of \$75,000 for general operating support.

Thanks to the efforts of Trustee Donald C. Platten, Chairman of the Corporate Campaign, contributions from the corporate community exceeded \$1.5 million this year. Leadership gifts came from Chemical Bank, Exxon Corporation, IBM Corporation, Bristol-Myers Company and the Bank of New York. Visitors could enjoy free Friday and Saturday evenings at the Museum thanks to a generous grant from Mobil. Johnson & Higgins supported a special exhibition on exploration of the South Seas. In addition, many firms selected the Museum as the site for their special events and promotions.

Several foundations have given strong support to the Museum's operations and programs. The Howard Phipps Foundation contributed to the President's Special Fund and the Phipps Tapirapécó Expedition to South America. The Wallace Funds (established by the founders of Reader's Digest), supported planning for capital improvements, the Edward John Noble Foundation continued its commitment to the research on St. Catherines Island, and the Monnell Foundation granted funds for general support. The Louis Calder Foundation, the Samuel and May Rudin Foundation, the William Randolph Hearst Foundation and The Vidda Foundation were among the many foundations that supported various educational programs.

Bequests remained an important source of funds for the endowment. We are especially grateful for gifts from the estates of Richard T. Shields and Mary Hemingway.

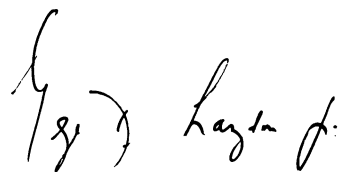
We are also grateful for support from the annual Friends group, Museum visitors and the loyal group of 520,000 members. In addition, I note with pride the contributions of time and talent from 500 volunteers who work throughout the Museum on weekdays, weekends and holidays.

During the past year the Museum said good-bye to two towering figures and greeted a third in a new role. Robert G. Goelet retired as Chairman of the Board of Trustees, but continues as a member of the Board and Chairman Emeritus. Mr. Goelet's years as President and Chairman of the Board were distinguished by a personal commitment to the natural sciences that benefited the Museum in countless ways. In June, Thomas D. Nicholson became Director Emeritus. He was a unique leader whose knowledge and talent brought the Museum to new levels of competence and stature. William T. Golden was elected as the new Chairman of the Board of Trustees in May.

Recognized nationally and internationally as a man of wisdom and vision in the enterprise of science, Bill Golden brings to his responsibilities as Chairman long experience and strong support for an agenda to sustain and strengthen the Museum in the future.

The contributions of those who so generously supported the Museum in the past year were essential. As we go forward in defining the tasks for the Museum that lie ahead, I trust that you will be increasingly involved and confident in the work of this great institution.

Approximately a year ago I began my work here. These last twelve months have been a time of excitement and learning for me, particularly about the Museum's resources and their use by our staff in opening the wonders of the natural world to the millions of visitors, and to scientists and scholars throughout the world. I think myself privileged to be part of this great Museum.



George D. Langdon, Jr.  
*President and Chief Executive Officer*



## Administrative Leadership

- 6 With a new managerial structure in place, five Vice Presidents will oversee the Museum's operations, scientific research, public programs, development and finances.

The Directorship of the Museum now has Vice Presidential status. William J. Moynihan, who holds the post of Vice President and Director, came to the Museum from Colgate University where he was Dean of the College and Associate Professor of Education. He served the Museum since 1988 as Executive Assistant to the President, and was named Director in July.

Michael J. Novacek, who was Chairman of the Department of Vertebrate Paleontology, is Vice President and Dean of Science. As such, he provides leadership to the curatorial staff, and advises the President on all matters dealing with the direction of scientific research at the Museum.

Dr. Novacek, appointed as an Assistant Curator in 1982, became Chairman of Vertebrate Paleontology in 1983, and became Curator this year.

Aldona Jonaitis, former Vice Provost for Undergraduate Studies at the State University of New York at Stony Brook, is the Museum's Vice President for Public Programs. She coordinates the operations of the Exhibition Department, the Education Department and the Planetarium which together disseminate the fruits of the Museum's scientific endeavors to more than 2.7 million visitors each year.

Dr. Jonaitis, an art historian, held teaching and administrative positions at SUNY, Stony Brook, and served as a Research Associate at the American Museum.

The position of Vice President for Finance is held by Barbara Dwyer Gunn. She oversees policy and operations in the administration of the Museum's budget. The Offices of Finance, Controller, Accounting, Purchasing and Payroll report to Ms. Gunn.

Before joining the Museum, Ms. Gunn was Director of the New York City Mayor's Office of Operations. She served in a number of city departments since 1979, including the Department of Transportation, the Department of Parks, and the Human Resources Unit in the Mayor's Office of Operations.

David Estridge, who was Vice President for Development and Public Affairs at Boston Children's Hospital, is Senior Vice President for Development and Public Affairs. His responsibilities include leading the Museum's corporate and private fund-raising and public relations efforts.

During his 11-year tenure at Children's Hospital, Mr. Estridge created and directed a fund-raising program that tripled philanthropic contributions. He established national award-winning public affairs programs and created three books on pediatric health care issues.

In addition to the appointment of the Vice Presidents, the position of Special Assistant to President Langdon was established. Linda F. Cahill, former Special Assistant to the Mayor of New York and Director of the Mayor's Office of Special Projects and Events, was named to that position. Ms. Cahill entered city service in 1978 as Assistant to the Mayor and Director of Scheduling. Previously, she held posts at the United Nations Association as Director of Speaker Services, Director of Education and as Assistant Director of UN-Day Programs.

Ms. Cahill oversees the activities of the President's Office and represents Mr. Langdon in coordinating and developing Museum policy and activities. She also brings staff representation and support to the Board of Trustees.

## Thomas D. Nicholson

In 1969, when Thomas D. Nicholson became Director, the Museum was celebrating its centennial. It was a jubilant time. A few years later times became grim. New York City was in danger of economic collapse, and the Museum was left with the prospect of having its funding severely cut. In the face of pressure to close halls and reduce programs, Dr. Nicholson expanded exhibition plans, extended visiting hours and began an aggressive program aimed at broadening income. The Museum not only survived, it flourished.

The extent to which Dr. Nicholson's vitality shaped the Museum during two decades is evident throughout the institution.

Dr. Nicholson began lecturing at the American Museum-Hayden Planetarium in 1952. In 1954, he became an Associate Astronomer and in 1964 was appointed Chairman. In 1969 he was appointed Director of the Museum, succeeding James A. Oliver.

Dr. Nicholson's new job was to guide one of the premier research institutions in the country. Some of his most significant contributions as an administrator were to improve the Museum's financial and organizational structure.

He instituted a formal search process to recruit



new scientists and began a tenure system for curators. In addition, he developed an effective grants and fellowship program to encourage innovative research and provide support for students in scientific disciplines.

Among the goals Dr. Nicholson set was modernizing the Museum's physical space. Approximately 300,000 square feet of storage and work areas were added through more efficient use of existing space. Collection management and research facilities were improved.

New construction was undertaken. The 11-story Childs Frick Wing, housing the Department of Vertebrate Paleontology and its renowned collections of fossil mammals, was brought to completion in the mid-1970s.

Public space, too, was refurbished. Extensive renovations were carried out in the Hall of South Asiatic Mammals and in the Akeley Memorial Hall of African Mammals.

New permanent exhibition halls were opened to share the riches of the Museum's collections and research with the public. Among them were the Morgan Memorial Hall of Gems and the Harry Frank Guggenheim Hall of Minerals (1976), the Gardner D. Stout Hall of Asian Peoples (1980), the Arthur Ross Hall of Meteorites (1980) and the Hall of South American Peoples (1989).

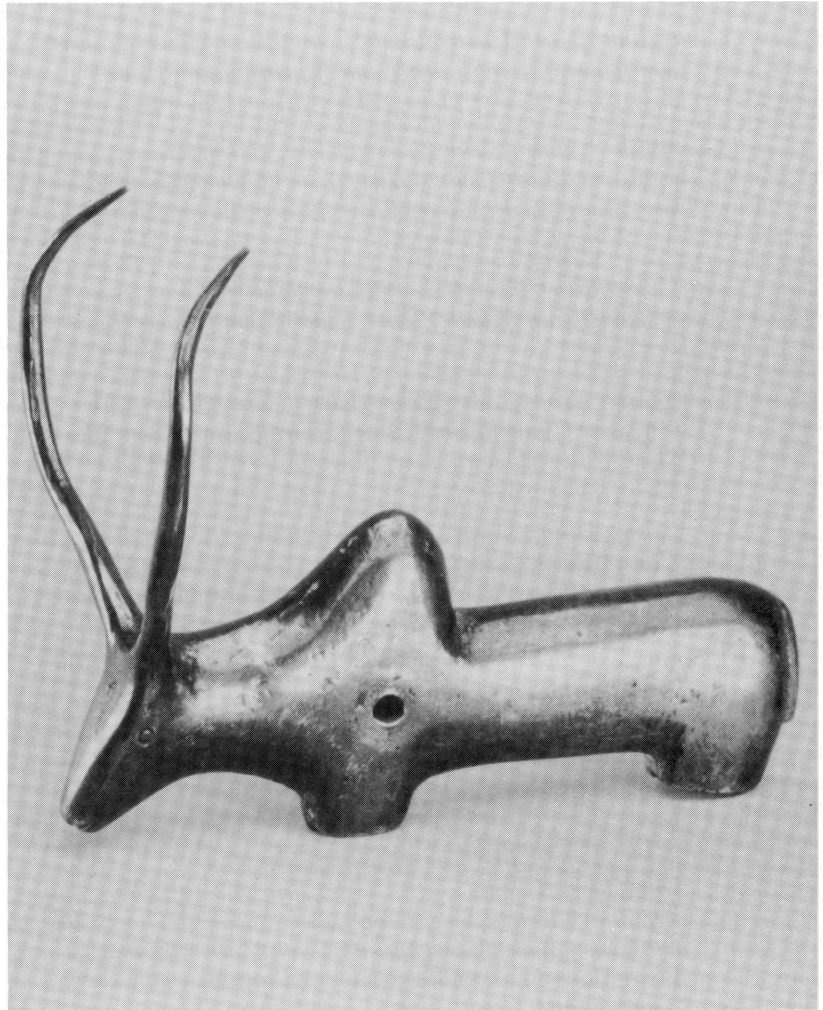
Dr. Nicholson earned attention and acclaim for the Museum with the presentation of such special exhibitions as "Pompeii AD79" (1979), "Gold of Eldorado: The Heritage of Colombia" (1979-1980), "Ancestors: Four Million Years of Humanity" (1984), "Asante: Kingdom of Gold" (1984), "Dark Caves, Bright Visions" (1986) and "Carthage: A Mosaic of Ancient Tunisia" (1987). Many of these traveled throughout the country.

Dr. Nicholson is responsible for bringing the first and only IMAX movie facility to New York City. The Naturemax Theater shows special format IMAX films on a screen four stories high and 66-feet wide, the biggest indoor screen in the city.

He was especially interested in reaching out to new communities and meeting the needs of all the Museum's constituencies. New education programs were created in African-American and Caribbean studies. The Education Department facilities were redesigned and expanded; these facilities now draw more than 200,000 visitors a year.

The changes took money, and Dr. Nicholson found new ways to increase the Museum's income and to provide services to constituents. These included making Museum space available for corporate events, establishing a discretionary admission fee, renovating the parking area and Museum shops, and creating new cafeteria and restaurant facilities.

*In this silver charm from Madagascar, believed to bring wealth to its wearer, the long horns represent the royal cattle of the Merina kingdom. The charm was among more than 500 artifacts in the special exhibition, "Madagascar: Island of the*



*Ancestors." During the exhibition's five-months here almost 400,000 visitors learned of the origins, history and culture of the Malagasy people of Madagascar. The American Museum was the only U.S. site for the exhibition, which was organized by the British Museum's Museum of Mankind.*

## Department of Anthropology

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*The Department of Anthropology maintained its commitment to research, exhibition and collections management. The Hall of South American Peoples, the Museum's 40th permanent exhibition hall, opened in January. It uses 2300 artifacts to provide insight into the social organization, political structure and artistic expression of South American peoples. The exhibition "Madagascar: Island of the Ancestors," an exploration of the cultures of Madagascar, opened in March. The department was honored by the election of Curator David Hurst Thomas to the National Academy of Science. He joins Curator Emeritus Harry Shapiro in receiving this recognition for distinguished research and contributions to science. Anna Roosevelt, Research Associate, was awarded the prestigious MacArthur Fellowship.*

**South American Archeology** Chairman and Curator Craig Morris worked on completing the Hall of South American Peoples. Dr. Morris researched two major long-term projects devoted to Andean political institutions and urbanism. The Huanuco Pampa project, supported by the National Science Foundation, was the subject of a book and numerous articles. It produced one of the largest computer databases in archeology and will form the basis of several additional publications. With the help of scientific assistants and new computer systems, several million items of information on Huanuco Pampa can be analyzed.

Dr. Morris spent nine weeks in the field on his other major long-term research, the Chinchapisco archeological project. A new ceramic coding system was devised, and study continued on the large botanical collections from recent excavations.

**Origins of States** Curator Robert L. Carneiro researched the origins and evolution of chiefdoms and states. Dr. Carneiro is preparing a paper "Chiefdoms: Their Origin and Evolution," and a book, "From Autonomous Village to the State: The Evolution of Complex Societies."

Dr. Carneiro studied the regional ethnology of Amazonia for another book, "Indians of the Tropical Forest," that will complement the Amazonian section of the Hall of South American Peoples.

**Indian Village Life** Curator Stanley A. Freed, in collaboration with Research Associate Ruth S. Freed, analyzed data collected in the North Indian village of Shanti Nagar from the 1950s to the 1980s. They completed drafts of a monograph and two articles exploring the connection of village ideology to illness, curing, death and the supernatural world. They also conducted research into the history of American anthropology.

Dr. Freed worked with Aldona Jonaitis, Research Associate in the department and newly appointed Vice President for Public Programs, on the special exhibition "Chiefly Feasts: The Kwakiutl Indian Potlatch," which will open in October, 1991.

**African Art** Curator Enid Schildkrout continued to develop the exhibition "African Reflections: Art from Northeastern Zaire" to open in June, 1990. Dr. Schildkrout is curating the exhibition and, with Research Associate Curtis A. Keim, writing and editing the catalog. They also published a paper on the evolution of pottery styles in northeast Zaire. Dr. Schildkrout produced and collaborated on the editing of two films about the Mangbetu people of Zaire for the exhibition, BBC television and Arts and Entertainment network.

Her research on African art was published as the introductory essay of a book "Wild Spirits, Strong Medicine: African art and the wilderness," which she edited.

Dr. Schildkrout served with Curator Ian Tattersall as co-curator for the Madagascar exhibition. She serves as Senior Scientific Editor of *Faces*, an anthropology magazine for children.

**Primate Research** With support of the National Geographic Society, Dr. Tattersall directed a paleontological survey of the Yemen Arab Republic, during which a Jurassic fish fauna was discovered.

Dr. Tattersall presented papers at international conferences on speciation and extinction patterns among Malagasy primate fauna, and on interspecific heterogeneity in the hormones of strepsirrhine primates. The primate research was conducted with Andrea Dunaif, Research Associate. "The Encyclopedia of Human Evolution and Prehistory," edited by Dr. Tattersall, Eric Delson, Research Associate in the Department of Vertebrate Paleontology, and John Van Couvering, Editor of Micropaleontology Press, was issued by Garland Publishing.

Through the efforts of Dr. Tattersall, the Museum was awarded a grant of \$500,000 by the National Science Foundation for the development



and implementation of the Hall of Human Biology and Evolution. Final design work and text copy are being completed.

In honor of its initial discovery by Dr. Tattersall, *Propithecus tattersalli* is now officially recognized by primatologists as a species of lemur in Madagascar.

**Archeology of Monitor Valley** Dr. Thomas published the third major monograph describing the Monitor Valley (Nevada) archeological research project in the *Anthropological Papers*. Support was provided by the Richard Lounsbery Foundation, the National Science Foundation, the Frederick G. Voss Fund and Earthwatch. This long-term, diachronic study examined the nature of human populations adapting to social and environmental stress. Primary data on 10 cave excavations and surface reconnaissance on prehistoric sites is presented.

For more on Dr. Thomas' research, see St. Catherine's Research Station, page 41.

**Korean Marriage Customs** Associate Curator Laurel Kendall researched contemporary Korean marriage customs. She uses experimental ethnographic techniques to analyze a dynamic, fast changing and sometimes contentious society.

She coorganized a conference held in Hua Hin, Thailand, that brought together scholars from throughout Asia for a discussion of religious identity in East and Southeast Asia.

She participated in several international conferences and presented papers at the American Anthropological Association and the Association for Asian Studies. She serves as Assistant Editor for the *Journal of Asian Studies*. She worked with Anna Cohn, Director of the Smithsonian Institution Traveling Exhibition Service (SITES), in preparing the Jews in Asia exhibit in the Hall of Asian Peoples.

**Anthropological Fieldnotes** Dr. Shapiro serves the department by answering inquiries on physical anthropology.

Dr. Shapiro's correspondence, fieldnotes and bibliographies, covering more than 60 years at the Museum, are being archived.

### Scientific Publications:

Bettinger, R. L.

1989. The archaeology of Pinyon House, two eagles, and crater middens: three residential sites in Owens Valley, eastern California. *Anthrop. Pap. of the Amer. Mus. of Nat. Hist.* 67: 1-355.

*This rare lemur, first seen in the Beankavy Forest of Madagascar by Anthropology Curator Ian Tattersall, belongs to a distinct new species. It was named Propithecus tattersalli, and will be commonly known as Tattersall's Sifaka or the Golden Crowned Sifaka. Sifaka is a Malagasy term derived from the calls made by lemurs of this group, which sound something like shi fak. Weighing an average of seven pounds, the*



*lemurs are distinguished by prominent tufted ears and a golden orange cap of fur at the crown of the head. The primates of Madagascar, among the best living models of the primates that flourished in the Eocene forests 50 million years ago, play an important role in understanding our own remote ancestry.*

#### 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.

- Carneiro, R. L.  
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## Astronomy and the American Museum-Hayden Planetarium

*The Planetarium added state-of-the-art audiovisual equipment to its classrooms, and received a grant to install a newly developed optical disc projection device in the Sky Theater. These additions enable the Planetarium to provide even higher quality educational programs in a setting that combines the best of the past with the most sophisticated technology available.*

**Sky Shows** Under the direction of Chairman and Associate Curator William A. Gutsch, Jr., a number of new Sky Shows were presented. Through the summer and fall, "Encounter: The Search for Extraterrestrial Life," narrated by *Star Trek's* Mark Lenard, was shown. A review of the search for life on other planets ranged from the fantasy voyages of classical literature to the modern use of robot spacecraft, high-speed computers and ultrasensitive listening devices.

The seasonal program, "The Star of Christmas," was followed in January by a double feature of Sky Shows. First was "Destination: Mars," which traced the fascination with this planet from the myths of yesterday to the proposed science research stations of the 21st century. Also featured was "Gateway to Infinity," a visually rich tour of the universe, narrated by James Earl Jones.

For preschoolers the program, "Wonderful Sky," featuring the Sesame Street Muppets\* was presented. "The Secret of the Cardboard Rocket," a show for children 6 to 9, was offered, as well as seven additional programs for children of various ages. During July and August, day campers and the general public were treated to "The Skies of Summer," a live program about the many things to see in the summer season, from constellations and planets, to showers of meteors.

Work began with Lucasfilm, Ltd., on a program for children 7 to 12. In it R2-D2 and C-3PO, the robots from the *Star Wars* movie trilogy, will explain the scientific uses of satellites and space probes.

Laser light programs on Friday and Saturday nights continued this year, featuring music by selected groups.

Public Sky Show attendance for the year was 324,705. Overall attendance was 586,527.

**Courses** A wide range of courses for children and adults on subjects from astronomy and space science to navigation and meteorology was offered. New courses included "Celestial Highlights," "Cosmic Mysteries," "Astronomy with Computers," and "The Future of Space Exploration."

**Live Concerts** In December, the fifth annual holiday concerts were performed by the New York Philomusica, which presented a program of works by Franz Joseph Haydn and Johann Michael Haydn, appropriately named "Haydn at the Hayden." The Ensemble for Early Music returned for a special Valentine's concert, "Music from the Age of Chivalry," with visuals created in cooperation with the Metropolitan Museum of Art and the Musée Condé in Chantilly, France.

In April, the Paul Winter Consort visited for the third time, performing four concerts which combined elements of jazz, symphonic and folk music with the rhythms of Brazil and Africa. The Planetarium's extensive special effects capabilities were used to create visual environments from snow-covered forests to mountain vistas.

**Special Lectures and Programs** On October 25 and 27, the 50th anniversary of the famous Orson Welles radio broadcast "The War of the Worlds" was commemorated with a special program "The Night of the Martians." Activities included an illustrated lecture by Dr. Gutsch on "The Scientific Exploration of Mars," a 45-work photo and art exhibition on Mars, telescopic observation of Mars and an illustrated replaying in the Sky Theater of portions of the original 1938 broadcast. Howard Koch, the writer of the radio play, was present to answer questions from the audience.

In November, William Hartmann, Research Astronomer from the Planetary Sciences Institute in Tucson and noted space artist, together with Planetarium Astronomical Artist Dennis Davidson and Planetarium Production Designer Brian Sullivan, gave a three-part illustrated lecture on "Space Art: The Universe Through the Eyes of the Artist."

In April, James Gunn, award-winning author and Professor of English at the University of Kansas, presented an illustrated lecture entitled "The History of Science Fiction."

A new lecture series, "Frontiers in Astronomy and Astrophysics," began in June. It features leading research scientists discussing recent discoveries ranging from planetary explorations to cosmology to new telescope technologies. The inaugural lecture, given by Thomas Banja,



Associate Professor of Astronomy at Boston University, was entitled "Molecules in Space: The New Milky Way."

An art exhibition featuring the works of Vincent Di Fate and other artists was presented in "Mars: The Fantasy, The Facts, The Future."

**Restoration and Renovation** For the fifth consecutive year, extensive work was done on the building. Through a generous grant from the Charles Hayden Foundation, the classrooms were completely renovated and new audiovisual equipment was installed, including large-screen video projectors, videotape and laser disc players, and an extensive library of hundreds of thousands of astronomy and space-related visuals.

The lobby was also completely restored, including its original 1935 Art Deco ceiling with constellation figures. The main box office was totally renovated, and new ornamental and flowering shrubbery was planted in front of the building.

Within the Planetarium's exhibition space, a new multi-image program, "American Pathfinders," was created by Mr. Sullivan for the Guggenheim Space Theater; Mr. Davidson completed three new giant astronomical murals in the Black Light Gallery, and the area used to display changing astronomical artworks was refabricated and expanded.

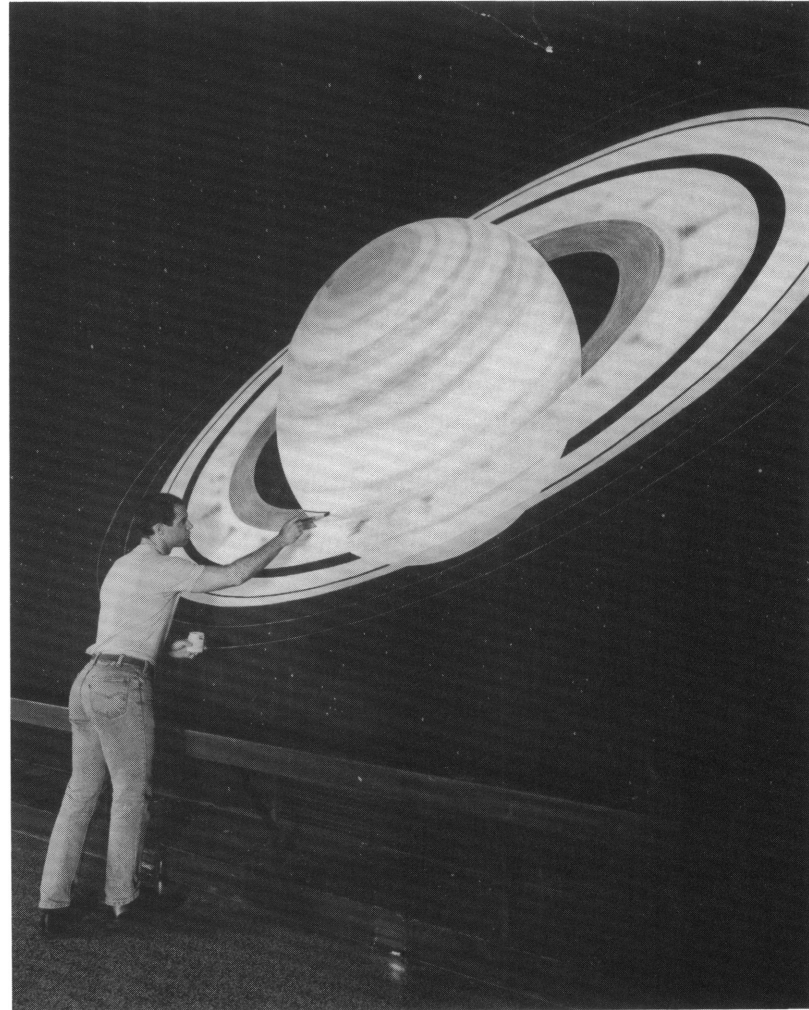
Designs were drawn up by the staff for a new Hall of the Solar System on the second floor.

**New Grants** The Prospect Hill Foundation awarded a grant of \$41,000 to the Planetarium for the purpose of outfitting the Sky Theater with state-of-the-art video projection equipment. Such equipment, using newly developed optical disc imagery, will greatly expand the scope of astronomical visuals the Planetarium can present in its public and school programs.

**Artwork and Show Sales** Shows were sold to planetariums in Tokyo and Melbourne, as well as many planetariums across the United States, through a policy that makes Sky Shows and related astronomical artwork available to other institutions for purchase. Over the past five years, Hayden programs have been purchased and presented in more than 30 planetariums on four continents.

**The Perkin Library** Through the continued generosity of the Richard S. Perkin family, the Perkin Library updated its computer system and began contract proceedings for membership in OCLC, the Online Computer Library Center.

*Astronomical Artist Dennis Davidson puts the finishing touches on Saturn's rings for an updated mural in the Planetarium's black light gallery. Mr. Davidson uses a specially pigmented latex-based paint that is sensitive to ultraviolet light to*



*portray with the greatest possible realism the characteristics of a planet. Discoveries from the Voyager spacecraft's exploratory mission yielded astronomers a wealth of data, dramatically changing their perceptions of Saturn.*

OCLC will also perform a conversion of the card catalog to the online system, so that the Perkin collection will be accessible to users in other parts of the country.

Groups of students made use of the Library as they worked collectively on class projects. Among these groups were architecture students from Yale and a special education class from a public school on New York's Upper East Side. The Library experienced a 50 percent increase in use by international visitors, including researchers from Greece, Israel, France and Czechoslovakia.

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## Department of Entomology

*The Department of Entomology cares for almost half of the Museum's specimens. The importance of the rapidly growing, worldwide collections of insects and arachnids was underscored this year by the award of a \$650,000 three-year facilities grant from the National Science Foundation. To obtain room for housing new specimens, the department's largest collection area will be renovated to support two levels of compact storage, roughly doubling its capacity.*

**Grant** The NSF grant enables the department to work on three special projects. The 150,000-specimen collection of true bugs and their allies acquired from Finnish entomologist Rauno Linnavuori will be incorporated into existing holdings of those groups. A computerized database for the department's more than 21,000 primary types (those specimens to which the scientific names of species are attached) will be established. Finally, a large backlog of noctuid moths will be prepared for study, sorted at least to the family level, and made available to specialists for research. The NSF grant also assists with the costs of the compactor system and provides salaries for two full-time collection conservation assistants, three part-time specimen preparators and outside specialists.

**Students** Negotiations were completed with Cornell University's Department of Entomology to establish a joint training program in insect and arachnid systematics. The program will increase the accessibility of the department's resources and staff for graduate education. The program's first student is expected to enroll at Cornell this fall. The department continues to play an active role in the American Museum of Natural History-City University of New York joint training program in evolutionary biology. Two CUNY graduate students were sponsored this year.

**Spiders** Chairman and Curator Norman I. Platnick completed work on two book-length projects. "Advances in Spider Taxonomy 1981-1987" was published by Manchester University Press in association with the British Arachnological Society. The 675-page hardcover volume covers more than 1000 papers and books published on spider classification during the seven-year period.

The manuscript for a handbook of the 100 species of the spider family Gnaphosidae found in Canada and the northern United States was completed with the assistance of Charles Dondale of the Biosystematics Research Centre in Ottawa.

Dr. Platnick and Thorne Research Fellow Raymond R. Forster completed a revision of the Chilean, New Zealand, New Caledonian and Australian spiders of the family Anapidae. These tiny spiders, less than 2mm long, spin intricate orbwebs less than an inch in diameter. The paper covers some 75 species of 22 genera, all but two of which are new, and includes the first records of the family from southern South America.

**Beetles** Curator Lee Herman continued studies on a generic and tribal revision of the Paederinae, a subfamily of the beetle family Staphylinidae. Dr. Herman plans to revise the higher classification, determine the phylogenetic relationships, and integrate the known data on the subfamily.

He virtually completed a catalog of the literature on the more than 7000 names used in the subfamily. The catalog includes references published from 1758 to date, and reflects the current composition of genera.

As a spinoff of the tribal revision, Dr. Herman is revising two closely related genera, *Cylindroxystus* and *Neolindus*. *Cylindroxystus* was originally placed in its own tribe and was said to be the link between the two other tribes, Paederini and Pinophilini. *Neolindus* and *Cylindroxystus* had never been associated with each other. Only six species of the two genera were previously known, but approximately 45 more will be added.

**Moths** George Willett Curator Frederick H. Rindge conducted systematic studies of the moth family Geometridae from the New World. His study of the tribe Melanolophiini was completed, except for the illustrations. Four of the 14 included genera are described as new, and about 50 species new to science are named. The paper marks the first time that all the genera of the tribe have been treated in a single publication.

Dr. Rindge also revised the genus *Phyle*, which includes moths that are very distinctive in appearance due to their unicolorous green upper and under surfaces. Of the 14 included species found from southern Mexico to southern South America, 10 are new and one is being transferred from a different subfamily.

Kalbfleisch Curatorial Fellow James S. Miller is reclassifying the world Notodontidae, a moth family including approximately 3000 species. His analysis is based on 160 larval and adult morphological characters for 60 representative

species, and identifies 11 major lineages within the family. Dr. Miller and Paul Feeny of Cornell University completed a paper studying the evolution of resistance to certain plant alkaloids in swallowtail butterfly larvae (Papilionidae).

As part of his ongoing systematic studies of the Dioptriidae, a Neotropical moth group with close affinities to the Notodontidae, Dr. Miller revised the genera *Euchontha* and *Pareuchontha*. The revision treated 10 species occurring in western South America, three of which are new. The paper also described a modification of the male forewing, which the moths may use for sound production.

Dr. Miller, with George Godfrey of the Illinois Natural History Survey, and David Carter of the British Museum, submitted a paper discussing two unusual mouthpart structures in notodontid caterpillars. The presence of these structures provides important evidence concerning the monophyly of the Notodontidae.

**Bees** Cleptoparasitic cuckoo bees lay their eggs in the nest cells of solitary or social bees, and their larvae eat pollen and nectar originally intended for larvae of the host species. Entomologists do not yet know how many times cleptoparasitism evolved within the bee family Anthophoridae, because separate lineages show perplexing evolutionary convergence. Curator Jerome G. Rozen, Jr., discovered that just-hatched larvae may answer the question.

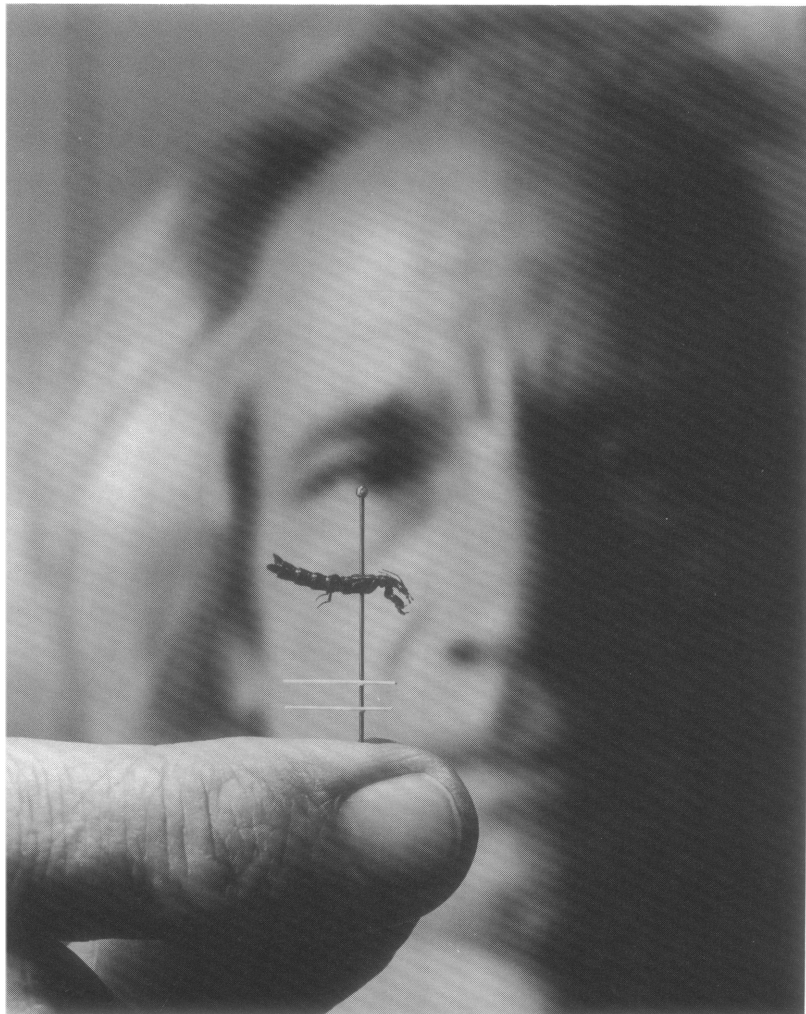
All these larvae have sharp-pointed mandibles used to kill host eggs or larvae, but different lineages have developed unique anatomical features that assist their rapacious lifestyle (e.g., different structures for detecting the presence of hosts inside the totally dark, subterranean host nests). Because these creatures are as small as 0.5mm in body length and may live for only two or three days, they are rarely collected. However, Dr. Rozen's fieldwork has provided the Museum with extensive samples.

**Bugs** Curator Randall T. Schuh completed a phylogenetic analysis of 112 species of the plant bug tribe Pilophorini using the computer program Hennig86. The results indicate that the primitive lineages exist today in South America and Africa, with more recent radiations in Southeast Asia and the Northern Hemisphere. Primitive feeding habits in the group were on the Monocotyledoneae with later shifts onto the Dicotyledoneae and Coniferae.

A companion manuscript containing documentation of nine new species of Pilophorini and numerous new synonymies and combinations



*The size of a new species of rove beetle of the genus Neolindus is illustrated by its relationship to the human thumb. The beetle is being studied by Lee Herman, Curator in the Department of Entomology. The new species, which has not been commonly collected, is a predatory beetle from Panama,*



*belonging to a large, diverse family. The importance of the Museum's rapidly growing worldwide collections of insects and arachnids is widely recognized. The National Science Foundation awarded a \$650,000 three-year facilities grant for renovation and expansion.*

was accepted for publication in the *Novitates*. Dr. Schuh also published a revision of the brightly colored bugs of the genus *Daleapidea*, some of which were previously placed in other genera. The projects were conducted with technical, field and salary support from the NSF.

Dr. Schuh also served as Managing Editor of the revised version of "The Torre-Bueno Glossary of Entomology." This standard reference, which had not been updated for 50 years, was published cooperatively by the New York Entomological Society and the Museum.

**Flies** The small fruit fly family Drosophilidae contains about 3000 described (and many more undescribed) species from all over the world. They attract the attention of biologists as diverse as biochemists and ecologists. Assistant Curator David A. Grimaldi has worked for three years on a worldwide reclassification of the 114 genera and subgenera in the family. The new classification, now nearing completion, should be more stable and more accurate at predicting unknown aspects of drosophilid natural history because it is based on phylogeny.

The University of Texas drosophilid collection, obtained on long-term loan this year, has been a great aid to Dr. Grimaldi's research. The collection was built by Professor Emeritus Marshall Wheeler, whose private library—including everything published on the taxonomy of drosophilids—was also acquired for Dr. Grimaldi's use.

Dr. Grimaldi spent three months collecting Diptera in the southeastern United States, Costa Rica and southern Venezuela. In addition, thousands of Costa Rican flies were donated by Daniel Janzen, a noted tropical biologist who is surveying the biodiversity of Costa Rica for the proposal of new national parks there.

### Scientific Publications:

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1988. Pupae acceptance by slaves of the social parasitic ant *Polyergus*. Psyche 94: 293-302.
- Grimaldi, D. A.  
1988. *Drosophila (Hirtodrosophila) chandleri* (Diptera, Drosophilidae) a new species from Sri Lanka with broad-headed males. J. N. Y. Entomol. Soc. 96: 323-326.

1989. The genus *Metopina* (Diptera, Phoridae) from Cretaceous and Tertiary ambers. J. N. Y. Entomol. Soc. 97: 65-72.
- Grimaldi, D. A., and G. Fenster  
1989. Evolution of extreme sexual dimorphisms: structural and behavioral convergence among broad-headed male Drosophilidae (Diptera). Am. Mus. Novitates 2939: 28 pp.
- Johnson, K.  
1989. A revisionary study of the Neotropical hairstreak butterfly genus *Noreena* and its new sister genus *Contrafacia* (Lepidoptera, Lycaenidae). J. N. Y. Entomol. Soc. 97: 11-46.
- Johnson, K., and H. Descimon  
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## Department of Herpetology and Ichthyology

*The department's collecting activities in threatened tropical areas extend to Madagascar, Africa, Hispaniola and South America. The 50th anniversary of the discovery of the recent coelacanth, Latimeria chalumnae, was marked in December by the acquisition and preparation of unique material for the collections. Richard G. Zweifel, Curator, retired after a career of 35 years in the Herpetology Department.*

**Tropical Ecosystems** Environmental changes due to the elimination of tropical forests influence native forms of cold-blooded vertebrates. In recent years the department has increasingly participated in faunal studies of tropical areas, with growing concern over the gradual loss of these poorly known resources.

During June and July, Assistant Curator Melanie Stiassny and Kalbfleisch Research Fellow Peter N. Reinthal began an aquatic survey of the largely deforested island of Madagascar. In collaboration with Patricia Wright, Department of Anthropology, Duke University, they found new aquatic forms. The native freshwater fishes have been severely restricted in distribution, apparently through the combined effects of deforestation and introduction of exotic fishes. In association with the Ministère de la Recherche Scientifique et Technologique pour le Développement of the Repoblika Demokratika Malagasy, the survey will continue with support from the World Wildlife Fund.

Dr. Reinthal studied cichlid fishes of the African Lakes Malawi and Kariba, in cooperation with the Malawi Fisheries Department and the Lake Kariba Fisheries Research Institute of Zimbabwe. His studies of feeding, behavior, systematics, and distribution of fishes within Lake Malawi help to explain how and why nearly 1000 species of the same family (Cichlidae) exist together in the lake.

Michael L. Smith, Kalbfleisch Assistant Curator, began a detailed survey of freshwater fishes of Hispaniola and discovered 14 new forms. He also explored the southern shores of Hispaniola for pupfish habitats and discovered two new species. A checklist of the nonmarine fishes of Hispaniola was completed with Carlos Rodriguez, Professor of Biology, Universidad Autonoma de Santo Domingo, Republica Dominicana.



**Phipps Tapirapecó Expedition** In February and March, several members of the department participated in the Phipps Tapirapecó Expedition to an area of southern Venezuela about 150 kilometers to the northeast of Cerro de la Neblina. The expedition, coordinated by Curator Charles Myers, was sponsored by the Caracas-based Fundación para el Desarrollo de las Ciencias Físicas, Matemáticas y Naturales, the same foundation that made possible the highly publicized expedition to Neblina in 1984. Collection of frogs, snakes, lizards and fishes was accomplished in the forested areas of Sierra de Unturán, upper Río Siapa Valley, and Cerro Tamacuari on the Brazilian border, where no collecting had been done previously. Transport to forest camps was by military helicopter from a base camp on the Río Mavaca. The expedition was supported by a contribution from the Phipps Foundation.

**Latimeria** On Dec. 23, 1938, M. Courtenay-Latimer, Curator of the East London Museum, noticed a large blue and silver fish on a trawler at a local dock. The fish was later identified as a living representative of a group believed to have become extinct with the dinosaurs. The new species was named after Ms. Courtenay-Latimer, and the only living coelacanth became widely known as *Latimeria chalumnae*.

The department's collections now total eight specimens, including the only known embryos. One embryo underwent special preparation over a period of years. It was returned to the department in early January by Dr. Michael Lagios, Children's Hospital in San Francisco, in the form of 1221 2x3-inch microscope slides, each showing a cross section through the entire head. These serial slides permit detailed study, previously impossible, of the structure of this important fish. The department also received a videotape from Hans Fricke, Max Planck Institut, of the first observations of the living fish. The videotape was shot during the night in the fishes' native habitat of the Comoro Islands from a deep-water minisubmarine. To celebrate the "golden jubilee," the department prepared a skeleton of one of the two frozen adult specimens that Research Associate William E. Bemis brought to the Museum in 1988. The prepared skeleton reveals many unique features of *Latimeria*, including a movable joint in the middle of the skull.

**Curator Retires** In March, Richard G. Zweifel retired after serving the Museum since his appointment as Assistant Curator in 1954. He was Chairman of the Department of Herpetology

from 1968-1980 and directed the department through the production of the Hall of Reptiles and Amphibians.

Dr. Zweifel studied the critical thermal maxima of salamanders, the influence of temperature on frog calls, anuran life histories, the genetics of color pattern polymorphism in California kingsnakes, temperature adaptation of anuran embryos and long-term studies on the population dynamics of toads and painted turtles.

As a systematist, Dr. Zweifel continued and strengthened the Museum's tradition of getting to know the animals in the field. Curatorial work on the Archbold New Guinea collections led to successive fieldwork on that island and to a long series of papers on the microhylid frogs of New Guinea. Work on New Guinea microhylids led to a natural interest in the occurrence of microhylids in Australia, and a review of the Australian Microhylidae, based on available museum material. Dr. Zweifel was a Visiting Fellow at the Australian Museum and collected, tape-recorded and photographed the Microhylidae of Australia, and produced a 1985 monograph that will long be a model of systematic research in Herpetology.

Dr. Zweifel participated in the Neblina Expedition of 1984 and charted relationships among all New World genera of Microhylidae—the first cladistic analysis of this fauna.

He was one of the founders of the *Catalogue of American Amphibians and Reptiles*, for which he served as Salientia Editor from 1966-1987 and concurrently as General Editor from 1974-1979.

Dr. Zweifel and his wife Fran moved near the Museum's Southwestern Research Station in Portal, Arizona.

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*Assistant Curator in the Department of Herpetology and Ichthyology. It is the first comprehensive ecological survey of freshwater habitats on Hispaniola with the aim of developing a program to conserve the island's biodiversity.*

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## Department of Invertebrates

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*Invertebrates seeks, as its central goal, to enhance understanding of the evolutionary history of a vast panoply of animal life: from microscopic, single-celled organisms through complex groups such as annelid worms, arthropods, mollusks and bryozoans. The department conducted research in the field and laboratory on a variety of different organisms, resulting in the augmentation of its collection of fossil and Recent invertebrates.*

**New Direction** To further its goals in elucidating invertebrate evolutionary history, the department allocated two curatorial positions to a program in molecular systematics. Ward Wheeler will arrive in late 1989 following a postdoctoral program at the University of California, Los Angeles. Dr. Wheeler will lead the search for a second curatorial staff member.

Molecular systematics addresses the same questions of evolutionary relationships posed in traditional systematics investigations. Molecular data—information pertaining to the sequence structure of the macromolecules of heredity (DNA, RNA)—augment the anatomical information from specimens in the Museum's collections.

There has been little progress in understanding the evolutionary relationships among major groups of invertebrates since the turn of the century. Recently, there has been evidence that molecular data will prove useful in deciphering fundamental and long-standing questions.

Maintenance of a laboratory where the data are directly gathered, rather than supplied by researchers elsewhere, will allow the department to pose specific questions. The laboratory will put data-gathering in the hands of scientists already skilled in general techniques of phylogenetic analysis.

The department has undertaken an extensive reorganization of its physical space. The molecular systematics complex will be on the sixth floor (site of the former Frick vertebrate paleontology facility). In addition to the curatorial laboratories, space will be provided for pre- and postdoctoral students, and for interdepartmental use. Research equipment, such as freezers and ultracentrifuges, will be shared by the laboratories.

**Evolution** The department's emphasis on molecular systematics will complement its existing program in causal evolutionary theory.

When rates of molecular evolutionary change in closely related living species are compared with rates of anatomical change documented in their fossil relatives, congruence between molecular and anatomical evolutionary rates can be determined. Such issues are of particular interest to Niles Eldredge, Chairman and Curator.

Dr. Eldredge has published a book, "Macroevo-lutionary Dynamics: Species, Niches and Adaptive Peaks." Aimed at both colleagues and graduate students, the book extends the theory of the origin of large-scale adaptations that define major taxonomic groups. Dr. Eldredge, working with graduate student Gregory Edgecombe of Columbia University and entering Columbia University graduate student Bruce Lieberman, analyzed the evolutionary history of the Calmoniidae, an important group of Silurian and Devonian trilobites from the Southern Hemisphere.

**Molluscan Systematics** Curator William K. Emerson studied species of the gastropod genus *Morum*. Especially interested in biogeographic patterns of the Indo-Pacific region, Dr. Emerson evaluated the distributions of living and fossil species with respect to their occurrence on different lithospheric plates of the region. Integrating paleontological with neontological studies is a specialty of Dr. Emerson.

Associate Curator Neil H. Landman is also interested in integrating fossil data with the study of close living relatives. He researched the systematics and evolution of scaphitid ammonites of the Cretaceous Pierre Shale in South Dakota. Working with Research Associate J. Kirk Cochran, Dr. Landman used the presence of radiocarbon in shells of living chambered *Nautilus* (closest living relative to ammonites) to deduce the previously unknown longevity of the animal. The radiocarbon was produced in atomic testing in the Pacific and was incorporated into the shells of marine mollusks.

**Bryozoans and Annelid Worms** Associate Curator Judith E. Winston investigated the systematics and functional anatomy of bryozoans—tiny, colonial organisms that feed with a specialized system of tentacles known as a "lophophore." At the Smithsonian Institution's Marine Station in Fort Pierce, Florida, Dr. Winston worked with a photographer to improve methods of lighting and photographing bryozoans. She also began writing a book explaining the fundamentals of systematics for biologists unfamiliar with the field.

The department is fortunate in having an active postdoctoral Research Fellow, Kirk Fitzhugh, a specialist in polychaete worm systematics. Dr. Fitzhugh's work centers on a revision of fan worm polychaetes of the family Sabellidae.

**Paleozoic Clams** Curator Emeritus Norman D. Newell studied Paleozoic clam evolution. With Research Associate Donald Boyd, Dr. Newell has been investigating patterns of evolution and extinction in Paleozoic scallops.

Research Associate John J. Lee, using the Museum's scanning electron microscope to conduct his research, studied endosymbiotic algae in larger foraminifera. The patterns of symbiosis that Dr. Lee and his associates have documented reveal intricate evolutionary interactions between two major groups of unicellular organisms.

Research Associate Linda H. Mantel investigated the hormonal controls in various species of crab and how they affect salt balance, molting and limb regeneration. Her work carries on the tradition of marine invertebrate physiology research led by the late Dorothy Bliss, first Chairman of the Department of Invertebrates.

## Scientific Publications:

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*Basing his research on fossils and living animals, Dr. Emerson is studying the occurrence of these gastropods on different lithospheric plates in the Pacific Ocean basin. The department studies a diverse range of animals, from minute bryozoans to mollusks.*

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# Department of Mammalogy

*Questions of mammalian species diversity, phylogenetic relationships, patterns of geographic distributions and evolutionary histories of the faunas reflected by these patterns are being addressed through the research efforts of the scientific staff in the Department of Mammalogy. Care and curation of the 260,000 specimens in the research collection is also a significant responsibility of the department.*

**Recent Extinctions** More than 60 genera of mammals became extinct during the Quaternary, the most recent period of earth history. It was during this time that *Homo sapiens* evolved. Were humans directly or indirectly responsible for some of these extinctions? The cause of the Quaternary extinctions has been debated for many years, but the actual mechanism of extinction has been difficult to identify. It remains unclear whether humans or natural factors were responsible.

With financial support from the National Science Foundation, Curator Ross D. MacPhee and his colleagues have been trying to determine the mechanism of extinction by investigating very recent extinctions that occurred on major islands—particularly Madagascar and the West Indies. These islands were occupied very late in human history (4000 to 5000 years ago in the case of the West Indies, and only 1500 to 2000 years in Madagascar), long after the effects of Ice Age glaciation and related climatic changes ran their course. Dr. MacPhee's interdisciplinary team includes anthropologist Robert Dewar, University of Connecticut, geologist Neil Wells, Kent State University and paleoecologist David Burney, Fordham University.

**Accepted Theory Is Questioned** Research in Madagascar over the last several years reveals that faunal losses were not primarily due to the clearing of vast areas of forest by burning, as was once thought. The paleoenvironmental record indicates that central Madagascar was never densely forested during the last 10,000 years. This does not mean that human causation can be excluded, but it does mean that the accepted theory is incorrect.

It must be established whether there was an extinction event 12,000 years ago in the Caribbean, the same time that a major event occurred in North and South America. Although often cited as a good example of a human-

mediated mass extinction, many scientists believe that a natural factor—possibly environmental changes related to the retreat of continental icecaps at the end of the last Ice Age—may have been equally or more important. To test this, Dr. MacPhee and Donald McFarlane, Los Angeles County Museum, are concentrating on finding and dating fossil remains from various islands in the Greater and Lesser Antilles. With the help of Derek Ford, McMaster University, an expert in the dating technique known as uranium-series disequilibrium, they have shown that giant heptaxodontid rodents from Jamaica probably disappeared well before people colonized the Caribbean. A related and truly gargantuan rodent, bear-sized *Amblyrhiza*, from the small island of Anguilla, may also have disappeared very early.

**Vertebrates from Puerto Rico** Dr. MacPhee's research in the West Indies also concerns the historical biogeography of the islands. Over 90 percent of the land mammals that lived in the West Indies during the Quaternary are now extinct. It is known from fossils that many of the islands supported a diverse mammalian fauna which included insectivores, sloths, several groups of rodents and even a few primates. No pre-Quaternary land mammals have been found, and therefore it is not known when the ancestors of the Quaternary taxa penetrated the Caribbean. Dr. MacPhee and Andre R. Wyss, Columbia University Graduate Fellow in the Department of Vertebrate Paleontology, conducted an exploratory survey and discovered snake and lizard remains in sands of the Early Miocene age. These are some of the oldest known land vertebrate fossils from the West Indies, and establish that reptiles, at least, occupied Puerto Rico as early as 17 million years ago. Were mammals also present at this time? The high endemicity of the recently extinct land mammal fauna of the West Indies implies that their ancestors must have arrived comparatively early. Dr. MacPhee and Mr. Wyss plan additional excavations.

**Bats** Systematics and distribution of vampire bats, the distributional patterns of Indo-Malayan species and studies on the systematics of species from New Guinea and Liberia were the subjects of several publications by Curator Emeritus Karl F. Koopman. The breadth of geographic coverage and depth of taxonomic diversity reflected by the reports attest to the expertise and diligence of Dr. Koopman, who continues to enlighten the scientific community about the distribution and evolution of the world's bat fauna.

**Muroid Rodents** In collaboration with Michael D. Carleton of the National Museum of Natural History, Smithsonian Institution, Chairman and Curator Guy G. Musser submitted a manuscript to be published as a Bulletin in the Museum publication on systematics of *Microryzomys*. The report is part of an endeavor to understand the diversity of Neotropical oryzomyine rodents and their evolutionary history. The genus contains two species of small-bodied and long-tailed mice that are endemic to the northern and central Andes, their distribution ranges from northern Venezuela, through Colombia, Ecuador and Peru, to central Bolivia. *Microryzomys minutus* dwells in a variety of wet, cool Andean forests, ranging from lower and upper montane rain forest, to subalpine rain forest. *M. altissimus* is regularly associated with paramo environments and the forest-paramo ecozone. Defining the species and documenting their geographic and altitudinal distributions formed one aspect of the study. Results were based on examination of over 900 Museum specimens representing 105 principal collecting localities.

Examination of morphological traits provided information about the possible phylogenetic relationship of the two species, *Microryzomys* and *Oligoryzomys*. Although clusters now assigned to *Microryzomys* and *Oligoryzomys* have traditionally been considered as part of *Oryzomys*, Drs. Carleton and Musser show that one particular species, *Oryzomys palustris*, is highly differentiated from both *Microryzomys* and *Oligoryzomys*, which share many primitive traits but which do not appear to be closely related to true *Oryzomys*.

**Social/Emotional Behavior** The behavior of an individual organism or a group of organisms of the same species may be viewed as an integration of many levels of structure and function. Curator Ethel Tobach studied these relationships in three stocks of laboratory rats *Rattus norvegicus*, and two species of primates *Macaca mulatta* and *Pongo pygmaeus abelei* with Marjorie Goldman, Bernadette Marriott, Gary Greenberg, and City University graduate students Teresa Pacheco Hernandez and Alexander Skolnick, and Tim McCarthy, a graduate student at the Wichita State University.

**South American Rodents** Assistant Curator Robert S. Voss's monograph on the systematics and ecology of ichthyomyine rodents was published. Ichthyomyines are semiaquatic, carnivorous rats and mice living along tropical rain forest streams in Central America and

northern South America. Dr. Voss's research on these animals encompasses their evolutionary relationships and functional morphology in relation to habitat and diet. Ichthyomyines are of particular interest to students of mammalian evolution as examples of adaptive divergence from other Neotropical muroid rodents and of adaptive convergence with unrelated small mammals on other continents.

Dr. Voss's laboratory research on the systematics of South American savanna mice in the genus *Zygodontomys* was marked by successful breeding experiments with captive animals from Venezuela. He is interested in the genetic and environmental determinants of phenotypic variation in the skull and dentition of these animals. The experiments resulted in quantitative estimates of the variation in cranial and dental measurements that are attributable to growth and sexual dimorphism with populations of randomly mating individuals. The manuscript reporting these results, coauthored by Invertebrates Research Associate Leslie F. Marcus and Patricia Escalante, a graduate student in Ornithology, was submitted to the journal *Evolution*.

Dr. Voss and Mary E. Holden, Exxon Research Assistant, collected small mammals on the Caribbean island of Tobago, including a breeding stock of *Zygodontomys* for genetic analyses. A stock of 12 breeding pairs is now housed in the department's facilities. Analyses of variation in the captive-bred hybrid offspring of crosses between the Tobago and the Venezuelan populations will provide information about the Mendelian basis of morphological differences, commonly used in mammalian systematics.

Dr. Voss studied collections of South American muroid rodents in London, Paris, Copenhagen, and Leiden, Netherlands. Examination of type specimens in these European collections is an important step toward the taxonomic revision of several Neotropical genera.

**Manuscript in Preparation** Curator Sydney Anderson's studies on Bolivian mammals resulted in the preparation of several manuscripts and publications on systematics of native rodents.

Work proceeded on a collaborative three-volume treatise of South American mammals to be published by the University of Chicago Press. Alfred Gardner, U.S. Fish and Wildlife Service, and James L. Patton, Museum of Vertebrate Zoology, University of California at Berkeley, are coauthors with Dr. Anderson.

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*Ross D. MacPhee, Curator in the Department of Mammalogy, measures the teeth from the well preserved skull of a dwarf hippopotamus, Hippopotamus lemerlei, from Madagascar. The Malagasy species*



*of hippo disappeared approximately 1000 years ago during the most recent period of earth history, the Quaternary. Dr. MacPhee's research centers on the causes of recent extinctions and determining what role, if any, humans played in them.*

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## Department of Mineral Sciences

*The Department of Mineral Sciences covers the fields of mineralogy, petrology, meteoritics, mineral deposits and gemology and is active in research, collections management, education and exhibition. The department's specimen-oriented research focuses on the geochemical processes operating within the Earth and throughout planetary systems. Research ranges from investigating the formation of chondritic meteorites and examining the role of fluids in producing platinum deposits, to studying minerals from high pressure environments.*

**The Collections** The mineral and gem collections grew by 320 specimens; 188 by donation, five by exchange and 127 by purchase. Some significant gifts included a rare black diamond, faceted in a pear shape and weighing 9.50 carats from Robert Schwager; a 22.56 carat emerald-crystal recovered from the wreck of the Nuestra Señora de Atocha from James B. Murphy II and Alden R. Murphy, and a 55.57 carat golden brown zircon from Sri Lanka from Arthur A. Rasch. Significant purchases included an etched beryl (var. heliodor) crystal from Wolodarsk-Wolynsky, Wolyn, Ukraine; a superb cubanite (a rare copper iron sulfide) crystal on matrix from Chibougamau, Quebec; a 169.88 carat emerald cut scapolite from the Malagasy Republic and a 90.29 carat amber-colored calcite from Chihuahua, Mexico.

The department loaned specimens to 13 institutions, primarily for research, but including the unprecedented loan of the 563-carat "Star of India" sapphire to the Academy of Natural Sciences of Philadelphia for a gala event.

Major relocation of the collections is underway to integrate the Columbia University Systematic Mineral Collection, purchased in 1980, with the rest of the mineral collection. Fifty new cabinets will house the majority of the Columbia Collection's 40,000 specimens as well as much of the rock and mineral deposits collections.

The meteorite collection grew significantly, with 18 new meteorites represented by 64 specimens. Twenty-two specimens (mostly thin sections) were loaned for research, and 67 meteoritic samples were given to researchers for analysis. Some newly acquired meteorites are Zagami (Nigeria), considered to be a sample from the planet Mars; Qingzhen (China), Weatherford

(Oklahoma), Villa Matamoros (Mexico), Nantan (China), Millbillillie (Australia), and 44 eucritic clasts from the Vaca Muerta (Chile) mesosiderite.

In the rock and mineral deposits collections, Assistant Curator Edmond A. Mathez established a suite of rocks from the classic Stillwater layered intrusion in Montana, started a worldwide sampling of mantle xenoliths (fragments of the mantle brought to the surface in lava) and began to inventory the Museum's unclassified rock collections. A major suite of drill cores was recovered from the classic, but now abandoned, Sterling Hill zinc-manganese ore body in Ogdensburg, New Jersey.

### Potassium-Rich Pyroxenes from Diamonds

In collaboration with John Gurney, University of Cape Town, Chairman and Curator George E. Harlow studied omphacite and diopside inclusions from diamonds. These pyroxenes are unusual in that they contain up to 1.7 percent weight potash, a component considered incompatible in pyroxene. Lattice parameters have been determined for several pyroxenes using X-ray diffractometer data. Linear regressions of cell volume against composition showed a large positive coefficient for potassium, supporting its presence in the pyroxene structure. Thus, potassium may be a useful geobarometer in mantle pyroxene.

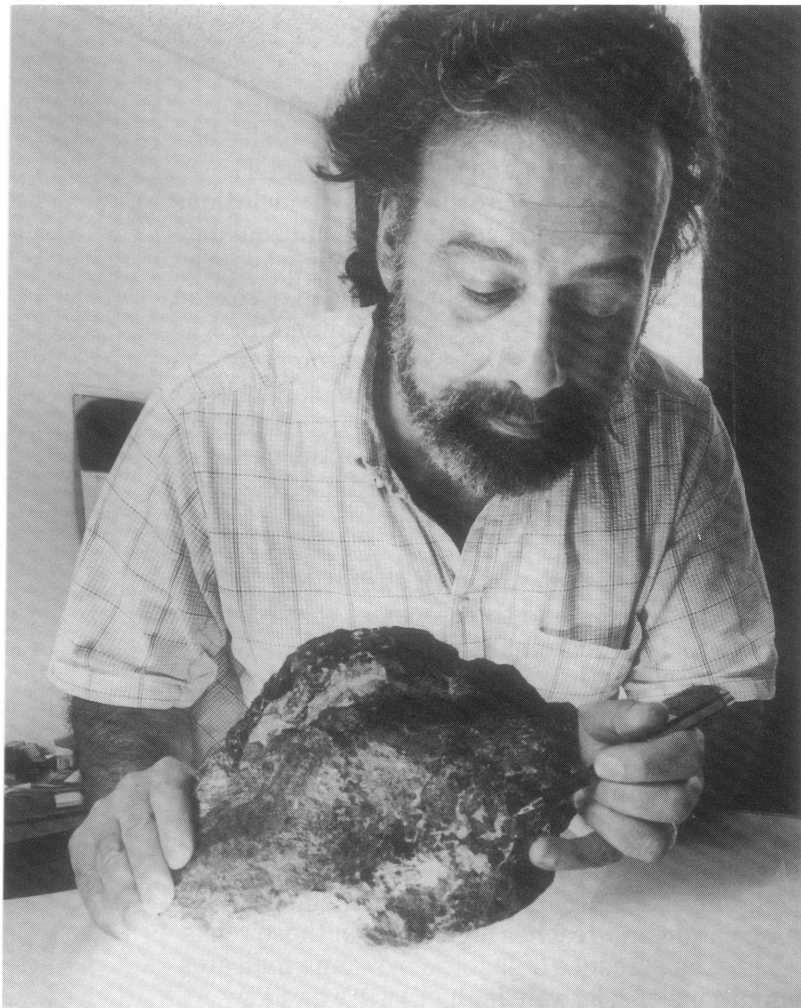
### Metabasites Associated with Jadeitite

To further understand the processes that form jadeite rock in Guatemala, Dr. Harlow, collaborating with T. W. Donnelley, State University of New York at Binghamton, is studying a coexisting cryptic rock that resembles basalt. Bulk compositions are variable but similar to altered basalts from the region, all sharing a soda enrichment over postulated original tholeiitic basalts. This soda enrichment appears to be characteristic of their serpentinite melange association and reaches high levels in those rocks where the presence of jadeitic pyroxene indicates conditions of relatively high pressure and low temperature. These metabasites are unlike other known examples from high-pressure terrain.

**New Primitive Meteorites** Curator Martin Prinz researched meteorites in collaboration with Craig Johnson, Research Fellow; Michael K. Weisberg, Scientific Assistant, and C. E. Nehru, Research Associate. The research was supported by NASA.

In recent years many meteorites have been discovered in Antarctica. A notable example is the ALH85151 chondrite, a new kind of primitive meteorite. Chondrites are the only rocks that

*Edmond A. Mathez, Assistant Curator in the Department of Mineral Sciences, studies a 2.7 billion-year-old chromitite rock from the Stillwater complex in Montana. The Stillwater complex, a layered mafic intrusion, is of particular*



*interest to scientists because it is a major domestic source of platinum and related elements. A mafic intrusion occurs when a magma body crystallizes in the earth's shallow crust and becomes exposed by erosion and the uplift of overlying rocks.*

recorded the earliest events that took place in the formation of the solar system 4.5 billion years ago. Until recently, there were nine chondritic types, but museum researchers have found examples of two new types. One type includes ALH85151 and Carlisle Lakes, Australia; the Kakangari meteorite (India) is the other.

**Dark Inclusions** The Allende meteorite fell in Mexico in 1969, and has been an excellent source of information about the solar nebula. Museum researchers are studying the poorly understood "dark inclusions" in Allende. These are embedded as black, featureless and relatively large (up to one centimeter) chunks. Study has revealed that they are samples of early-formed chondritic material which exchanged oxygen to varying degrees with the evolving solar nebula.

**Platinum Group Elements** An active topic of research concerns the platinum group elements (PGEs, which include the elements iridium, osmium, ruthenium, rhodium, platinum and palladium) and how they become concentrated in certain horizons in layered mafic igneous complexes. Museum research has focused on the relative roles of original sulfide liquids that accumulated on the floors of magma chambers, compared to fluids traveling through sulfide-rich horizons in concentrating PGEs.

Dr. Mathez and his colleagues and students were able to show through calculations and rock observations that the expected fluids were composed mainly of carbon dioxide, carbon monoxide and hydrochloric acid. Cheryl Peach, a Ph.D student in the American Museum of Natural History-Columbia graduate program, studied sulfide-bearing basalt glasses, which represent quenched magma. Separated glass and sulfide were analyzed to provide the first PGE "distribution coefficients." These data are being used to evaluate models of ore genesis.

**Diamonds** Dr. Mathez is studying carbon geochemistry in the mantle environment. In a project funded by the National Science Foundation, he will study the conditions under which diamonds have formed.

**Exhibition and Education** Dr. Prinz presented a small exhibit, "The Barwell Meteorite: A British Christmas Gift." The Barwell meteorite, on loan from the British Museum (Natural History), fell on Dec. 24, 1965, and caused much excitement in England. Dr. Harlow worked on an exhibit illustrating microscopic mineral samples on a video monitor via an automated microscope. The

exhibit is scheduled for installation in the Guggenheim Hall of Minerals in 1989. It has been supported by the Belsky Fund.

Dr. Mathez taught part of a three-day course on "Ore Deposition Associated with Magmas," sponsored by the Society of Economic Geologists and the Geological Society of America. He also organized a seminar, "The Nature of the Lower Crust," with Alan Zindler, Columbia University, for the American Museum of Natural History-Columbia graduate program.

**Departmental Changes** After 13 years with Dr. Prinz as Chairman, the responsibilities passed to Dr. Harlow. Through Dr. Prinz's leadership and diligence, the department was transformed from a single curatorship to a thriving scientific environment with four curators, several research and curatorial fellows and three scientific assistants.

Demetrius Pohl, Assistant Curator of Mineral Deposits, returned to industry after four years. A curatorial fellowship was established for a manager of the department's electron microprobe and was filled by Eugene S. Ilton from Johns Hopkins University. Dr. Johnson joined the staff as a Research Fellow working with Dr. Prinz on the NASA-funded meteorite research program.

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1989. (Abstract) Carbon isotopic compositions of xenoliths from Hualalai Volcano, Hawaii. *Eos* 70: 510.
- Nehru, C. E., M. Prinz, and M. K. Weisberg*  
1988. (Abstract) Glassy, cryptocrystalline and radial pyroxene chondrules in type 3 ordinary chondrites. *Meteoritics* 23: 293.
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1989. (Abstract) The association of anorthosite, chromitite and pegmatoid in the Merensky Reef, Bushveld Complex. *Eos* 70: 490-491.
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1988. (Abstract) Macrochondrules in ordinary chondrites: constraints on the chondrule-forming process. *Meteoritics* 23: 309-310.

## Department of Ornithology

*Staff members took part in expeditions to areas as diverse as Papua New Guinea, Chile, Liberia, Venezuela, Canada, Ecuador, Kenya, Mexico, China and the Seychelles. The ultimate goal of fieldwork, combined with Museum and laboratory research, is to understand avian biodiversity. This is accomplished through the study of geographical variation, hybridization and range overlap, phylogeny, behavior and morphology.*

**Tapirapecó Expedition** The spectacular, isolated tabletop mountains (*tepui*s) of southern Venezuela have a unique avifauna. Associate Curator George F. Barrowclough led the ornithological part of an expedition to southern Amazonas, Venezuela, visiting three remote localities that had not been sampled previously. The expedition was partially funded by the Phipps Foundation.

**Geographical Variation** Clarifying the nature of geographical variation and its underlying genetic differentiation is an important part of the department's research program because such variation may be a crucial first step in species formation. Dr. Barrowclough's study of genetic differentiation in *Strix occidentalis* (Spotted Owl) populations from Oregon, California and New Mexico revealed low heterozygosity (little genetic variability) within populations, but substantial differentiation between Pacific Coast and interior Great Basin populations. The result is of particular interest because the bird has recently been declared a threatened species.

Dr. Barrowclough also studied geographic variation in the tropical American woodcreeper *Glyphorhynchus spirurus* with Chapman Fellow Angelo P. Capparella, and in finches of the genus *Junco* from Arizona and the Appalachians. With

Research Associate Robert F. Rockwell, Dr. Barrowclough developed a theoretical model to increase understanding of the nature of genetic differentiation.

To reconstruct speciation, graduate students Patricia Escalante, Mary Katz and F. Jay Pitocchelli traced patterns of geographic variation in birds from Mexico, Australia and North America respectively.

**Hybridization and Range Overlap** Chairman and Curator François Vuilleumier, with Dr. Capparella and Graduate Student Ivan Lazo of the Catholic University in Santiago, Chile, led an expedition to Chile. They collected two species of sierra finches, genus *Phrygilus* across their zone of hybridization, and two species of miners, genus *Geositta* in their area of geographical overlap in Patagonia and Tierra del Fuego. Tissue samples obtained in these transects are being analyzed for biochemical variation that might provide clues to the evolutionary history of the species, in addition to those offered by morphological criteria. The work is supported, in part, by the Leonard C. Sanford Fund.

**Phylogeny** Tracing evolutionary lineages (phylogeny reconstruction) is one of the department's primary research objectives. As part of his research on the phylogeny of the New World flycatchers and relatives, Lamont Curator Emeritus Wesley E. Lanyon investigated the relationships of two poorly known taxa: the plantcutters, *Phytotoma*, with Scott M. Lanyon of the Field Museum of Natural History in Chicago, and the *Schiffornis* group of tyrannoids with Richard O. Prum, a Graduate Student from the University of Michigan.

Three other studies of avian phylogeny were pursued. Graduate Student Sylvia J. Hope completed her Ph.D. thesis on the phylogeny of the Corvidae, suggesting a new interpretation of the evolution of crows, jays and their relatives. During an expedition to Ecuador, Research Associate Robert Bleiweiss obtained tissue samples from some 40 species of hummingbirds in order to carry out DNA-DNA hybridization studies of hummingbird phylogeny. The work is funded by the National Science Foundation. To better understand the phylogeny of tropical American woodcreepers (Dendrocolaptidae), Dr. Capparella collected syrinxes (vocal organs) from presumed relatives (outgroups) in temperate Chile for comparison in the laboratory.

**Behavior and Systematics** Behavioral patterns are often significant indicators of taxonomic or



systematic relationships. Lamont Curator Lester L. Short, with Jennifer F. M. Horne of the National Museums of Kenya, attempted to unravel the systematic relationships of the enigmatic honeyguides (Indicatoridae) by observing their behavior in central Kenya. During the past field season, they studied the breeding behavior of four little-known species by color-banding and following 107 individuals. Funding came from the Leonard C. Sanford Fund and Marianna Collins.

Senior Scientific Assistant Mary LeCroy spent 10 days in a rain forest camp on Goodenough Island in the D'Entrecasteaux Islands (Papua New Guinea) investigating group behavior of the Curl-crested Manucode (*Manucodia comrii*). Unlike most other birds of paradise, the species has a pair bond.

Research Associate Cheryl F. Harding found that hormonal control of male finch singing behavior depends on whether a song is directed at a male, a female, or not directed toward another bird. Her research was supported by the National Institutes of Health and the National Institute of Mental Health.

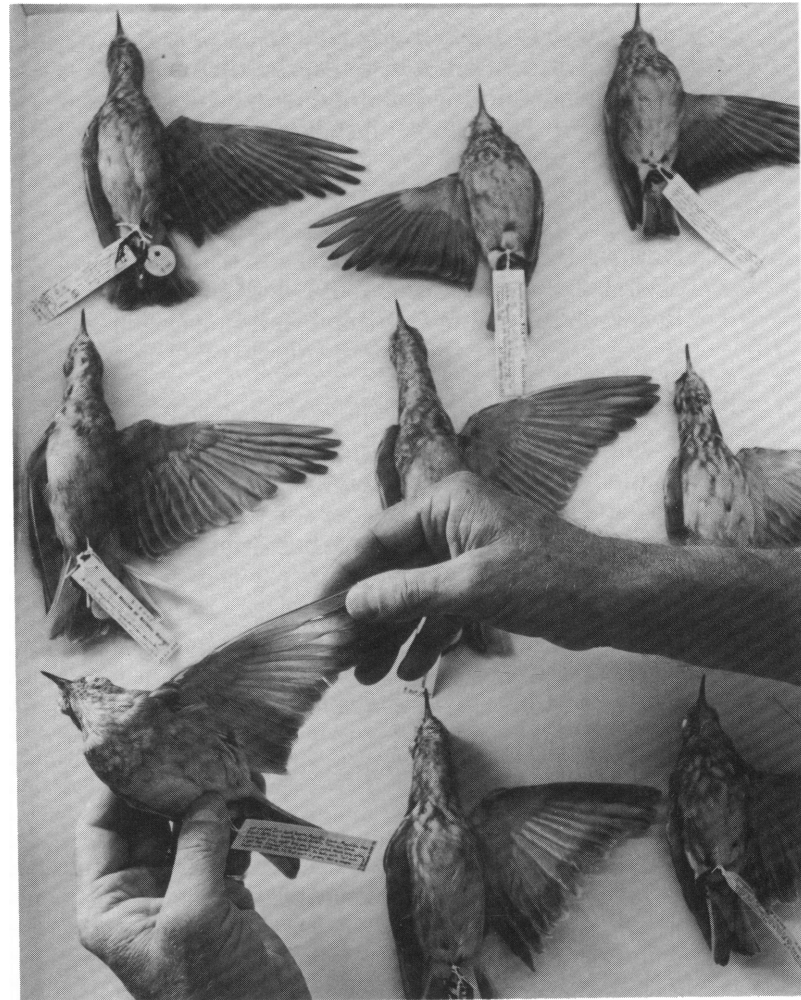
Graduate Student Rosemarie Gnam researched the breeding behavior of the Bahama Parrot (*Amazona leucocephala bahamensis*), which is unusual among parrots in that it nests underground. The results of her work will serve as the basis for recommendations to the Bahamian government on how best to preserve the endangered bird.

**Morphology and Classification** Morphological characters are the fundamental basis for classifying birds and proved to be useful in several projects. Research Associate Walter J. Bock, working with Paul Bühler of Hohenheim, West Germany, and Patricia V. Rich of Monash University in Melbourne, Australia, analyzed the cranial morphology of palaeognathous birds (tinamous, ostriches and relatives), which have long been grouped together because of their similar palate. Contrary to conventional classifications, the research suggests that flightless ratites (ostriches, rheas, emus and cassowaries) are not a single group.

Scientific Assistant Allison V. Andors researched the skeletal morphology of *Diatryma*, a giant groundbird that lived in Europe and North America 50 million years ago. His work indicates that *Diatryma* was not a fleet-footed predator allied to cranelike Gruiformes, as was previously believed, but was a pedestrian herbivore related to waterfowl (Anseriformes) and, more distantly, to gallinaceous birds (Galliformes) such as pheasants and turkeys.

Associate W. Parker Cane examined the

The primary and secondary feathers of *Geositta antarctica*, commonly known as the Short-Billed Miner, are examined. Also on the tray are specimens of *Geositta cunicularia*, the Common Miner. François Vuilleumier, Chairman of the Ornithology Department, is studying the effects of glaciation and climatic changes on the evolutionary histories of such birds in



Tierra del Fuego and Patagonia. The specimens are prepared in an unusual way: one wing spread to show differences in color between species. *Geositta cunicularia*'s flight feathers are a bright cinnamon color with a dark border, while those of *Geositta antarctica* are a more uniform brown. Even though the morphological differences are slight, the birds represent two distinct species.

ecomorphological relationships between poorly known babblers of the genus *Trichastoma*, and between thrushes of the genus *Alethe*, collected with Research Associate Robert W. Dickerman during an expedition to Liberia.

**Other Research** Chapman Fellow Jonathan J. Becker researched the origins and extinctions of island birds on Aldabra Atoll (Republic of Seychelles). Research Associate Jared Diamond and Ms. LeCroy evaluated convergent evolution of similar forms of rails related to *Gallirallus philippensis* on different islands. Dr. Diamond also worked with Curator Emeritus Ernst Mayr on the distribution of birds on the Bismarck archipelago and the Solomon Islands of northern Melanesia. Their book on the subject is nearing completion.

Dr. Dickerman, Dr. Barrowclough and David Lee of the North Carolina State Museum of Natural History researched the distribution of oceanic birds off the coast of North Carolina. Research Associate G. Stuart Keith investigated African birds for the fourth volume of "The Birds of Africa."

Research Associate Robert F. Rockwell and Fred Cooke of Queen's University in Canada studied the population biology of the Lesser Snow Goose. They analyzed tissues for the presence of toxic compounds and levels of bacterial and parasitic infestation in order to evaluate the recent decline in reproductive fitness. Field Associate Ben King found the endangered Hainan Partridge, *Arborophila ardens*, in two patches of montane forest on Hainan Island, off southeast China. Lamont Curator Emeritus Dean Amadon worked with Dr. Short on taxonomic theory below the level of genus.

**Honors and Awards** The department was proud to learn that Curator Emeritus Ernst Mayr was elected a Foreign Member of the Royal Society in London and an Honorary Member of the Académie des Sciences in Paris. The Frank M. Chapman Fund Committee awarded 67 grants totaling \$40,066 to researchers. The Chapman Fund, administered by the Ornithology Department, is the most important agency funding ornithological research worldwide.

**Collection Management** Associate Richard Sloss inventoried and reorganized the department's more than 750 mounted birds, covering some 500 species.

Field Associate John Bull extracted specimens of birds from around the world from the main collections for installation in the world reference

series. These representative specimens facilitate quick identification of species.

**Losses** The department was greatly saddened by the deaths of Research Associates William H. Phelps, Jr., and James C. Greenway, Jr., and Volunteer Laura Goldman. Beginning in 1938, Mr. Phelps and his father, the late William Henry Phelps, amassed the Colección Ornitológica Phelps, a Neotropical collection housed in Caracas and now numbering 76,300 skins. Since 1952, Mr. Phelps was a Research Associate in the department, and from 1956 until 1959 he was a Member of the Board of Trustees of the Museum.

Mr. Greenway was a Trustee of the Museum in the early 1960s and a Research Associate since 1962. A noted authority on extinct and endangered birds, Mr. Greenway wrote the classic book, "Extinct and Vanishing Birds of the World," originally published in 1958.

Since 1981, Mrs. Goldman cataloged specimens and organized reprints and archives.

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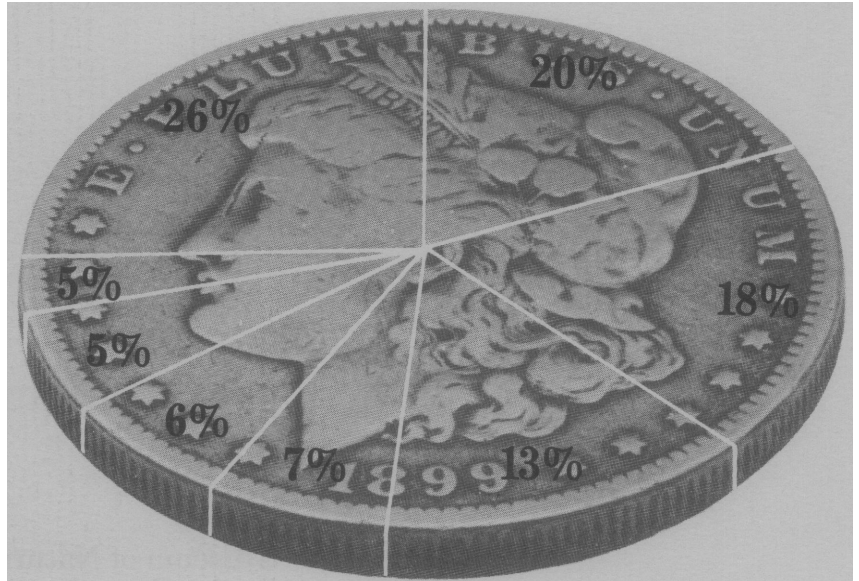
## **Financial Statements**

**American Museum of Natural History**

## Revenue 1988-89

### \$46,122,010

26%	Natural History Magazine & Membership
20%	Endowment & Related Funds
18%	City of New York (Appropriated Funds 14%) (Value of Energy Services & Contributions to Pension Costs 4%)
13%	Auxiliary Activities
7%	Visitor Contributions
6%	Grants & Other Restricted Funds
5%	Corporate & Individual Contributions
5%	Other Revenue



## Expenses 1988-89

### \$44,838,748

33%	Scientific Research, Education & Exhibition
24%	Natural History Magazine & Membership
20%	Plant Operation & Maintenance
14%	Administrative & General
9%	Auxiliary Activities



# Treasurer's Report

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The Financial Statements of the American Museum of Natural History appear on the following pages. These statements which consist of Balance Sheets, Statements of Revenue and Expenses of Current Funds, and Statements of Changes in Fund Balances have been audited by Coopers & Lybrand. The related notes appear on Pages A-8, A-9 and A-10. In reviewing the Balance Sheets it should be noted that the costs of the investments in marketable securities amount to \$175,424,787 (market value \$194,361,499). The investments are accounted for on a trade-date basis and include the General Fund of \$10,674,607, Special Funds of \$20,652,553 and Endowment Funds of \$144,097,627. General Fund investments of \$10,674,607 consist mainly of cash payments from museum members for benefits to be provided in future years and are generally offset by the liability for unearned membership income which amounted to \$8,446,449. Special Funds investments of \$20,652,553 consist mainly of funds received for the completion of special programs and projects from government agencies, private foundations and individuals as well as Museum funds set aside for specific programs to be completed in future years. Endowment Fund investments of \$144,097,627 represent funds allocated for endowment purposes by donors or by the Board of Trustees since the organization of the Museum in 1869.

The revenue and expenses of the General and Special Funds appear on Page A-6 in the Statement of Revenue and Expenses of Current Funds. Total revenue for the funds amounted to \$46,122,010. Total expenses amounted to \$44,838,748. The combined operation of both funds showed an excess of revenue over expenses of \$1,883,262. The General Fund, which provides the ongoing support for scientific and educational programs as well as administrative activities, had an excess of revenue over expenses of \$22,893 after support grants. Special Funds, which are restricted and used for special programs and projects that may continue for several years, had an excess of revenue over expenses of \$1,860,369.

General Fund revenue in fiscal 1988-89 amounted to \$39,684,191, an increase of \$1,435,045 over the prior year. Increases occurred in the following areas: Gifts, Bequests and Grants; Distribution from Endowment Funds, Interest and Dividends, and Natural History Magazine and Membership. There were decreases in the City of New York appropriated funds and Auxilliary Activities.

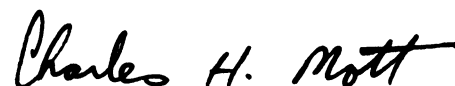
Increased support from the Trustees and other

donors resulted in an increase in Gifts, Grants and Bequests. The increase in distribution from Endowment Funds resulted from the application of the income allocation formula as explained in Note 7. The increase in interest and dividends resulted from a higher rate of return on invested funds and an increase in the principal available for investment. The increase in Natural History Magazine and Membership resulted from the effect of a dues increase which was put into effect on July 1, 1988.

The decrease in the City of New York appropriated funds was due to a reduction in funding. The decrease in revenue from Auxilliary Activities is detailed in Note 10.

General Funds expenses for the year amounted to \$40,261,298, compared to \$38,557,828 in the prior year. The increase of \$1,703,470 consisted of increases for scientific and educational activities, administrative and general expenses, cost of living adjustments to the salaries of employees, increased costs for additional personnel services and supplies purchased from outside vendors, as well as increased expenditures for conservation, research programs and major physical improvements to museum facilities.

The fiscal year 1988-1989 has been a transitional one during which changes in governance introduced by the Trustees on July 1, 1988, took effect. The administration reviewed many phases of Museum operations and introduced changes that will improve programs and management. The effect of these changes will be felt in the Museum in the years to come.



Charles H. Mott  
*Treasurer*

# Report of Independent Certified Public Accountants

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

We have audited the accompanying balance sheets of the AMERICAN MUSEUM of NATURAL HISTORY as of June 30, 1989 and 1988, and the related statements of revenue and expenses of current funds and changes in fund balances for the years then ended. These financial statements are the responsibility of the Museum's management. Our responsibility is to express an opinion on these financial statements based on our audits.

We conducted our audits in accordance with generally accepted auditing standards. Those standards require that we plan and perform the audits to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for our opinion.

In our opinion, the financial statements referred to above present fairly, in all material respects, the financial position of the American Museum of Natural History at June 30, 1989 and 1988, and the results of its operations and changes in its fund balances for the years then ended, in conformity with generally accepted accounting principles.



New York, New York  
September 22, 1989

# American Museum of Natural History Balance Sheets, June 30, 1989 and 1988

## Assets:

Cash  
Receivable for securities sold  
Accrued interest and dividends receivable  
Accounts receivable, less allowance for  
doubtful accounts of \$248,000 in 1989  
and \$462,000 in 1988  
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  
Special Funds (Note 5)  
Endowment Funds (Notes 6 and 7)

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



1989				1988			
Current Funds				Current Funds			
General Fund	Special Funds	Endowment Funds	Total	General Fund	Special Funds	Endowment Funds	Total
\$ 293,084	\$ 77,813	\$ 95,820	\$ 466,717	\$ 1,714,552	\$ 39,146		\$ 1,753,698
		689,272	689,272			\$ 177,043	177,043
48,311	93,469	1,035,935	1,177,715	34,011	67,918	1,115,752	1,217,681
2,534,866	416,582		2,951,448	1,757,580	61,399		1,818,979
10,674,607	20,652,553	144,097,627	175,424,787	9,545,369	19,061,551	138,966,443	167,573,363
	425,000		425,000		425,000		425,000
1,071,305			1,071,305	1,178,370			1,178,370
959,146	141,647		1,100,793	785,541	199,697		985,238
\$15,581,319	\$21,807,064	\$145,918,654	\$183,307,037	\$15,015,423	\$19,854,711	\$140,259,238	\$175,129,372
\$ 3,952,764	\$ 1,387,232	\$ 246,884	\$ 5,586,880	\$ 3,586,580	\$ 698,250	\$ 1,124,442	\$ 5,409,272
2,678,090			2,678,090	2,379,815			2,379,815
		1,920,104	1,920,104			568,545	568,545
8,446,449			8,446,449	8,686,710			8,686,710
504,016			504,016	362,318			362,318
	20,419,832		20,419,832		19,156,461		19,156,461
		143,751,666	143,751,666			138,566,251	138,566,251
\$15,581,319	\$21,807,064	\$145,918,654	\$183,307,037	\$15,015,423	\$19,854,711	\$140,259,238	\$175,129,372

# Statements of Revenue and Expenses of Current Funds for the years ended June 30, 1989 and 1988

	General Fund		Special Funds		Total	
Revenue:	1989	1988	1989	1988	1989	1988
The City of New York:						
Appropriated funds	\$ 6,601,201	\$ 6,747,276			\$ 6,601,201	\$ 6,747,276
Value of energy services and contributions to pension costs (Notes 8 and 9)	1,892,316	1,983,115			1,892,316	1,983,115
Gifts, bequests and grants	2,516,134	1,844,599	\$2,813,662	\$2,643,927	5,329,796	4,488,526
Distribution from Endowment Funds (Note 7)	4,758,000	4,285,000	1,913,283	1,697,641	6,671,283	5,982,641
Interest and dividends	2,340,541	1,804,405	181,455	139,647	2,521,996	1,944,052
Visitors' contributions	3,056,075	3,025,902			3,056,075	3,025,902
Natural History Magazine and membership	11,999,652	11,552,481			11,999,652	11,552,481
Other revenue	641,064	652,584	1,529,419	2,064,434	2,170,483	2,717,018
Auxiliary activities (Note 10)	5,879,208	6,353,784			5,879,208	6,353,784
Total revenue	39,684,191	38,249,146	6,437,819	6,545,649	46,122,010	44,794,795
Expenses:						
Scientific and educational activities	7,711,078	7,184,440			7,711,078	7,184,440
Exhibition halls and exhibits	2,376,265	2,270,409			2,376,265	2,270,409
Other special purpose programs and projects			4,511,945	4,666,767	4,511,945	4,666,767
Administrative and general	6,344,572	5,154,059	65,505	164,447	6,410,077	5,318,506
Plant operation and maintenance (Note 8)	8,826,479	9,255,034			8,826,479	9,255,034
Natural History Magazine and membership	11,173,288	10,857,987			11,173,288	10,857,987
Auxiliary activities (Note 10)	3,829,616	3,835,899			3,829,616	3,835,899
Total expenses	40,261,298	38,557,828	4,577,450	4,831,214	44,838,748	43,389,042
Excess of revenue over expenses (expenses over revenue) before support grants	(577,107)	(308,682)	1,860,369	1,714,435	1,283,262	1,405,753
Support grants (Note 11)	600,000	671,000			600,000	671,000
Excess of revenue over expenses	\$ 22,893	\$ 362,318	\$1,860,369	\$1,714,435	\$ 1,883,262	\$ 2,076,753

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



# Statements of Changes in Fund Balances for the years ended June 30, 1989 and 1988

	Current Funds				Endowment Funds	
	General Fund		Special Funds		1989	1988
	1989	1988	1989	1988		
Balances, beginning of year	\$ 362,318	\$ ( 296,882)	\$19,156,461	\$17,442,026	\$138,566,251	\$131,754,298
<b>Additions:</b>						
Gifts, bequests and grants					691,293	1,886,972
Interest and dividend income (Note 7)					1,046,270	1,280,919
Net gain on sale of investments					3,987,486	5,178,123
Excess of revenue over expenses	22,893	362,318	1,860,369	1,714,435		
Total additions	22,893	362,318	1,860,369	1,714,435	5,725,049	8,346,014
<b>Deductions:</b>						
General and administrative expenses					693,110	647,820
Contributions to pension cost (Notes 7 and 9)					324,717	589,359
Total deductions					1,017,827	1,237,179
<b>Interfund Transfers:</b>						
Net funds returned to Endowment for investment			(700,000)		700,000	
Financing of deficit & special projects	118,805	296,882	103,002		(221,807)	(296,882)
Total transfers	118,805	296,882	(596,998)		478,193	(296,882)
Balances, end of year	\$ 504,016	\$ 362,318	\$20,419,832	\$19,156,461	\$143,751,666	\$138,566,251

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 land and buildings occupied 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.

The accounts of the Museum are maintained in accordance with the principles of fund accounting in order to abide by the limitations and restrictions placed on the use of the resources available to the Museum. Revenue received and expenses incurred for specified purposes are classified for accounting and financial reporting purposes into individual funds for which separate accounts are maintained. However, in the accompanying financial statements, funds that have similar characteristics have been combined into fund groups. The General Fund consists of resources that are available at the discretion of the Board of Trustees ("Trustees") for general Museum operations. Special Funds are restricted by donors or by the Trustees for specified purposes. Endowment Funds include funds subject to restrictions established by the donor that require the original principal be invested in perpetuity, and funds established by donors or Trustees (funds functioning as endowments) where the principal may be expended for the purposes authorized.

Interest and dividend income from Endowment Funds is distributed to current funds based on a formula adopted by the Board of Trustees as described in Note 7.

Investments are stated at cost or, if acquired by gift, at fair value at date of acquisition. Nonmarketable securities are valued by the Investment 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. Net capital gains on current funds are included in other revenue, and amounted to \$20,219 and \$236,203 in fiscal 1989 and 1988, respectively.

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:	1989		1988	
	Cost	Market	Cost	Market
General Fund	\$ 10,674,607	\$ 11,766,356	\$ 9,545,369	\$ 10,269,410
Special Funds	20,652,553	22,759,337	19,061,551	20,504,971
Endowment Funds	144,097,627	159,835,806	138,966,443	146,955,776
	\$175,424,787	\$194,361,499	\$167,573,363	\$177,730,157
The Museum's investments consist of the following:				
Sort-term obligations	\$ 24,772,000	\$ 24,772,000	\$ 29,083,022	\$ 29,083,022
Fixed income securities	62,973,114	66,302,950	54,901,096	56,578,333
Common and preferred stocks	83,531,808	99,397,712	79,383,724	87,939,850
Other investments	4,147,865	3,888,837	4,205,521	4,128,952
	\$175,424,787	\$194,361,499	\$167,573,363	\$177,730,157

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 cash or letters of credit as collateral in an amount which equals or exceeds the value of securities loaned. At June 30, 1989 and 1988, the market value of securities loaned amounted to approximately \$8,597,000 and \$8,929,000, respectively, and the market value of the related collateral amounted to approximately \$8,695,000 and \$9,102,000, 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.



**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 of the Planetarium at a cost of \$425,000 (\$570,000 principal amount), which are past due. For the years ended June 30, 1989 and 1988, interest income on these bonds (at 4 1/2%) of \$25,650 was paid and is included in the General Fund revenue.

<b>4. Inventories</b>	<b>1989</b>	<b>1988</b>
Natural History Magazine paper	\$ 590,565	\$ 594,817
Museum Shops merchandise	480,740	583,553
	<b>\$1,071,305</b>	<b>\$1,178,370</b>

**5. Special Funds:** Special Funds balances include approximately \$7,426,000 and \$7,792,000 at June 30, 1989 and 1988, respectively, restricted by the donor as to use.

**6. Endowment Funds:**

Endowment Funds consist of:	<b>June 30, 1989</b>	<b>June 30, 1988</b>
Endowment Funds, income available for:		
Restricted purposes	\$ 61,707,237	\$ 59,211,726
Unrestricted purposes	19,536,558	18,854,532
Funds functioning as endowment, principal and income available for:		
Restricted purposes	28,988,377	28,108,710
Unrestricted purposes	33,519,494	32,391,283
	<b>\$143,751,666</b>	<b>\$138,566,251</b>

**7. Distribution from Endowment Funds:** Total interest and dividend income for the Endowment Funds for fiscal 1989 and 1988 amounted to \$7,717,553 and \$7,263,560, respectively. The policy adopted by the Board of Trustees provides for distributions to current funds at five percent of the average of the market value of the Endowment Funds for the three preceding years. The distributions are allocated between General and Special Funds on a unit basis which reflects the ratio of the related funds invested in the pooled portfolio to total market value. The distributions were:

	<b>1989</b>	<b>1988</b>
General Fund	\$4,758,000	\$4,285,000
Special Funds	1,913,283	1,697,641
	<b>\$6,671,283</b>	<b>\$5,982,641</b>

The excess income was retained in the Endowment Funds. Of this amount, \$324,717 and \$289,359 in fiscal 1989 and 1988, respectively, was allocated for pension support to the Cultural Institutions Retirement System Plan ("CIRS Plan"), based on the five percent formula. In addition, in fiscal 1988, \$300,000 was withdrawn from the Pension Support Endowment Fund to fund an increase in pensions for those employees who retired before the Museum joined the CIRS Plan in 1971.

**8. Plant Operation and Maintenance Expenses:** Plant operation and maintenance expenses in fiscal 1989 and 1988 include the value of energy services supplied by the City of New York of \$1,609,313 and \$1,622,602, respectively.

**9. Pension Plan:** The Museum participates in the CIRS Plan, which consists of an employer funded defined benefit plan and an employee contributory savings 401K plan. It is a multiemployer plan and the 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.

The Museum accrues and funds annually the normal cost for eligible employees participating in the CIRS 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 \$938,535 and \$1,096,000 in fiscal 1989 and 1988, respectively. Of this amount, \$283,003 and \$360,513 were paid by the City directly to CIRS in fiscal 1989 and 1988, respectively, and \$324,717 and \$289,359, respectively, were funded through the Pension Support Endowment Fund.

The Planetarium reimburses the Museum for actual payroll costs for its staff. It also reimburses the Museum for all employee benefit costs, including pension, which are calculated as a percentage of payroll and amounted to \$161,295 and \$158,193 in fiscal 1989 and 1988, respectively.

**10. Auxiliary Activities:** Revenue and expenses for auxiliary activities in fiscal 1989 and 1988 were:

	1989		1988	
	Revenue	Expenses	Revenue	Expenses
Museum Shops	\$2,955,040	\$2,313,439	\$3,124,898	\$2,349,988
Discovery Tours	719,541	551,368	966,524	642,020
Naturemax	702,025	493,063	959,973	353,311
Other	1,502,602	471,746	1,302,389	490,580
	\$5,879,208	\$3,829,616	\$6,353,784	\$3,835,899

**11. Support Grants:** In fiscal 1989 and 1988 support grants were received from the New York State Council on the Arts in the amounts of \$600,000 and \$596,000, respectively. In fiscal 1988, the Museum also received a support grant from the Institute of Museum Services in the amount of \$75,000.

**12. Postretirement Benefits:** The Museum provides health insurance for all retired employees and life insurance for certain retired employees. These costs are summarized below:

	1989	1988
Health insurance	\$388,173	\$373,210
Life insurance, net of a dividend of \$26,294 in fiscal 1988	82,281	49,944
	\$470,454	\$423,154

**13. 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 \$176,764 and \$174,664 in fiscal 1989 and 1988, respectively. Admission fees paid by visitors to the Planetarium include entry to the Museum. The Museum received approximately \$60,549 and \$61,900 in fiscal 1989 and 1988, respectively, for visitors who entered the Museum from the Planetarium.

**14. Buildings:** The City appropriates funds for the renovation, improvement and alteration of the buildings occupied by the Museum. Funds expended by the City for these capital projects in fiscal 1989 and 1988 amounted to \$2,259,452 and \$1,064,000, respectively.

**15. Reclassifications:** Certain amounts in the 1988 financial statements have been reclassified to conform with the 1989 presentation.

**16. Tax Status:** The Museum is a not-for-profit organization exempt from corporate federal income tax under Section 501(c)(3) of the Internal Revenue Code.

## **Financial Statements**

**American Museum of Natural History  
Planetarium Authority  
(Hayden Planetarium)**

# Report of Independent Certified Public Accountants

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

We have audited the accompanying  
balance sheets of the AMERICAN  
MUSEUM of NATURAL HISTORY  
PLANETARIUM AUTHORITY as of  
June 30, 1989 and 1988, and the  
related statements of revenue and  
expenses of current funds and changes  
in fund balances for the years then  
ended. These financial statements are  
the responsibility of the Planetarium's  
management. Our responsibility is to  
express an opinion on these financial  
statements based on our audits.

We conducted our audits in accor-  
dance with generally accepted audit-  
ing standards. Those standards  
require that we plan and perform the  
audits to obtain reasonable assurance  
about whether the financial state-  
ments are free of material misstate-  
ment. An audit includes examining, on  
a test basis, evidence supporting the  
amounts and disclosures in the finan-  
cial statements. An audit also includes  
assessing the accounting principles  
used and significant estimates made  
by management, as well as evaluating  
the overall financial statement presen-  
tation. We believe that our audits  
provide a reasonable basis for our  
opinion.

In our opinion, the financial state-  
ments referred to above present fairly,  
in all material respects, the financial  
position of the American Museum of  
Natural History Planetarium Author-  
ity at June 30, 1989 and 1988, and the  
results of its operations and changes  
in its fund balances for the years then  
ended, in conformity with generally  
accepted accounting principles.



New York, New York  
September 8, 1989

# American Museum of Natural History Planetarium Authority Balance Sheets, June 30, 1989 and 1988

## Assets:

Cash  
Investments (Note 2)  
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  
4 1/2% Refunding Serial Revenue Bonds, past due (Note 3)  
Accrued interest, past due

### Contributed capital:

Charles Hayden  
Charles Hayden Foundation  
The Perkin Fund

### Funds:

General Fund  
Special Funds (Note 4)

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



	1989			1988		
	General Fund	Special Funds	Total	General Fund	Special Funds	Total
	\$ 215,085		\$ 215,085	\$ 116,298		\$ 116,298
	356,822	\$1,293,639	1,650,461	422,767	\$1,177,233	1,600,000
	5,092	23,011	28,103	10,036	12,458	22,494
	55,747		55,747	48,335		48,335
	632,746	1,316,650	1,949,396	597,436	1,189,691	1,787,127
	1,019,210		1,019,210	1,019,210		1,019,210
	1,310,892		1,310,892	1,111,864		1,111,864
	221,928		221,928	221,928		221,928
	1,532,820		1,532,820	1,333,792		1,333,792
	(791,560)		(791,560)	(716,739)		(716,739)
	741,260		741,260	617,053		617,053
	\$2,393,216	\$1,316,650	\$3,709,866	\$2,233,699	\$1,189,691	\$3,423,390
	\$ 73,416	\$ 42,035	\$ 115,451	\$ 98,728	\$ 60,959	\$ 159,687
	89,593		89,593	69,204		69,204
	570,000		570,000	570,000		570,000
	315,450		315,450	315,450		315,450
	1,048,459	42,035	1,090,494	1,053,382	60,959	1,114,341
	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
	358,433		358,433	193,993		193,993
		1,274,615	1,274,615		1,128,732	1,128,732
	\$2,393,216	\$1,316,650	\$3,709,866	\$2,233,699	\$1,189,691	\$3,423,390



## **Statements of Revenue and Expenses of Current Funds for the years ended June 30, 1989 and 1988**

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### **Revenue:**

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

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Total Revenue

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### **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 (Note 5)

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Total Expenses

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Excess of revenue over expenses

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## **Statements of Changes in Fund Balances for the years ended June 30, 1989 and 1988**

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Balances, beginning of year  
Excess of revenue over expenses  
Transfers between funds (Note 5)

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Balances, end of year

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

General Fund		Special Funds		Total	
1989	1988	1989	1988	1989	1988
\$1,093,918	\$1,132,621	\$267,753	\$241,050	\$1,361,671	\$1,373,671
299,644	269,388			299,644	269,388
62,655	73,070			62,655	73,070
63,250	21,000	96,334	38,000	159,584	59,000
48,492	40,894	90,054	75,947	138,546	116,841
80,143	51,756			80,143	51,756
1,648,102	1,588,729	454,141	354,997	2,102,243	1,943,726
596,099	606,908			596,099	606,908
374,797	316,453			374,797	316,453
202,935	187,962			202,935	187,962
226,236	206,677			226,236	206,677
46,279	52,753			46,279	52,753
		33,272	17,598	33,272	17,598
		211,832	196,486	211,832	196,486
25,650	25,650			25,650	25,650
74,820	61,246			74,820	61,246
1,546,816	1,457,649	245,104	214,084	1,791,920	1,671,733
\$ 101,286	\$ 131,080	\$209,037	\$140,913	\$ 310,323	\$ 271,993

General Fund		Special Funds	
1989	1988	1989	1988
\$ 193,993	\$ 12,810	\$1,128,732	\$1,037,922
101,286	131,080	209,037	140,913
63,154	50,103	(63,154)	(50,103)
\$358,433	\$193,993	\$1,274,615	\$1,128,732

# Notes to Financial Statements

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## **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 ("City") to be maintained and operated in the same manner as other City property occupied by the Museum. The Planetarium and The Museum 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.

The Planetarium maintains its accounts principally on the accrual basis.

The accounts of the Planetarium are maintained in accordance with the principles of fund accounting in order to abide by the limitations and restrictions placed on the use of the resources available to the Planetarium. Revenue received and expenses incurred for specified purposes are classified for accounting and financial reporting purposes into individual funds for which separate accounts are maintained. However, in the accompanying financial statements, funds that have similar characteristics have been combined into fund groups. The General Fund

consists of resources that are available at the discretion of the Trustees for general Planetarium operations. Special Funds are restricted by donors or by the Trustees for specified purposes.

Major building improvements and equipment purchases are capitalized and depreciated by 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. Investments:** Investments at June 30, 1989 consist of short-term obligations in the amount of \$1,150,000 and fixed income securities in the amount of \$500,461. The aggregate market value approximates cost.

**3. Revenue Bonds:** The Planetarium's 4 1/2% Refunding Serial Revenue 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 the Special Funds balances were approximately \$198,879 and \$199,214 at June 30, 1989 and 1988, respectively, restricted by the donor as to use.

**5. Depreciation:** Depreciation on major building improvements and equipment purchases which have been financed from cash generated by restricted funds is funded by transfers from restricted funds.

## **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 1989 and 1988 were \$176,764 and \$174,664, respectively.

The Planetarium reimburses the Museum for actual payroll costs for its staff. It also reimburses the Museum for all employee benefit costs, including pension, which are calculated as a percentage of payroll and amounted to \$161,295 and \$158,193 in fiscal 1989 and 1988, respectively.

Admission fees paid to enter the Planetarium also include entry to the Museum. The Planetarium paid the Museum approximately \$60,549 and \$61,900 in fiscal 1989 and 1988, respectively, for visitors who entered the Museum from the Planetarium.

**7. Reclassifications:** Certain amounts in the 1988 financial statements have been reclassified to conform with the 1989 presentation.

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

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

1988. Answering the call of the honeyguide. *Int. Wildlife* 18(2): 42-44.

Vuilleumier, F.

1989. [Review] *Les oiseaux du Lac Léman*, by P. Géroutet. *Auk* 106(2): 346.

Walters, M. J., A. Gonzalez, and C. F. Harding

1988. Stress, estrogen receptors and sexual behavior in male Zebra Finches. *Soc. for Neurosci. Abstr.* 14(1): 435.

phylogeny of turtles. Chairman and Associate Curator Michael J. Novacek with Frick Curator Malcolm C. McKenna and Columbia University Graduate Fellow Andre R. Wyss, coauthored a chapter on the major relationships of placental (eutherian) mammals, which reviewed the relative merits of evidence from paleontology, morphology and molecular analyses.

Augmenting these contributions to the volume on tetrapod phylogeny were several related projects. Dr. Novacek participated in a Nobel Symposium, "The Hierarchy of Life," at Karlskoga, Sweden.

Dr. McKenna advanced his comprehensive classification of mammals with the assistance of several colleagues and staff. He also prepared an analysis of new amino-acid sequence data for mammalian phylogeny.

The relationships of Australian marsupials and carnivores were subjects of Dr. Tedford's systematic work. His research produced four coauthored papers in a symposium volume "Possums and Opossums," which in part derives from fossils Dr. Tedford collected in Australia with support of the National Science Foundation.

Dr. Gaffney completed a massive manuscript on the 200 million-year-old turtle, *Proganochelys*, which was submitted to the Museum's monographic series. He completed several other papers on fossil turtles from China, Australia and North America.

Associate Curator John G. Maisey investigated Cretaceous fishes and Late Paleozoic hybodont sharks. Work on the fishes focused on the Museum's extraordinary collection from the Santana Formation in Brazil.

These activities were complemented by research on fossil fishes by Curator Emeritus Bobb Schaeffer. Although Dr. Schaeffer decided to leave the New York area, he will continue to have a close association with the department.

### Vertebrate History in South America

The department, in collaboration with various individuals and institutions in South America, expanded its knowledge of the fossil record of the continent.

In conjunction with his work on fossil fishes, Dr. Maisey is the editor and major contributor of a comprehensive, illustrated volume on the Santana Formation assemblage, which includes fishes and specimens of fossil frogs, spiders, scorpions, plants, crocodiles, turtles and pterosaurs. The vast majority of these specimens are represented by the Axelrod Collection of fossil fishes, which is now housed in a fully renovated facility developed

## Department of Vertebrate Paleontology

*The diverse research and activities by the staff of the Department of Vertebrate Paleontology draw on evidence from fossils, Earth history and living biota. In seeking a better understanding of the planet's biodiversity, the fossil record provides an important and unique inroad; it represents the only direct evidence of the great variety of extinct organisms. The importance of the fossil database is evident when considering that the number of extinct species far outnumber those surviving.*

**Goals and Resources** Curators in the department applied their research on fossils to questions dealing with the major outlines of vertebrate phylogeny. Their research bears heavily on issues arising from the renewed interest in both morphological and molecular studies in systematics. Such investigations continue to draw heavily on the extraordinarily diverse collections maintained in the department, including the Frick Fossil Vertebrate Collection and the Axelrod Collection (of South American fishes and other vertebrates).

**The Hierarchy of Life** Curators, research associates, postdoctoral fellows and graduate students contributed to a definitive volume, "The Phylogeny and Classification of the Tetrapods," edited by Michael J. Benton, Queens University, Belfast Northern Ireland. Curator Richard H. Tedford coauthored a major review of carnivore phylogeny with Nancy Neff, University of Connecticut and John Flynn, Field Museum of Natural History. Curator Eugene S. Gaffney and former Kalbfleisch Postdoctoral Fellow Peter A. Meylan collaborated on a detailed study of the

through a cost-sharing program between the Museum and the NSF. Work on the Santana assemblage reveals several different shallow and deep water environments from which the fossils were recovered. Dr. Maisey completed an analysis of questions concerning the mode of death and preservation of the fossil fauna and basic physical conditions of the different aquatic environments represented.

Another important area in documenting the history of the South American vertebrate fauna is field exploration of the southern Andes. Field research resulted in striking discoveries of fossil mammals from a location some 10,000 feet above sea level in the central Andes of Chile. The project was coordinated by Dr. Novacek in collaboration with the Museo Nacional de Historia Natural in Santiago. Dr. McKenna, Dr. Wyss, Research Associate John Flynn, Columbia University Graduate Fellow Meng Jin and Mark Norell of Yale University participated in the project. The expedition was funded by a grant from the National Geographic Society. A large sample from the site shows an abundance of complete skulls and jaws which indicate a mammal fauna much older than any previously known from the southern Andes.

**China Projects** Dr. Tedford, in association with Chinese colleagues, conducted NSF-funded studies of the six million to one million-year-old sequence of rocks in the Shanxi Province, People's Republic of China. Examination of the succession of rocks in the fossiliferous Yushe Basin revealed a nearly continuous sequence from about six million to three million years ago, with a one million year time gap before deposition continued, about 1.5 million-years ago. Geologic work was complemented by sampling through the sequence for small fossil mammals. Dating techniques that measure the original paleomagnetic properties of the rock samples were used to determine the age of the specimens.

Dr. McKenna described fossil mammals from China, representing ancient relatives of horses and rhinos. Dr. Gaffney's studies of snapping turtles show that this group of turtles, family Chelydridae, has a much older record in China, extending into the Jurassic (150 million years ago).

Mr. Meng is describing the skull anatomy of the Didymoconids, a group of early Cenozoic mammals from China. His research, which draws on the Museum's holdings, the Chinese collections and his own fieldwork in China, should shed light on the evolutionary relationships of this group and other early mammals.

**Research on a Global Scale** Dr. McKenna studied fossil mammals from the 50-million-year-old localities of Axel Heiberg Island in the Arctic. Dr. Novacek joined Curator Ian Tattersall, Department of Anthropology, for a paleontological reconnaissance of North Yemen. The project, sponsored by the National Geographic Society, revealed strong potentials for paleontological sampling of Mesozoic fishes and other vertebrates. Fieldwork in remote localities depend on the extraordinary resource of the department's vast collections for comparative study. These include holdings which are maintained through the support of the Childs Frick Endowment.

**Excellent Support** Departmental activities increasingly involve both work on the fossil vertebrate exhibition halls, as well as major renovations of storage facilities. Exhibition Coordinator Lowell Dingus assisted with renovations of the Osborn Hall of Fossil Mammals, and aided departmental curators in a comprehensive proposal for modification of the fossil vertebrate halls.

### Scientific Publications:

*Archer, M., R. H. Tedford, and T. H. Rich*

1987. The Pilkipildridae, a new family and four new species of petauroid possums (Marsupialia, Phalangerida) from the Australian Miocene. In M. Archer (ed.), *Possums and Opossums: Studies in evolution*, 607-627. Sydney: Surrey Beatty and Sons and Roy. Zool. Soc. New South Wales.

*Berta, A., C. E. Ray, and A. R. Wyss\** (Sponsor: M. C. McKenna)  
1989. Skeleton of the oldest known pinniped, *Enaliarctos mealsi*. *Sci.* 244: 60-62.

Blum, S. D., J. G. Maisey, and I. S. Rutzky  
1989. A method for chemical reduction and removal of ferric iron applied to vertebrate fossils. *J. Vert. Paleontol.* 9(1): 119-121.

*Cifelli, R. L., C. R. Schaff, and M. C. McKenna*

1989. The relationships of the Arctostylopidae (Mammalia): new data and interpretation. *Bull. Mus. Comp. Zool.* 152(1): 1-44.

*Delson, E.*

1989. Chronology of South African australopithecine site units. In F. E. Grine (ed.), *Evolutionary history of the "robust" australopithecines*, 317-324. New York: Aldine de Gruyter.

1989. Fossil man (abridged). *Concise Encyclopedia of Science and Technology*, 2nd ed., 801-803. New York: McGraw Hill.

1989. Monkey (abridged). *Ibid*, p. 1194.

*Flynn, J. J., N. A. Neff, and R. H. Tedford*

1988. Phylogeny of the Carnivora. In M. J. Benton (ed.), *The phylogeny and classification of the tetrapods*. Vol. 2, *Mammals*. Syst. Assoc. Spec. Vol. No. 35B: 73-115. Oxford: Clarendon Press.

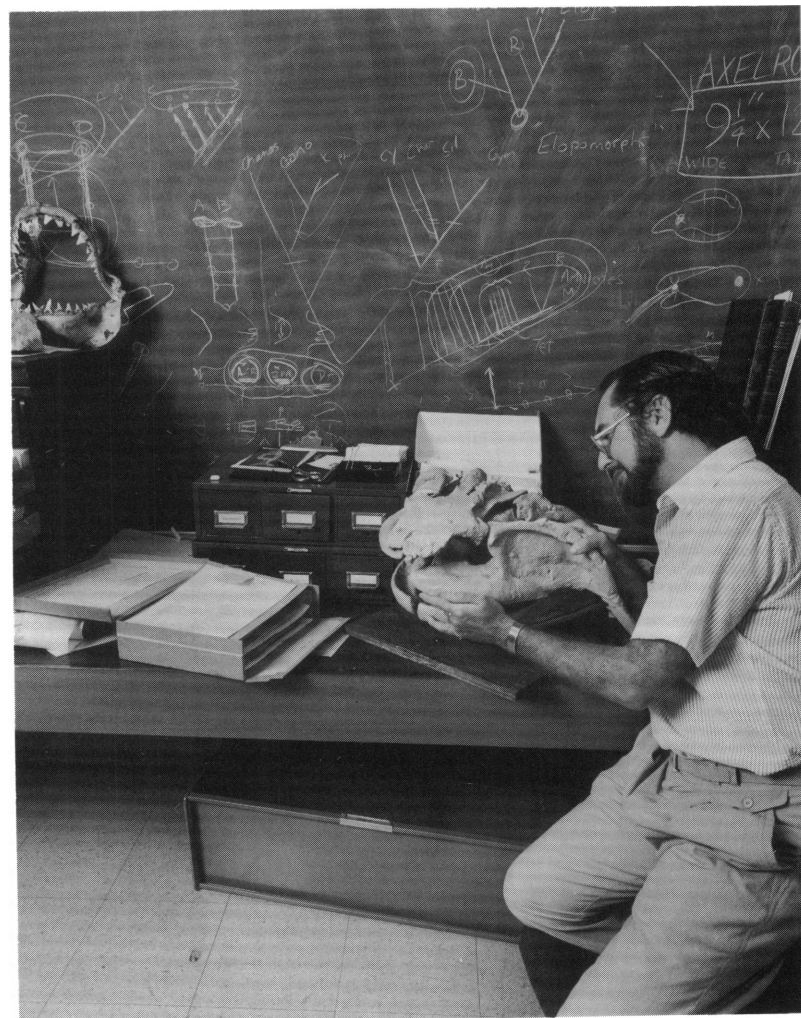
*Gaffney, E. S.*

1988. A cladogram of the pleurodiran turtles. *Acta Zool. Cracov* 31: 487-492.



- Gaffney, E. S., and P. A. Meylan  
1988. A phylogeny of turtles. In M. J. Benton (ed.), The phylogeny and classification of the tetrapods. Vol. 1, Amphibians, reptiles, birds. Syst. Assoc. Spec. Vol. No. 35B: 157-219. Oxford: Clarendon Press.
- Legendre, S., T. H. Rich, P. V. Rich, G. J. Knox, P. Punyaprasiddhi, D. M. Trumpy, J. Wahlert, and P. Napawongse Newman  
1988. Miocene fossil vertebrates from the Nong Hen-I(A) exploration well of Thai Shell Exploration and Production Company Limited, Phitsanulok Basin, Thailand. J. Vert. Paleontol. 8(3): 278-289.
- McKenna, M. C., and J. J. Flynn  
1989. Kemmerer, Wyoming to Thermopolis, Wyoming. In J. J. Flynn (ed.), Mesozoic/Cenozoic vertebrate paleontology: classic localities, contemporary approaches. 28th Int. Geol. Congress, Field Trip Guidebook T322: 29-33. Washington, D.C.: American Geophysical Union.
- McNamara, K. J., G. W. Kendrick, A. Baynes, E. Frankel, A. Gale, R. Holst, J. Long, and J. G. Maisey  
1989. Brolgas on the Lyndon River. Western Australian Naturalist 18(1): 24.
- Maisey, J. G.  
1988. The hybodont shark from Hamilton Quarry. In G. Mapes and R. Mapes (eds.), Regional geology and paleontology of upper Paleozoic Hamilton Quarry area in southeastern Kansas. Kansas Geol. Surv. Guidebook Series 6: 177-180.  
1989. *Hamiltonichthys mapesi*, g. and sp. nov. (Chondrichthyes, Elasmobranchii), from the Upper Pennsylvanian of Kansas. Am. Mus. Novitates 2931: 42 pp..
- Meylan, P. A., and E. S. Gaffney  
1989. The skeletal morphology of the Cretaceous cryptodiran turtle, *Adocus*, and the relationships of the Trionychoidea. Am. Mus. Novitates 2941: 60 pp.
- Novacek, M. J., A. R. Wyss\* (Sponsor: M. C. McKenna), and M. C. McKenna  
1988. The major groups of eutherian mammals. In M. J. Benton (ed.), The phylogeny and classification of the tetrapods. Vol. 2, Mammals. Syst. Assoc. Spec. Vol. No. 35B: 31-71. Oxford: Clarendon Press.
- Novacek, M. J.  
1989. Higher mammal phylogeny: the morphological-molecular synthesis. In B. Fernholm, K. Bremer, H. Jornvall (eds.), The hierarchy of life, 421-435. Amsterdam: Elsevier Sci. Publ.
- Tattersall, I., E. Delson, and J. A. Van Couvering, (eds.)  
1988. Encyclopedia of human evolution and prehistory. New York: Garland Publ.
- Tedford, R. H., and M. O. Woodburne  
1987. The Ilariidae, a new family of vombatiform marsupials from Miocene strata of South Australia and an evaluation of the homology of molar cusps in the Diprotodontia. In M. Archer (ed.), Possums and Opossums: Studies in evolution, 401-418. Sydney: Surrey Beatty and Sons and Roy. Zool. Soc. New South Wales.
- Wahlert, J. H.  
1989. The three types of incisor enamel in rodents. Nat. Hist. Mus. L. A. County, Sci. Ser. 33: 7-16.
- Wahlert, J. H., and S. L. Sawitzke  
1988. Muscle insertion and basicranial morphology in rodents. Ann. N.Y. Acad. Sci. 529: 128-130.
- Wahlert, J. H., and R. A. Souza  
1988. Skull morphology of *Gregorymys* and relationships of the Entoptychinae (Rodentia, Geomyidae). Am. Mus. Novitates 2922: 13 pp.

*John G. Maisey, Curator in the Department of Vertebrate Paleontology, examines a cast of the upper jaw of a Xenacanth shark found in the Permian rocks of Texas. Dr. Maisey's*



*research focuses on the past evolutionary history and the environments of fossil fishes. The Department of Vertebrate Paleontology studies living and fossil vertebrates to establish their phylogenetic relationships.*

- Woodburne, M. O., R. H. Tedford, M. Archer, and N. S. Pledge  
1987. *Madakoala*, a new genus and two species of Miocene koalas (Marsupialia, Phascolarctidae) from South Australia, and a new species of *Perikoala*. In M. Archer (ed.), *Possums and Opossums: Studies in evolution*, 293-317. Sydney: Surrey Beatty and Sons and Roy. Zool. Soc. New South Wales.
- Woodburne, M. O., R. H. Tedford, and M. Archer  
1987. New Miocene ringtail possums (Marsupialia, Pseudocheiridae) from South Australia. In M. Archer (ed.), *Possums and Opossums: Studies in evolution*, 639-679. Sydney: Surrey Beatty and Sons and Roy. Zool. Soc. New South Wales.
- Woodburne, M. O., R. H. Tedford, and C. C. Swisher  
1988. Lithostratigraphy, biostratigraphy and geochronology of the Barstow Formation, Mojave Desert, southern California. Natl. Assoc. Geol. Teachers, Field Trip Guidebook, pp. 1-18.
- Wyss, A. R.\* (Sponsor: M. C. McKenna)  
1988. Evidence from flipper structure for a single origin of pinnipeds. *Nature* 334(6181): 427-428.
1988. On "retrogression" in the evolution of the Phocinae and phylogenetic affinities of the monk seals. *Amer. Mus. Novitates* 2924: 38 pp.
- Xue Xiangru, and E. Delson  
1988. A new species of *Dryopithecus* from Gansu, China. *Kexue Tongbao* (Beijing) 33: 449-452 (in Chinese); 34: 62-68 (in English).

## Abstracts, Reviews and Popular Publications:

- Chernoff, B., T. Duncan, T. Elias, B. Mishler, M. Novacek, E. Theriot, Q. Wheeler, and D. S. Wood  
1989. Commentary on the place of systematics. *ASC Newsletter* 17(1): 1-2.
- Delson, E.  
1988. [Review] Variation, culture and evolution in African populations: Papers in honour of Dr. Hertha de Villiers, R. Singer and J. K. Lundy (eds.). *J. Hum. Evol.* 17: 274-275.
1988. Studies on the northern Pleistocene. [Reviews of] Quaternary glaciation in the northern hemisphere, V. Sibrava, G. M. Richmond, and D. Q. Bowen (eds.). *Analyse Critique des Stratotypes Quaternaires*, by A. Billard. *J. Hum. Evol.* 17: 643-645.
1989. [Review] *Geologie de la prehistoire: Methodes, techniques, applications*, J.-C. Miskovsky (ed.). *J. Hum. Evol.* 18: 145.
- Dingus, L., and E. S. Gaffney  
1988. From the land of dragons. Guide to special exhibition, 16 pp.
- McKenna, M. C.  
1989. Marsupials right side up. [Review of] *Possums and opossums: Studies in evolution*, 2 vols, M. Archer (ed.). *Science* 244: 1096-1097.
- Novacek, M. J.  
1988. Navigators of the night. *Nat. Hist.* 97(10): 67-70.
1988. (Abstract) Fossils, missing data, and phylogenies. *J. Vert. Paleontol.* 8(3): 23A.
1989. [Review] *Cenozoic mammals of North America. Geochronology and biostratigraphy*, M. O. Woodburne (ed.). *Q. Rev. Biol.* 64(1): 63-64.
1989. (Abstract) Miocene mammals and the history of the southern Andes. VI Int. Congress of the Pacific Sci. Found., Vina del Mar, Chile.
1989. (Abstract) Ontogeny, phylogeny, and the bat sonar system. *Amer. Soc. Mammalogists*, June 1989.

## Research Stations

*The Museum's four research stations provide curators and visiting scientists with opportunities to study diverse ecological habitats. Undergraduate and graduate students conduct research at the stations to advance their field training in the natural sciences. The stations offer laboratory space, library facilities and living accommodations.*

**Southwestern Research Station** The unique research opportunities available at the Southwestern Research Station, now in its 34th year, continue to attract outstanding scientists. The station is located near Portal, Arizona. In addition to members of the Museum's curatorial staff, other scientists came from universities, museums and governmental agencies throughout the world to conduct research at the station. Some return annually for long-term research projects.

The station has served as a training ground for young scientists. It is a community of scientific professionals, post-doctoral students, Ph.D. and M.S. graduate students, and undergraduates majoring in the natural sciences. The station's role in fostering the development of professionals entered a new era with the establishment of the Southwestern Research Station Student Support Fund.

As a result of generous contributions by friends of the station, the Museum awarded three Southwestern Research Station Student Research Grants to Jennie E. Larkin of the University of Washington, who will investigate latitudinal constraints on hibernatory range in poorwills; Erick Greene of the University of California at Davis, who is studying developmental polymorphism in a caterpillar, and Randall L. Morrison of the University of Kansas, whose research focuses on an ultrastructural analysis of ventral skin color in the lizard *Sceloporus jarrovi*.

The Museum received an award of \$5000 from the Margaret T. Morris Foundation for research, writing or exhibits about animals of the American southwest. The gift was allocated to the Southwestern Research Station.

The Museum is seeking to modernize the station's research facilities. A National Science Foundation grant matched by Museum funds will provide multi-user equipment (fiber optic illuminators, telethermometers, temperature control chambers) and a laboratory. These changes will significantly improve the station for scientists with diverse technical needs.

During the year, 1326 people spent one or more nights in residence at the station. Of these, 146 were engaged in research, an increase over last year.

Twenty-two volunteers from the United States, Canada, England and Australia assisted with the maintenance and functioning of the station and participated in research. Several volunteers returned as Research Assistants and many pursued careers in the biological sciences.

Resident Director Wade C. Sherbrooke was appointed Research Associate in the Department of Herpetology and Ichthyology at the Museum. He is also a Research Associate in the Department of Ecology and Evolutionary Biology at the University of Arizona, Tucson.

His work on the biology of horned lizards includes studies of the detoxification of ant venom by a blood factor, and the function of blood-squirting from the eye region when the animals are threatened.

**Great Gull Island** Some 6000 pairs of Common Terns nested on Great Gull Island in 1988. The island is located 17 miles northwest of Montauk Point in Long Island Sound. The tern colony has doubled in size since the reintroduction of *Microtus pennsylvanicus* in 1981. These small rodents devour the vegetation, clearing large areas where the terns can nest. Among the island's birds is a 26-year-old Common Tern that sets a longevity record for the species.

About 1200 pairs of Roseate Terns, an endangered species, nested on Great Gull Island. The concentration of Roseate Terns is the largest in New York State and runs a close second on the east coast to a colony of 1500 pairs on Bird Island, Massachusetts.

Jeff Spendelow, Thomas Grace and Peter Cormons of the U.S. Fish and Wildlife Service, collected adult birds to determine the amount of intercolony movement in the Roseate Tern. They identified a 14-year-old bird, a record for the species.

Joseph DiCostanzo, a graduate student at the City University of New York, studied the effects of age on reproductive success of Common Terns. W. Parker Cane, Associate in the Department of Ornithology, studied inherited traits in Common Terns and established differences in molt patterns within and between their populations. Adam Fry, a student at Southern Connecticut State University, weighed Common Tern eggs throughout the incubation period to determine their rate of weight loss, a phenomenon not previously studied in the species.

Helen Hays, Chairman of the Great Gull Island Committee, received the Eisenmann Medal from

the Linnaean Society of New York for her work on Great Gull Island. The medal is given to individuals for achievement in ornithology and for encouraging amateurs to become interested in bird studies.

**Archbold Biological Station** Scientists at the Archbold Biological Station, located in south-central Florida, are involved in research activities in ecology, evolutionary biology and animal behavior. The station's 4300 acres provide one of the most important preserves in the state for threatened and endangered species.

The resident staff and more than 50 visiting investigators researched plant and animal ecology. Eric Menges, a plant ecologist, joined the research staff and launched several studies of the ecology and life history of endangered plants endemic to the Florida scrub. He revised and activated a long-term plan for fire management, including a major interdisciplinary study of post-fire regeneration.

John W. Fitzpatrick, former Chairman of the Department of Zoology at the Field Museum of Natural History, joined as executive director of the station.

The Board of Directors signed a 30-year lease for the Buck Island Ranch from the John D. and Catherine T. MacArthur Foundation and received a grant of cattle, ranch equipment and citrus fruit from the foundation. The 17-square-mile ranch is now designated the John D. MacArthur Agro-ecology Research Center, and operates as a division of the Archbold Biological Station. It provides a setting for research on the relationships between agriculture and native environments of central Florida. Research will be conducted by visiting investigators, resident staff and scientists working at Archbold.

Except for a few small preserves, the unique scrub community characterizing the southern Lake Wales Ridge has virtually disappeared. This destruction threatens the existence of large numbers of distinctive, locally endemic plants. Efforts of the Archbold Biological Station are directed toward studying the problem, educating the public and preserving the scrub.

The Florida Chapter of the Nature Conservancy awarded the station its Chairman's Award. It was presented to Frances Archbold Hufty, President of Archbold Expeditions.

**St. Catherines Island** Research conducted on St. Catherines Island, one of the barrier islands off the Georgia coast, includes archeology, ecology and evolutionary biology.

David Hurst Thomas, Curator in the Department

*Members of the Education Department prepare for a class in the newly refurbished Louis Calder Laboratory. From left to right are Lisa Sita, Museum Instructor; David Alicea, Rudin Intern; Stephanie Penceal, Assistant Community Programming Coordinator, and Ismael Calderon, Community*



*Programming Coordinator. In the lab, the Education Department conducts teacher-training workshops, and the Junior High School Natural Science Program for highly motivated inner city youngsters. Natural science classes and anthropology workshops for students of various ages are also held in the Calder Lab.*

of Anthropology, is the Museum's principal investigator in the archeological program on St. Catherines. Dr. Thomas spent 13 weeks supervising excavations of the extensive Franciscan mission complex on the island, a project supported by the Edward John Noble and St. Catherines Island Foundations. Excavation of the 17th-century church, the *cocina/convento* complex and a well were completed. Dr. Thomas is writing a second monograph describing the archeology of Mission Santa Catalina.

In an effort to place the excavations on St. Catherines Island in a global context, Dr. Thomas organized a three-year program to observe the Columbian Quincentenary. Nine "Columbian Consequence" seminars are scheduled throughout the country between 1988 and 1990. The Smithsonian Institution Press will publish the results in a series of volumes. The St. Catherines Island research program is administered by the Office of Grants and Fellowships.

## Department of Education

*Museum visitors had a rare opportunity to see Tibetan Buddhist monks perform two ancient rituals never publicly seen in the United States. Through such programs and other activities, the department directly reached more than 300,000 visitors, half of which were young people. The department's goals are to present programs to a diverse audience, to attract new audiences and to add to the public's understanding of the Museum's collections, exhibitions and ongoing research.*

**Tibetan Buddhist Monks** Two extraordinary demonstrations of Tibetan Buddhist art took place at the Museum. In July, four monks from the Namgyal Monastery painstakingly created a multicolored sand mandala. Some 50,000 visitors watched as the symbolic "painting" was made in the Frederick Leonhardt People Center.

In January and February, 10 monks from the Gyuto Tantric Monastery created an altar of butter sculpture figures to commemorate the Tibetan New Year. The demonstration took place in the Hall of Oceanic Birds, and after its completion the altar remained on view for another month. A total of 75,000 visitors saw the

altar and learned about the cultural tradition from which it is derived.

Staff members from the department, volunteers and trained interns explained to visitors the cultural context of these demonstrations, and written materials were distributed. The monks themselves seemed to thrive on the experience, and became active museum educators, as they patiently communicated with visitors.

**Service to Schools** The reservation/registration office processes more than 4000 requests from teachers in the tri-state area of New York, New Jersey and Connecticut for independent class visits on weekday mornings. The office also handles 1000 requests for programs taught by Museum instructors, which are available for New York City schools. Nearly 20,000 youngsters in school groups participated in a program taught by a staff member. The most popular requests were for tours of the dinosaur, Ocean life, Eastern Woodlands and Plains Indians and Man in Africa halls.

Independent visits by school groups totaled more than 150,000 children and their adult chaperones. Classes coming for such independent visits are on their own, but 60 departmental teaching volunteers, stationed in the exhibition halls, encounter many of these groups and provide short informal learning experiences. Education volunteers reached more than 21,000 youngsters in this way.

Classes for visually and hearing impaired and learning disabled youngsters are provided, and regular school programs are also available to them. Special education activities are supported by a gift from The Vidda Foundation. More than 1500 people participated, including 96 special education classes from schools and other community organizations. Most of these programs are carried out in small groups because of the special needs of the individuals involved.

During Black History Month, teachers selected from 170 offerings for their classes to participate in. Among the choices were: craft workshops, theater performances and films. More than 13,000 youngsters in school groups participated in the February program which was supported by a grant from the New York State Council on the Arts.

**Community Programming** In a sense, all programming is community-oriented whether for school groups, adult audiences or particular cultural groups. However, a number of community programs have a specific aim — to attract new audiences, particularly from the African-American, Latin-American, Asian-American and Caribbean

communities. Many programs geared toward these audiences are offered throughout the year, ranging from lectures and participatory workshops to films and performances. They reach a combined audience of some 40,000 people. Support is provided by the Samuel and May Rudin Foundation, the William Randolph Hearst Foundation, the Helena Rubinstein Foundation and the Henry Nias Foundation.

The Junior High School Natural Science Program provides an in-depth experience for a select group of youngsters. Twenty-six pupils from eight schools in upper Manhattan and the Bronx came to the Museum two days a week throughout the school year for an intensive science curriculum. The program, supported by the Christodora Foundation and by income from a gift by Mrs. Harold Boeschenstein, encourages boys and girls to continue an interest in science and pursue a career in that area. A planned outgrowth of this program is the development of modular units for a science curriculum designed for junior high school students. Thirty school classes and their teachers were invited to the Museum to test the curriculum units developed here.

**Learning Facilities for Children** The Discovery Room and the Alexander M. White Natural Science Center are designed for youngsters from five to 10 years of age. Both facilities provide special learning opportunities and are open on weekends from October through July on a first-come-first-served basis. This year, more than 5000 parents and children investigated artifacts and specimens in the Discovery Room. During the week it is the setting for teaching programs for the visually impaired and learning disabled, serving more than 1000 youngsters with special needs.

The Alexander M. White Natural Science Center, a larger facility, hosted 50,000 visitors. Most came on weekends and in family groups. On weekday mornings, the Center is used by New York City school classes. Most of the exhibits in the Natural Science Center have interactive elements which set this space apart from most other areas of the Museum.

**Adult Learning** The department is responsible for developing and carrying out public programming on all the Museum's scientific topics except astronomy. For school classes and training of teachers the department operates primarily on weekdays. However, adult activities are mostly offered on weekends or evenings.

There are afternoon and evening lecture series, college-accredited courses for teachers, local field trips and many special events.



Nearly 6000 adults enrolled in lecture series and field trips. Lecture series covered a range of topics from prehistoric cave art and archeology of the Middle East to series on oceans, wildflowers and birds. The exhibition "Madagascar: Island of the Ancestors" was supplemented with a lecture series focusing on the unique animal and plant life of the island. Some lectures draw audiences numbering in the hundreds, but the opportunity to participate in smaller classes is available. Animal drawing and travel photography are among series with limited enrollment.

Field trips ranged from morning bird walks in Central Park to a weekend of whale-watching off Cape Cod.

From October through June, the Leonhardt People Center focused on a different region or cultural tradition each month. The cultures of Japan, China, South America, the Pacific, the Middle East, Africa, the Caribbean and Latin America were highlighted with live performances of music and dance, along with short slide talks, films and demonstrations of crafts.

**Film Programs** The 12th annual Margaret Mead Film Festival is the department's largest single adult event. Over the course of its four evenings, nearly 7000 people watched documentary films and listened to filmmakers and anthropologists from 15 nations discuss their work. The Festival, which began as a one-time celebration of Dr. Mead's career at the Museum, has become an ongoing tribute.

There were other exciting film programs. In cooperation with Asian Cinevision, feature films from Japan, Korea, the Philippines and Taiwan were screened. "Prize-winning Dance Films" was presented in cooperation with Dance Films Association. In conjunction with the World Wildlife Fund, a two-day program of new works by some of the best wildlife filmmakers was presented.

## Department of Exhibition and Graphics

*Interactive exhibits improve the visitor's level of comprehension and increase involvement in a museum's presentations. The future museum-goer will enjoy a more personal experience as a result of the development of new methods of exhibition.*

**Interactive Exhibit** To update the Jewish section of the Hall of Asian Peoples, originally built in 1980, the designers searched for new ways to present a vast amount of factual material. A touch-screen interactive exhibit, simultaneously displaying historical facts and relevant visual images, was designed and installed. This enables visitors to access material on a subject of particular interest at their own pace, by way of the touch-screen. The redesign project was funded by the Kaufmann Foundation.

**Evaluation Techniques** The department has been experimenting with new methods of evaluating exhibition techniques. Through the use of an interactive computer we were able to question visitors after they completed their tour of the "From the Land of Dragons" exhibition. Responses from more than 2200 visitors revealed that the curator/designer team was successful in conveying scientific information.

**Permanent Hall** Eugene B. Bergmann, Senior Designer, working with Curators Craig Morris and Robert Carneiro of the Department of Anthropology, completed the design and installation of the Hall of South American Peoples. This monumental project spanned nine years from initial planning to its opening in January. The 11,000-square-foot hall exhibits some 2300 objects illustrating more than 12,000 years of the history of the peoples of South America, their subsistence, social organization, political structure, religious beliefs, ceremonial practices, technologies and artistic expression. The hall replaces the original South American hall, which opened in 1907 and closed in the 1960s. It is divided into an introductory section, an archeology section on the coastal and highland regions, and a section on the ethnology of the Indians of Amazonia. Brilliantly colored textiles, polychrome pottery, intricately worked gold and silver ornaments and the well-preserved remains of the "Copper Man" (a Chilean who died in a mining accident circa A.D. 500) are a small

sampling of the hall's vast collection.

Work continues on the design of the new Hall of Human Biology and Evolution, partially funded by a grant from the National Science Foundation. Long-range planning began on the renovation of the fossil halls on the fourth floor. Work on the Osborn Hall of Late Fossil Mammals awaits a complete evaluation of the feasibility of redesigning all the fossil halls.

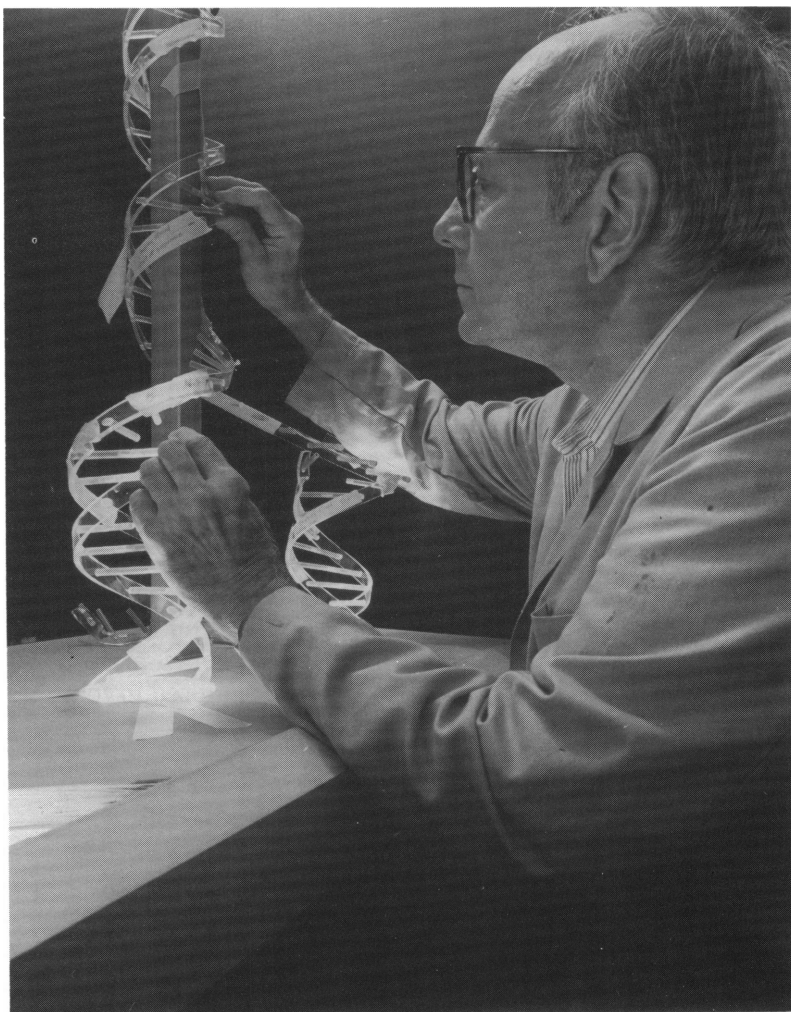
**Special Exhibitions** The two major special exhibitions presented in Gallery 3 during the year were "Magnificent Voyagers: The U.S. Exploring Expedition, 1838-1842," and "Madagascar: Island of the Ancestors." In September, "Magnificent Voyagers" opened at the American Museum, the seventh stop on a national tour organized by the Smithsonian Institution Traveling Exhibition Service. The Wilkes Expedition to the South Seas and Antarctica was depicted through the display of 400 objects, specimens and artifacts, including a recreation of a shipboard cabin. "Madagascar: Island of the Ancestors" was a joint effort between the American Museum and the British Museum (Museum of Mankind) in London. The Exhibition Coordinator was John Mack, who organized the original exhibition in London with materials borrowed from Madagascar. The origins, history and culture of the Malagasy people were presented through funerary sculpture, gold and silver jewelry and other royal regalia. The newly designed version of the show opened in March for a five-month run.

"From the Land of Dragons," staged in Gallery 1, is typical of the kind of traveling exhibition that the Museum originates. The concept came from Eugene Gaffney, Curator in the Department of Vertebrate Paleontology, as a result of his research in the Peoples Republic of China. Designer Willard Whitson worked closely with Dr. Gaffney over a two-year period on a dynamic design illustrating the interrelationship between dinosaurs, reptiles and reptilelike mammals. After its stay at the Museum, the exhibition was presented at the Boston Museum of Science.

At the conclusion of "From the Land of Dragons," Gallery 1 was closed. It will become part of the Hall of Human Biology and Evolution, scheduled to open in mid-1991.

**Naturemax Gallery** The Naturemax Gallery was enlarged to the former dimensions of Gallery 77, and is again known by that name. The last presentation in Naturemax Gallery was an exhibition prepared by the Los Angeles County Museum of Natural History entitled "Dinosaurs, Mammoths and Cavemen: The Art of Charles R.

*Derek Squires, Senior Principal Preparator in the Department of Exhibition and Graphics, deftly works on a five-foot-long model of a strand of DNA, the blueprint for life. The transmission of genetic information, the structure and function of cells and organ systems of the human body, and*



*human and primate evolution will be presented in the Hall of Human Biology and Evolution, scheduled to open in 1991. The Museum received a \$500,000 grant from the National Science Foundation toward the development of the hall, with additional funding from the Booth Ferris Foundation.*

Knight." This exhibition featured many original oils and watercolors by the world-famous artist who created many paintings and murals for the Museum. The first show in the new Gallery 77 was "The Far Side of Science" featuring the cartoons of Gary Larson.

**Other Exhibits** Two collections totaling 153 colored diamonds, some of them the rarest natural "fancy" colored diamonds in the world, were exhibited in the Museum's Morgan Memorial Hall of Gems. The Aurora Gem Collection has 128 diamonds, the Goldberg Collection, 25 stones. Both were gathered over many years from sources all over the world. They represent an incredible range of colors, hues and fineness.

The Akeley Gallery held two exhibits this year: "Drawn from the Sea," a collection of antique and contemporary illustrations of fish organized by the Smithsonian Institution Traveling Exhibition Service, and "Nature of New York City: Photographs by the Sierra Club." The latter exhibit was sponsored by the Arthur Ross Foundation.

Other exhibits in the Arthur Ross Exhibit of the Month program included the "50th Anniversary of the Bronx High School of Science," the annual Origami Holiday Tree, "Tibetan Butter Sculpture" and "A Naturalist at Large: John Treadwell Nichols."

In March, an exhibit celebrating the 120th Anniversary of the American Museum was built and installed in the Legislative Building in Albany. It featured a 16-foot-high representation of a *Tyrannosaurus rex* skeleton sculpted in foam board.

## Department of Library Services

*The bibliographic control of library collections is part applied science and part intellectual discipline. Because library collections are products of human activities, the precepts of library science have to be applied to an often disorderly assortment of materials to make them accessible to users. During the past year extraordinary progress was made in processing special collections and in upgrading serial and monograph cataloging to provide better descriptions and accessibility to this international resource.*

**Special Collections** The numerous archives, manuscripts, photograph and film collections must be sorted, inventoried, arranged, rehoused in conservationally sound materials, restored and cataloged. As with biological classification, it is necessary to have an understanding of the essential nature and structure of the collection, before dividing it into its constituent parts. Then calendars, checklists and catalogs are developed to show the relationships among the parts.

A number of large and small collections still require extensive work. With the aid of volunteers, some 20 collections were processed. These collections include such major resources as the Nels C. Nelson negatives of New Mexico sites; the Alonzo Pond materials that include correspondence, clippings, photographs, negatives, films, manuscripts and diaries; the Jochelson collection of correspondence, artifacts, and photographs; the Morden slide and photograph collection, and a recent addition of correspondence to the papers of Roy Chapman Andrews.

An inventory of the Museum's building plans in the Plant Manager's office was begun, the letters of George N. Lawrence and Henry Edwards were inventoried and 1200 file prints of glass plate negatives from the Jesup North Pacific Expedition of 1897-1903 were made. Working with volunteer Hal Bernard, Nina Root, Chairwoman, produced a videotape, "To the Ends of the Earth," from the unedited 1920s film footage of the Central Asiatic Expedition of 1921-1930.

**Monograph and Serial Collections** The major portion of the monograph collection is cataloged by an outdated system that is not responsive to researchers. In an effort to correct some of the problems, multi-part works that had been

individually cataloged were recataloged into cohesive units. Among such works were the 40 volume *Histoire physique, naturelle et politique de Madagascar* (1875-1954), Bronn's 60 volume *Klassen und Ordnungen der Tierreichs* (1880-1933) and the 30 volume *U. S. Exploring Expedition* (1838-1842).

The 30,000 pamphlet collection is being completely reviewed to identify rarities and duplicates. The collection will then be restored and recataloged; this year 3000 pamphlets were reviewed.

As one of the few libraries in the Online Computer Library Center (OCLC) network that can modify permanent online records, the Library is responsible for correcting the catalog records in the main database; Diana Shih, Senior Cataloging Librarian, corrected 1020 records submitted by other libraries. Regional databases were also updated, more than 800 records were added to the Union List of Serials.

Another important aspect of providing increased access to the collection is the continuing work of adding Chinese and Japanese characters to catalog cards, and of transliterating Slavic monograph titles.

**Collection Management** With the advice of the scientific staff, a new collection development policy was drafted by Miriam Tam, Assistant Librarian for Technical Services, and Priscilla Watson, Senior Acquisitions Librarian. It serves as the guideline for selecting and deaccessioning materials.

A conservation laboratory, funded by a grant from the Howard Phipps Foundation, was completed, and a Parylene 1050 coater was loaned to the laboratory by the Nova Tran Corporation to be used experimentally by the Museum. The equipment coats fragile objects with clear Parylene, strengthening it and helping to prevent physical damage without changing the object's appearance. Barbara Rhodes, Conservation Manager, completed the condition survey of the collections, which will serve as a program for preservation.

The U. S. Department of Education grant to microfilm manuscript and archival material was completed, and in the process the entire Museum Archive was rehoused in conservationally sound folders and boxes. More than 550 nitrate negatives were converted to safety film. A collection of 900 stereoscopic glass negatives from the Lang-Chapin Expedition to the Congo of 1909-1915 was rehoused and 82 of the most important images were printed for use in the upcoming exhibition and publication on the Mangbetu. Rare panoramic

Museum explorer Roy Chapman Andrews, left, is seen in archival footage taken in Mongolia during the Central Asiatic Expedition of 1920-1931. "To the Ends of the Earth," a 19-minute videotape, featuring rare footage from the expedition, was produced and written by Library Services Chairwoman Nina J. Root, and directed



and edited by Volunteer Hal Bernard. Among the outstanding discoveries of the expedition were dinosaur eggs, and the skull and other bones of a *Baluchitherium*, the largest land mammal ever found. The Library's natural history film archive contains some 600 films documenting Museum expeditions.



negatives, ranging in size from 12 inches to three feet, which were taken with a Cirkut camera on the Central Asiatic Expedition of 1921-1930, were restored and printed.

Under a grant from the N. Y. State Department of Libraries a design for a new environmental system for the conservation of collections was completed. The system will maintain proper temperature and humidity levels, and provide for filtration of harmful gases and particulates. A grant was received from the same agency for a rare book refurbishing project.

As part of the long-term project to analyze and review collections, Ms. Root and Mary Genett, Library Associate, identified nearly 200 rare volumes in the general collection for transfer to the Rare Book Room. Ms. Root expanded the natural history rare book lecture series to include the newly identified rare volumes.

**Exhibits and Loans** Two exhibits, "Rhinoceros: A Beast Everyway Admirable" and "Mesoamerica: A Cultural Record," were mounted in the Library Gallery. "The Museum Prints," a collection of photographs, brochures, lecture programs and other Museum publications dating from 1871 to the present, was displayed in the Library entrance.

The paintings of Titian R. Peale continued to travel with the Smithsonian exhibition, "Magnificent Voyagers: The U. S. Exploring Expedition, 1838-1842." Three letters of E.A. Hoffman were borrowed by the General Theological Society in New York City for their exhibition, "Dean Hoffman's Grand Design," and the California Academy of Sciences borrowed Carl Akeley memorabilia for "Gorillas: The Struggle for Survival in the Virungas." Ten William Belanske watercolors and two Nicholas Pike journals were borrowed for the Museum's presentation of the Smithsonian's exhibition, "Drawn from the Sea: Art in the Service of Ichthyology."

**Services** The Library served 11,037 patrons, answered 30,539 reference questions, circulated 35,886 items, photocopied 16,414 pages for the public, received 1361 interlibrary loan requests from other libraries and borrowed 429 items for the staff. It processed 7452 photographic orders, realizing an income of \$62,640, and granted \$6106 worth of gratis permissions. It filled seven orders for film footage, realizing an income of \$9293, and sold 404 Museum slide packets.

Additions to the collection included 1962 monograph titles, 45 new serial titles and 17,311 issues. One hundred seventy volumes were transferred to the Rare Book Room, 30,617 cards

were filed in the public catalog, and 30,477 issues of scientific publications and *Recent Publications in Natural History* were distributed.

In April, online database searching through the Dialog network became available to staff members. This enables the Library to do a fast and efficient international search to discover what has been written on a subject or by a particular author. Martin Shapiro, Senior Reference Librarian, has undergone training in database searching and has thus far completed 25 searches.

**Staff Activities** Ms. Rhodes presented a paper on the importance of environmental controls for the protection of library and archival materials at the Metropolitan Museum of Art Preservation Workshop, and was appointed to the Conservation/Preservation Advisory Council of the New York Metropolitan Reference and Research Library Agency (METRO). Ms. Root was reelected to the New York Academy of Sciences publications committee.

## **Publications:**

AMNH Department of Library Services

1987. *Recent Publications in Natural History* 5(4).

1988. *Recent Publications in Natural History* 6(1)(2).

Root, N. J. [producer]

1988. *To the Ends of the Earth* [videocassette], 19 min. New York: AMNH Department of Library Services.

## Collections Management

Collections management and conservation work in the Department of Anthropology is directed toward providing the artifacts with a stable environment and assuring that exhibition halls and storerooms have environmental controls. Materials that will house and support artifacts are analyzed by the conservators to ensure that they will not damage the objects. Conservators are also consulted when collections are transferred to new storage and when objects are loaned to another museum or placed on exhibit.

The installation of the Hall of South American Peoples is an example of the use of state-of-the-art conservation techniques. This permanent exhibition includes climate control, controlled lighting and non-invasive mounts for the artifacts.

Each of the 2300 objects in the Hall of South American Peoples received complete conservation treatment before installation. This included photo documentation, condition reporting, repair of structural defects and cleaning.

Collections management and conservation specialists applied their knowledge to develop more efficient storage facilities, such as the Museum's specially designed textile storage units with built-in lightweight screen supports. This project was carried out with funding from the National Science Foundation.

Storage for oversize objects presents a major challenge for collections management staff. Boats and canoes, for example, are now stored in specially designed mobile storage units—24-foot-long multitiered shelves on wheels.

The African collections are being transferred to a new mobile (wheeled) storage system in the Department of Anthropology. The data for each artifact—its country of origin, culture, materials, dimensions and condition—are computerized, greatly enhancing the research potential of the collection.

A pilot project to combine digitized color images of the collections with text documentation is underway, supported by the Phipps Anthropology Fund and a grant from the New York State Council on the Arts. The technology was used to produce records for review by Siberian scholars who plan to report on portions of the American Museum's Siberian collections.

Conservators are investigating safer forms of pest control. Freezing techniques are being developed and used experimentally with some artifacts to avoid the application of toxic fumigants.

## Interdepartmental Facilities

The Interdepartmental Facilities provide computer and scanning electron microscope (SEM) services to the Museum community. The SEM laboratory is available to Museum staff by appointment. Although it is primarily a research tool, the SEM is also used in demonstrations to school groups as part of their study of microscopy. The computer system is used by both administrative and scientific departments for word processing, database management and telecommunications.

The past year was one of change in the Interdepartmental Facilities. The new Zeiss SEM began operating in October. A new critical point dryer was installed in March. In late spring, an energy dispersive microanalysis system (EDS) was added to the SEM.

The new SEM has a number of features which were not available on the old microscope. The new Backscatter Detector enables the SEM to produce a high contrast image even when flat specimens are observed. The Backscatter Detector can also reveal topography in objects such as shells, teeth and skulls.

A video printer was added to the choice of photographic options on the microscope. It permits SEM images to be printed at a low cost. The SEM now rests on an antivibration platform that reduces the likelihood that photographs taken at high magnifications will be flawed by vibrations.

Preparation of soft specimens for SEM observation is greatly improved by the new critical point dryer. Soft tissue contains water and the high vacuum in an SEM specimen chamber causes the tissue surface to shrivel, distorting the specimen. The critical point dryer removes water without causing tissue collapse.

The EDS permits identification and mapping of the elemental content of SEM specimens. The elements in specimens have characteristic energy spectra which can be detected and stored by the EDS system for future reference.

The new computer central processor completed its first full year of operation in April. During the year enhancements were made to existing databases for Public Affairs, Grants and Fellowships, the Planetarium, Guest Services and the Education Department. The old Volunteer Office computer data file was converted to a relational database that allows easy tracking and reporting of volunteer skills, assignments and hours. A new program was created for the Office of Public Affairs to process information from Museum visitor surveys.

## Grants and Fellowships

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The Grants and Fellowship Programs are instrumental in the Museum's role in education. These competitive programs provide support to investigators conducting basic research at many levels of development, from undergraduates to established scientists. The Grants Program offers small grants to students and recent postdoctoral investigators to pursue research projects in the field or at their home institutions. The Collection Study Program offers grants to visit the Museum's extensive collections to those students and recent postdoctoral investigators who are not within easy commuting distance. The Research and Museum Fellowship Program offers one- to two-year salaried positions (up to five years for curatorial fellows) for postdoctoral investigators to conduct their research here or at any of the field stations. The Doctoral Training Program supports the training and education of graduate fellows enrolled in a Ph.D. program with a member university (Columbia, Cornell, the City University of New York).

The Grants Program supported 210 predoctoral candidates and postdoctoral investigators. The program awarded 67 Frank M. Chapman Memorial Grants in Ornithology; 64 Lerner-Gray Grants for Marine Research; 68 Theodore Roosevelt Memorial grants in North American zoology and paleozoology; six Lincoln Ellsworth Grants for Exploration and Science in the Near Arctic; one Donn E. Rosen Grant in Ichthyology; three Southwestern Research Station Grants for research at the station and one Weatherhead Grant for Asian Studies.

Collection Study Grants, which enable students and recent postdoctoral researchers to visit the Museum's scientific collections, supported 20 researchers who visited the departments of Anthropology, Entomology, Herpetology and Ichthyology, Invertebrates, Mammalogy, Ornithology and Vertebrate Paleontology.

This year, six Research Fellows participated in the Research and Museum Fellowship Program which supports recent postdoctoral investigators, established scientists and other scholars in carrying out specific projects at the Museum for a limited period of time, usually one or two years. Raymond R. Forster, a Thorne Research Fellow in Entomology, reviewed the classification of the superfamily Araneioidea. Frances J. Irish, Kalbfleisch Research Fellow in Herpetology and Ichthyology, investigated the relationships among Neotropical xenodontine snakes of the genus *Atractus* and its allies. Maureen Donnelly, a

Boeschenstein Research Fellow in Herpetology and Ichthyology, studied the evolution of ant feeding behavior in the frog family Dendrobatidae. Peter Reinthal, a Kalbfleisch Research Fellow in Herpetology and Ichthyology, worked on the evolutionary relationships of the rock-dwelling cichlid fishes of Lake Malawi, Africa. Kirk Fitzhugh, a Thorne Research Fellow in Invertebrates, investigated the transformation, distribution and patterns of relationships of the marine worm, *Sabellid polychaete*. Gavin Naylor, a Kalbfleisch Research Fellow in Vertebrate Paleontology, traced the evolution of sharks through the fossil record by studying the change in tooth shape of the shark genus *Carcharhinus*.

The Curatorial Fellowship Program enables individuals holding doctoral degrees or equivalents to assume the duties and responsibilities of the curatorial staff for a limited term appointment not to exceed five years.

Michael Smith completed his fourth year as Kalbfleisch Assistant Curator (Fellow) in Herpetology and Ichthyology. A National Science Foundation grant supports a project on relationships of goodeid fishes based on osteological and female reproductive characters. He also estimated relationships among six genera related to *Cyprinodon* (pupfishes).

James Miller, Kalbfleisch Assistant Curator (Fellow) in the Department of Entomology, conducted revisionary research on a Neotropical group of moths, the Diopitidae, which has not been studied since 1918. This group is pivotal to an understanding of a much larger group of moths, the Noctuoidea. Dr. Miller will also use his phylogenetic reconstructions to study the evolution of host-plant associations in the moths.

The Doctoral Training Program supports the training and education of graduate fellows enrolled in Ph.D. programs at universities where the Museum participates in a joint Museum/University training program. This year the Museum supported four graduate fellows. In his second year in the program, Gregory Edgecombe, a Ph.D. candidate in the Department of Geological Sciences at Columbia University, investigated the phylogenetic history of trilobites in collaboration with Chairman and Curator of the Department of Invertebrates, Niles Eldredge. Andre R. Wyss, also in the Department of Geological Sciences at Columbia University, completed his Ph.D. requirements this year. He worked on a comparative evolutionary study of the orbital region of the skull in higher level mammals in collaboration with Curator in the Department of Vertebrate Paleontology, Malcolm C. McKenna. Bonnie Bain, a Ph.D. candidate in the Department of Entomology

at City University of New York, is working on a revision of the genus *Austropallene*. She is collaborating with Chairman and Curator Norman I. Platnick of the Department of Entomology. Patricia Escalante, a Ph.D. candidate in the Department of Ornithology at the City University of New York, is studying the geographic variation in yellowthroats (*Geothlypis*) of Baja California and western Mexico. She is working in conjunction with Chairman and Curator of the Ornithology Department, François Vuilleumier.

The programs for Grants and Fellowships are supported by the generosity of many donors to the following funds: Boeschstein Fund, Frank M. Chapman Memorial Fund, Lincoln Ellsworth Fund for Exploration and Science, Greenwall Fund, Hoffman Research Fund, the Junior Committee Fund, Franklin H. Kalbfleisch Endowment Fund, Lerner-Gray Fund for Marine Research, Theodore Roosevelt Memorial Fund, Donn E. Rosen Fund for Ichthyology, Rudin Grants and Fellowships Fund, Southwestern Research Station Student Fund, Thorne Fund and Weatherhead Fund for Asian Studies.

## Publications, Membership and Marketing

**Natural History** While an issue of *Natural History* typically offers articles on a wide range of subjects, two issues of the magazine brought together groups of researchers from disparate fields to focus on a single ecological story.

In August, the subject was the little-known natural history of Alaska's threatened Tongass National Forest, one of the last primeval rain forests in North America, and one of a handful of temperate-zone rain forests in the world. The Tongass, which has been evolving for 10,000 years, is now being rapidly and irreversibly altered by logging. Six specialists in forestry, fisheries and wildlife elucidated some of the newly understood ecological systems in an undisturbed forest.

"The Long, Hot Summer of '88," a special section on the causes and effects of drought in America's upper Midwest, appeared in January. Meteorologists and climatologists wrote of winds, jet stream, fire suppression, soil and self-sustaining dry weather patterns. Zoologists, botanists and sociologists explained why some organisms thrived (bark beetles, mountain

*Designer Thomas Page and Assistant Designer Iromie Weeramantry select photos for a feature article in Natural History magazine. Thousands of photos are*



*reviewed each year for inclusion in the magazine. Natural History, renowned for its spectacular photography, presents a wide range of natural science subjects to its half million readers.*



bluebirds), while others were sorely pressed (least terns, mallards, grasses, humans).

The impact of the ozone hole on the ecosystem was explored in October by Sayed Z. El-Sayed, professor of biological oceanography at Texas A & M University, whose experiments in Antarctica indicated that increased exposure to ultraviolet light, brought on by the thinning of the ozone layer, may have a disastrous effect on the microscopic plant life that fuels all life in the Southern Ocean.

Several articles by anthropologists revealed the conflicts between traditional and contemporary values, including "The Death of Lao Yu," William Jankowiak's account of a funeral in provincial China, and "Two Lives for the Ariaal," by Elliot Fratkin, on the influence of famine-relief programs on nomadic peoples in eastern Africa. "Henna Party" by Maria Messina offered an inside view of secular women's culture in Moslem Morocco, while "Tibetan Nuns" by Barbara Aziz documented a little known tradition among the women of Tibet.

The opening of the Museum's Hall of South American Peoples in early 1989 was reflected in *Natural History* by the publication of two major archeological articles "Long Before the Inca" by Richard Burger, associate professor of anthropology at Yale University, and "Lost Civilizations of the Lower Amazon" by Museum Research Associate Anna Roosevelt, both of which challenged previous beliefs about the development of South American civilization.

Several other Museum scientists appeared in the magazine. Dr. Novacek wrote "Navigators of the Night," on the evolution of echolocation in bats. Dr. Michael Smith authored "Drawn from the Sea," on the history of ichthyological illustration. Dr. Grimaldi described his discovery of an 80-million-year-old fossilized bee in a piece of New Jersey amber, and Sidney Horenstein, Senior Scientific Assistant in Invertebrates, told of mastodons that once walked on Manhattan Island. Dr. Kendall wrote "The Marriage of Yong-su's Mother," a Korean woman's tale of disappointment. Dr. Cole and Carol R. Townsend, Associate in the Department of Ichthyology and Herpetology, coauthored an article predicting the existence of a South American lizard that has not yet been discovered.

*Natural History's* newest columnist, Jared Diamond, Research Associate in Ornithology, produced six columns under the rubric "Nature's Infinite Book," on such varied topics as the genetics of malaria resistance, genocide, first contacts of Europeans with remote peoples and mixed-species bird flocks.

The growth and success of *Natural History* magazine's operations and Associate Membership was marked by total revenues exceeding \$11 million for the fiscal year.

*Natural History's* advertising revenues in 1988-89 were \$6.1 million, as measured by the Publishers Information Bureau. Average paid circulation exceeded 510,000 in the June report of the Audit Bureau of Circulations. The magazine plays an important role in communicating with Museum members and represents the main medium for advertising Discovery Tours and Discovery Cruises, the Members' Book Program and other Museum activities.

**Discovery Tours and Cruises** Discovery Tours and Discovery Cruises, the Museum's educational travel program, took members and friends to all seven continents. Travel programs parallel Museum research and exhibitions, and include lectures, informal discussions and meetings with local experts. Through the course of the year, 48 Museum and guest lecturers led more than 670 participants to 35 countries.

The many new destinations for Discovery Tours and Cruises included:

- \* A cruise program from Scotland to Iceland with visits to the Shetland, Orkney and Faroe Islands.
- \* A wildlife cruise program up the Orinoco and Amazon Rivers.
- \* A program tracking the endangered mountain gorillas of Rwanda, and meeting with local conservationists.
- \* A guided tour through prehistoric caves of Spain, including Altamira.
- \* A program to the Baja Peninsula at the peak breeding season for whales.
- \* A cruise up the Danube River, visiting numerous cities of Eastern Europe.

**Membership** Internationally renowned ethologists, archeologists and popular entertainers offered members scientific and cultural insights into topics ranging from current research to ancient folklore.

Highlights included a lecture by primatologist Jane Goodall on her ongoing study of the chimpanzees of Gombe, a description by archeologist Christopher Donnan of the discovery of an unlooted tomb from the Moche culture of northern Peru, and an up-to-the-minute report on the critical plight of the African elephant by the mammalogist Oria Douglas-Hamilton. Other programs included an evening with ichthyologist

Eugenie Clark and the mysterious deep sea sharks, entomologist Terry Erwin's description of his survey of insect life in the rain forest canopy of the Amazon and a look at the perils and rewards of studying tigers in the Royal Chitwan National Park of Nepal with naturalists Mel and Fiona Sunquist.

Behind the scenes tours of the Department of Herpetology and Ichthyology and the Department of Mineral Sciences were sell-out events, as were the series of geology walking tours offered by Mr. Horenstein.

Weekend programs for family audiences were greatly expanded. They proved to be a substantial financial success and generated much praise from the membership. Programs included live animal demonstrations, a dinosaur weekend, storytelling, chemistry experiments, puppet theater performances and dramatizations of classic folk tales, all of which played to sold-out houses.

In an effort to heighten awareness of Museum research, a series of talks were offered by the curatorial staff and Museum research associates. Dr. Kendall spoke on Korean Shamans, Dr. Michael Smith described the uses and techniques of scientific illustration, Mr. King lectured on the birds of China, Dr. Short spoke about African birds, Dr. Grimaldi discussed his research on insects in amber, Dr. Stiassny spoke on her discoveries regarding the ichthyofauna of Madagascar and Dr. MacPhee discussed the search for the causes of the great mammal extinctions at the end of the last Ice Age.

**Museum Shop** Sales in the Junior Shop were at a record high, marking a trend of increased buying by adults as well as by youngsters shopping on their own.

The search for varied merchandise related to special exhibits proved to be an exciting challenge. There were special books, jewelry and gift items for "Magnificent Voyagers," "Madagascar," "Bruno Liljefors," "Charles R. Knight," "Gary Larson" and "From the Land of Dragons."

The Museum Shop worked with both the Membership and Volunteer Offices in their special programs. Books are available for sale at special lectures, and assorted merchandise is provided for programs such as children's birthday parties and the origami workshop.

The opening of the Hall of South American Peoples provided the opportunity of adding to the collection of crafts and gifts from that continent. Particularly popular were crafts from Peru. The F. Schumacher Company textile firm introduced its collection "Treasures of the Ancient Andes" based on the Museum's ancient Andean artifacts.

The collection of woven and printed fabrics and wallcoverings have been well received throughout the country.

The Museum Shop's most popular items were minerals and gems, native American and Indonesian jewelry, crafts from Africa and dinosaur objects.

**Micropaleontology Press** The Press is the world's major source of reference data on the microscopic fossils used in oil exploration, and is supported by subscriptions from oil companies, geological surveys and universities.

The Press delivered four volumes of the *Ellis and Messina Catalogues of Micropaleontology*, including *Foraminifera* vol. 91, *Ostracoda* vol. 55, and *Diatoms* vols. 5 and 6, as well as a computerized database for all 40,000 species in the *Catalogue of Foraminifera*. The quarterly research journal *Micropaleontology* vol. 34 and the monthly *Bibliography and Index of Micropaleontology* vol. 17 were published together with several special works.

**Special Publications** The department ushered in many new projects over the course of the past year including one especially noteworthy catalog tentatively titled *African Reflections: Art from Northeastern Zaire*, by Dr. Schildkrout.

*Curator* began its fourth decade, with 1300 subscribers representing museums and libraries in the Americas, England and 35 other countries.

Two calendars were produced featuring treasures from the Museum's collections — "Crystals" and "Totems and Talismans: The Northwest Coast Indian Art Collection at the American Museum of Natural History." A third calendar, "Dinosaurs," highlights paintings by the great paleontological artist Charles R. Knight.

The Members' Book Program offers through its catalog some of the finest titles recently published in the natural sciences as well as related photography, art and children's books.

**Scientific Publications** The Office of Scientific Publications produces three serials, the *Bulletin of the American Museum of Natural History*, the *Novitates* and the *Anthropological Papers of the American Museum of Natural History*. Although these publications may not be immediately recognizable to the public at large, they are familiar titles to scientists conducting research in the fields of zoological systematics, evolution and anthropology.

These professional publications serve the scientific community by disseminating the results of the research that is conducted under the

auspices of the Museum. Research papers are submitted for publication through the appropriate scientific departments by Museum-affiliated authors and are subjected to professional review by specialists both inside and outside the Museum. The finished publications follow a long-held tradition of quality, with precise illustrations and detailed text.

An often overlooked benefit of the scientific publications is the enhancement of the Library's stock of professional journals. The Museum receives more than 2500 professional journals from other institutions in exchange for our scientific publications. This results in a considerable savings in journal subscription fees.

This year, the Office of Scientific Publications produced 26 issues of the *Novitates* totaling 582 pages, two *Anthropological Papers* totaling 858 pages and five *Bulletins* totaling 1189 pages.

The *Anthropological Papers* included a 500-page monograph, the third in a series, analyzing and describing the excavation of prehistoric Monitor Valley, Nevada, by David Hurst Thomas, Curator in the Department of Anthropology, and colleagues.

The *Bulletin* included a 230-page account of the rats and mice that inhabit the tropical forest streams of Central America and northern South America, written by Robert S. Voss, Curator in the Department of Mammalogy.

## Administration

**Plant Operations, Construction, Maintenance and Building Services** The Construction Department restored the Hall of Mexico and Central America to its former configuration after the exhibition "Pre-Columbian Art from the Ernest Erickson Collection" closed. Construction of the Hall of South American Peoples was completed. Construction services were provided for special exhibitions and for the new conservation laboratory in the Department of Library Services. Demolition of the old Hall of Biology of Man and of Gallery 1 were completed and plans implemented for the Hall of Human Biology and Evolution, scheduled to open in 1991.

Major renovations throughout the Museum were made by the carpentry, painting and masonry shops of the Construction Department. These included permanent offices for the Department of Mineral Sciences, temporary offices for the President and his staff, additional space for the Rare Book Room and expanded storage areas for the Museum Shop.

Other office renovations were completed for the Departments of Anthropology, Ornithology, Mammalogy, Education, Guest Services and for the Friends of the Origami Center of America. Designs for additional space were developed for the Financial Office and the Department of Development and Public Affairs. Plans were also developed for a molecular systematics research laboratory for the Department of Invertebrates and a compact storage area for the Department of Entomology.

The Construction Department monitored rehabilitation projects funded by the New York City Department of Cultural Affairs and the Department of General Services. These included exterior facade and roof rehabilitation, construction of a firestair tower adjacent to the building housing the Hall of South American Peoples and installation of an emergency power generator. New heating, ventilating and air conditioning systems were installed in the American Museum-Hayden Planetarium's library and gift shop as well as in the Hall of the Sun. Heating, ventilating and air conditioning systems were upgraded for the Main Auditorium, the building housing the Hall of North American Mammals and the Planetarium's Guggenheim Space Theater.

In other projects, vent and gas lines, an acid neutralization tank and filtration system were installed in the library's conservation laboratory, a program was developed for the rehabilitation of

steam and condensate lines and repair or replacement of water tanks, and the Building Services Department worked with the New York City Departments of Cultural Affairs and General Services on the design phase of a city capital budget project to convert the Museum's security system to a multiplex computerized intrusion and fire alarm system.

**Financial Operations** In 1977, the Offices of the Assistant Director for Financial Operations began to use the services of an outside service bureau for the computerization of the general ledger and related reports. In recent years the complexity and size of the Museum operations have increased beyond the capacity of the outside service bureau to provide the financial information required for timely and efficient reporting. It was recommended that an in-house computer system be used for general ledger and related reports.

The Museum obtained a grant of \$250,000 for the computer hardware from the City of New York through Manhattan Borough President David N. Dinkins. The software, estimated at \$200,000, will be purchased from Museum funds.

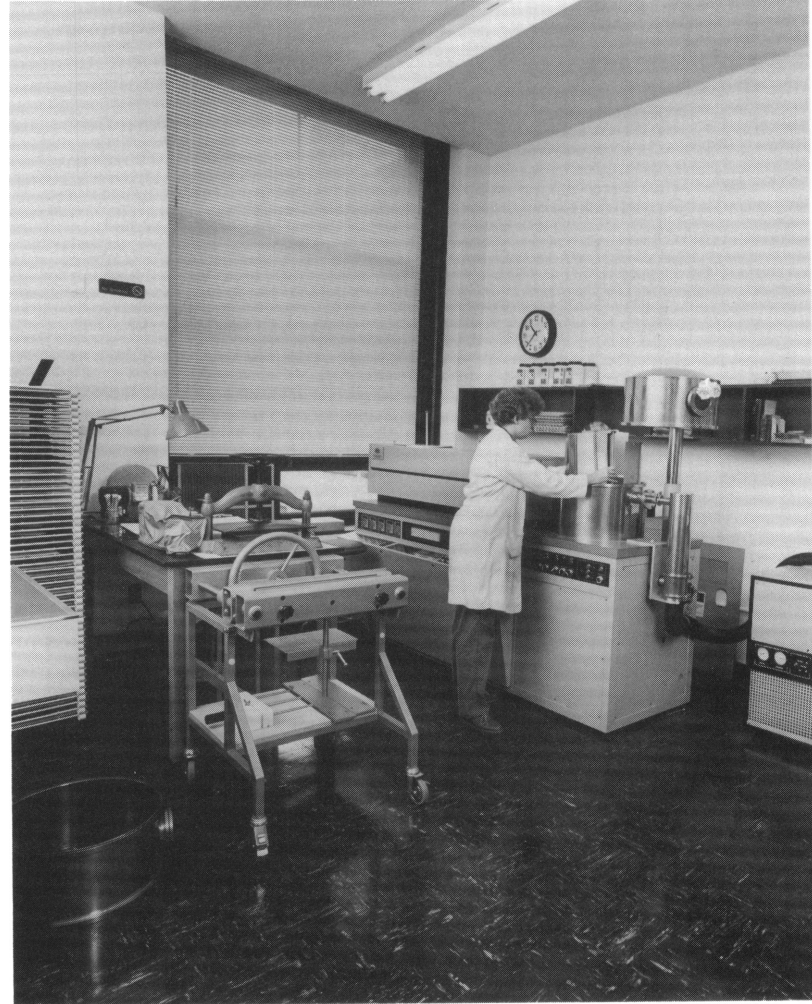
**Naturemax Theater** The film "Grand Canyon: The Hidden Secrets," drew large audiences to the theater. Two other films, "Behold Hawaii," which depicts a young man's search for his heritage, and "Dance of Life" were also featured.

The theater was closed for renovation for three weeks in June. The work included installation of a back-up sound system and upgrading of the existing one.

The Museum joined the Museum Film Network, an international organization of museums and space theaters interested in producing scientific and educational films in the IMAX/OMNIMAX format.

**Museum Attendance** Attendance for the 1988-89 fiscal year totaled 3,089,409. This figure includes 2,502,882 to the Museum and 586,527 to the Planetarium.

*Conservation Manager Barbara Rhodes uses a coater to treat fragile library materials at the new conservation laboratory in the Department of Library Services. The Museum's Construction and Maintenance Departments build and in-*



*stall major facilities, such as the Library's new conservation laboratory. The departments also coordinated projects at the Museum that were funded by the New York City Department of General Services and the Department of Cultural Affairs.*



## Development and Public Affairs

**Development** Individuals, corporations, foundations and government agencies contributed more than \$6 million to the Museum. The number of individual donors increased by 40 percent. A direct mail campaign to recruit new donors, the upgrading of members' gifts, and appeals to Discovery Tour alumni all contributed to the increase. Development also began to test telemarketing appeals. A new research position was created to coordinate prospect research and identify new donors of major gifts.

Museum contributors were invited to many events including previews of the Hall of South American Peoples and the Madagascar exhibition. Development began a program of curatorial tours in which members of the Friends group were invited to meet the curators in their laboratories.

Under the leadership of Trustee Donald Platten, the Corporate Campaign saw increases over the previous year both in dollar amounts and numbers of donors. More than 200 companies participated. Officers of contributing corporations were invited to have lunch, tour the scientific departments and meet the staff. Employees of donor corporations were invited to private Naturemax screenings and previews of exhibitions. Eleven such events were attended by 2000 guests.

Development continued to solicit bequests through advertising in *Natural History* and notices enclosed in membership acknowledgment letters. A program was begun to promote other kinds of planned gifts such as charitable remainder and lead trusts.

Foundations and government agencies, leading corporate contributors and individual donors that funded major Museum activities are acknowledged with thanks elsewhere in this report.

**Benefit Events** The first meeting of the new Special Events Council in October was followed by a tour of the Hall of South American Peoples. The Council sponsored tours in Mammalogy, Mineral Sciences and Vertebrate Paleontology.

The success of the annual Halloween Party generated interest in planning an event for older, former attendees. The "Rock Around the Rocks" dance in the Hall of Meteorites featured live music, a treasure hunt and a contest to guess the weight of the Ahnighito Meteorite. The ever successful Halloween Party, as well as events for sixth and seventh graders, are planned for next year.

Mrs. James Figg and Mrs. Charles Mallory chaired the "Hot Time in the Tundra" evening in

the Hall of Ocean Life. The imaginative setting encouraged various styles of "arctic" dress. The party brought out in full force both new and past members of the innovative Junior Committee. Proceeds from the event will fund a symposium at the Museum in the spring on the environment.

Plans were made for a glamorous benefit dinner dance to be held in December to open the "Crossroads of Continents" exhibition. A vigorous committee effort is underway to make the benefit memorable and profitable. The Cochairmen are Mrs. Richard Kessler, Mrs. Frank A. Metz and Mrs. Stephen Spahn. The Honorary Chairmen are Mrs. Philip F. Anschutz, Mrs. Charles A. Dana, Jr., Mrs. Thomas M. Evans, Mrs. Henry Clay Frick II, Mrs. Robert G. Goelet, Mrs. Arthur Ross and Mrs. Yves H. Robert. Mrs. Constantine Sidamon-Eristoff is Patron Chairman and Frank G. Lyon is Dinner Chairman.

**Public Affairs** Two unique Museum programs, the Tibetan Sand Mandala and the Tibetan Butter Sculpture demonstrations, sponsored by the Department of Education, attracted widespread media attention.

The summer's sand mandala demonstration featured four Tibetan Buddhist monks who created an intricate seven-foot painting with brightly colored grains of sand. Due to extensive print and broadcast coverage, 50,000 people visited the demonstration in six weeks. Kay Larsen, *New York* magazine's art critic, wrote a full-length article, and *Time* magazine, The New York Times, Associated Press, local news stations, Cable News Network, magazine-format shows like WABC's "New York Views" and Fox TV's "Good Morning New York" also covered it.

When 10 Tibetan Buddhist monks created elaborate sculptures from a butterlike substance before the public for the first time, the press was invited for photo opportunities. This resulted in coverage in *People* magazine and on news broadcasts that reached 6.5 million households. More than 70,000 Museum visitors saw the demonstration.

The opening of the Hall of South American Peoples received widespread media attention. Special tours were set for art critics, editors and print and broadcast reporters with Curators Robert L. Carneiro and Craig Morris of the Anthropology Department. The hall was covered by such national print media as The Wall Street Journal, The Christian Science Monitor, *The New York Times Magazine*, *Travel & Leisure*, *Archaeology*, and *Diversion*. The hall was featured in *Vista*, a Hispanic-oriented Sunday supplement carried in 28 U.S. cities.

Public Affairs produces a national radio series now distributed to 697 stations. The 13-week, three-minute segments are offered three times a year. The spring and fall series featured interviews between Director Emeritus Thomas D. Nicholson and Museum scientists. The winter series presented Editor Alan Ternes interviewing the authors of *Natural History* articles.

More City and State representatives than ever attended "Legislators Night" with their families. The evening, designed to acquaint legislators with Museum programs, featured a tour of the Hall of South American Peoples and the natural history of New York State.

Exhibitions and other programs were further promoted through full-page advertising in The New York Times and *New York* magazine. Radio ad campaigns, targeting diverse segments of prospective visitors, complemented the print advertising. Ogilvy & Mather created the ads.

**Guest Services** The Office supports the programs of all Museum departments. These include the Margaret Mead Film Festival, Members' birthday parties, Education's Camp-Ins, and a variety of lectures, meetings, classes, media events, screenings, performances and social events.

Opportunities for presenting the Museum to special audiences increased. Events were staged for corporations, scholarly groups and others. They added substantial revenue to support the work of the Museum. Because numerous inquiries are received concerning policy and availability of space for such events, an informational mailing package was produced.

Events this year included the promotional launching for the Nissan Motor Corporation's 1990 "Z" car in the Hall of Ocean Life, and Lancome's Noctosome, a new nightcream, in the Planetarium. The 1000-seat Main Auditorium was the site of a symposium for the Junior Academy of the New York Academy of Sciences, and Fall programming announcements by ABC Television Network and Fox Broadcasting Company.

Other events were staged for The New York State Council on the Arts, BP North American Petroleum, Inc., Goldstar Electronics International, Inc., Central Synagogue, Citibank, Committee on the Supreme Court, New York Lawyers' Association, Maurice Villency, Inc., Ross & Cohen, Willkie Farr & Gallagher, Johnson & Johnson, the Boone and Crockett Club, Showtime/The Movie Channel, American Brands, Inc., New York Fashion Council, Radio City Music Hall, New York Telephone, J. Walter Thompson, N.Y. City Board of Education, Merrill Lynch, Cosmetic Executive Women, Inc., Sherman & Sterling,

*Volunteer Darya Siachitano at work in the Anthropology Department cataloging archeological material collected from St. Catherines Island, Georgia. Here she is entering data on a 17th-century Spanish Majolica plate. Volunteers play important*



*roles in the Museum, from the very visible Museum Highlights Tour Guides and Information Desk personnel to behind-the-scenes departmental workers like Ms. Siachitano. More than 500 volunteers gave a total of 94,531 hours of service to the Museum during 1988-1989.*

WOR Radio, Angeles Corporation, New York Regional Association of Grantmakers, Chemical Bank, Johnson & Higgins, National Association of Museum Exhibitors, Special Libraries Association, Flushing Hospital, WPLJ Power Radio 95, Association of Bank Holding Companies and Johns Hopkins University.

The American Museum Restaurant served 52,235 members and other visitors. The Food Express accommodated an additional 627,828, and the Employees' Dining Room served 88,603 employee meals.

Prospective visitors received information brochures, printed in several languages, at tourist centers and travel outlets. New equipment was installed to improve recorded telephone information services for the public. Floor plans, printed in English and five other languages, were updated to feature special exhibitions. Topical information was provided on the closed circuit television system.

**Volunteers** A total of 106 volunteers worked on a Public Affairs visitor survey; 59 volunteers taught at the Origami teaching tables; 36 worked for the Education Department assisting with Camp-Ins and weekend Children's Workshops; 17 assisted when Tibetan monks created butter sculptures and 46 worked at the Margaret Mead Film Festival. Four volunteers served as docents for "Dreamings: The Art of Aboriginal Australia" at the Asia Society. Eighteen volunteers staffed a booth at the Central Park Conservancy's annual "You Gotta Have Park" weekend.

All of these tasks were performed over and above the volunteers' regular assignments. During the 363 days of the year that the Museum is open to the public, 530 volunteers gave 94,531 hours.

Volunteers who worked 1000 or more hours received letters of recognition. All volunteers were feted at a reception hosted by President and Mrs. Langdon. The Library Volunteer Support Team was honored at a City Hall reception hosted by Borough President David N. Dinkins. Information Desk volunteer Joan Bull received a Certificate of Merit from the New York Convention and Visitors Bureau for her "outstanding representation of Big Apple hospitality."

There was a four percent increase in Museum Highlights Tours, and the number of guides in the program increased to 71. Guides gave tours of New York State exhibits to State and City officials and of scientific departments to Museum members. Special tours were offered of the new Hall of South American Peoples (an especially popular one) and the exhibits on Madagascar and 19th-century exploration.

Educational groups taking Museum Highlights Tours came from Greece, the USSR and Korea, and from American universities including Barnard, Fordham, Trinity and Southern Ohio. English as a Second Language students at New York University's American Language Institute program were also given a series of tours of the Museum.

Volunteers contributed to the research capabilities of the scientific departments. Walter B. Elvers, a retired dentist, developed such an innovative technique for extracting fossils from matrices, that he was asked to present his method at the annual meeting of the Society of Vertebrate Paleontologists. Harold Bernard, a retired video editor, working with Library Chairperson Nina J. Root, produced a 19-minute video on the Roy Chapman Andrews 1920s Central Asiatic Expeditions. Other volunteers worked at field stations in Long Island Sound and in Arizona.

The Volunteer Office contributed to the profession of volunteer management by compiling a directory of volunteer programs for distribution to administrators in New York City. Mitzi Bhavnani, Manager, chaired a session on the profile of the volunteer of the 1990s at the American Association of Museums' annual meeting.

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 Ornithology Research – Ornithology  
 Mrs. Constantine Sidamon-Eristoff  
 Special Course Fund  
 President General Fund  
 Herpetology General Fund

Mr. and Mrs. Richard A. Sloss  
 Ornithology Research – Ornithology  
 Frank B. Smithe  
 Ornithology Research – Ornithology  
 Melanie L. J. Stiassny  
 Fish Research Fund – Ichthyology  
 Mr. and Mrs. Edward E. Wardwell  
 Gardner Stout Memorial Fund

#### **\$500 and over**

Richard Bohart  
 Southwestern Research Station  
 George T. Delacorte  
 Textile Conservation Fund –  
 Anthropology  
 Ann M. Lacy  
 Great Gull Island Project – Ornithology  
 Mary K. LeCroy  
 Great Gull Island Project – Ornithology  
 Mrs. Francis H. Low  
 Ornithology Research – Ornithology  
 New York Shell Club  
 William Old Malacology Fund –  
 Invertebrates  
 Student Fund  
 Justin O'Brien  
 Great Gull Island Project – Ornithology  
 Mr. and Mrs. Gale G. Pasley, Jr.  
 Margaret Mead Film Festival –  
 Education  
 Theodore Roosevelt Association  
 Theodore Roosevelt Memorial Fund  
 Time-Life Books Inc.  
 Photo Collection Special Fund  
 Thomas Wismuller  
 "African Reflections" Exhibition –  
 Anthropology

#### **GOVERNMENT GRANTS AND SUPPORT**

##### **Source Amount/Purpose**

National Science Foundation  
 \$300,000/Hall of Human Biology and  
 Evolution  
 \$377,730/Curatorial Support for  
 Entomological Collection  
 \$152,810/New Scanning Electron  
 Microscope  
 \$59,593/Scallops of the Permo-Triassic  
 Crisis  
 \$57,600/Mantle Oxidation States and  
 the Solubility of Oxygen in Diamond  
 \$41,994/REU: Evolutionary Biology at  
 AMNH  
 \$13,500/Japanese Language Fellowship  
 \$5,600/Archaeological Research on  
 Marajo Island, Brazil

National Endowment for the Humanities  
 \$60,000/Ancient Andean Civilizations  
 Publication  
 National Heritage Trust  
 \$25,000/Margaret Mead Film Festival  
 New York State Council On Arts  
 \$600,000/General Operating Support  
 \$8,000/Black History Month  
 \$8,000/Asian Programs  
 \$20,000/Northwest Coast Storage  
 Maintenance  
 \$10,000/1988 Margaret Mead Film  
 Festival  
 \$7,500/Salsa Program  
 New York State Library  
 The State Education Department  
 \$16,500/Conservation/Preservation of  
 Library materials

#### **BEQUESTS**

Estate of Seraphine Albisser  
 Estate of John N. Blackman  
 Estate of Dorothy Bliss  
 Estate of Arthur O. Choate, Jr.  
 Estate of Evelyn Combes  
 Estate of Charles Ettl  
 Estate of Mary Hemingway  
 Estate of Veronica P. Johnson  
 Estate of Leonard LaGrange, Jr.  
 Estate of Hazel Ramsay  
 Estate of Hope Sayles (Anonymous Gift)  
 Estate of Richard Shields  
 Estate of Ruth Somerville  
 Estate of Alvin Stockman  
 Estate of Mildred G. Uhrbrock  
 Estate of Emanuel Weil  
 Estate of George Willett

#### **MEMORIAL GIFTS**

The American Museum wishes to express  
 its appreciation to those who contributed  
 funds in memory of:

Gordon Ekholm  
 Sibyl Golden  
 Elizabeth McR. Herman  
 Donald Kinney  
 Virginia McCarthy  
 Margaret Mead  
 Veronica Johns Parker  
 Clare Kellogg Stout

## GIFTS-IN-KIND

### Department of Anthropology

*420 Pre-Columbian and ethnographic artifacts*; made of clay, stucco, stone, jade, obsidian, paper, shell, gold, tumbaga, silver, wood, feathers, textiles, and bone: including vessels, a metate, mace heads, pendants, a plaque, figures, rings, masks, stamps, a labret, a bell, a bead, earspools, a paper fragment, a lithic blade, hachas, a plamate stone, yokes, whistles, trumpet, sculptures, a knife handle, flutes, a drum, censers, a balance beam, looms, a finial, and textiles including sashes, shirts, mantles, tassels, a head band, bags, and blankets; representing various cultures and styles from Mexico, Central America, South America and the Southwest United States; 60386

Ernest Erickson Foundation  
Abraham S. Guterman, President

*Two Pre-Columbian Artifacts*; textile fragment, *Recuay Culture* (200 B.C.–A.D. 500), Peru; *Ceramic sculpture depicting four human figures, Nayarit Culture* (400 B.C.–A.D. 200), Mexico; 60512, 60594  
Eugene Schnell

*Two stone sculptures from India*; pink sandstone relief of a four-armed *yaksha*, Central India, 9–10th century A.D. Gray schist relief of male figure holding a wine cup, Gandhara, 3rd–4th century A.D.; 60641

Barbara Stoler Miller

*14 ethnographic artifacts*; including nine sculptures in soapstone and slate depicting lifeways and legends; two soapstone lamps; one snow knife, one *ulu* knife; one fishing spear; Eskimo People, Quebec Province, Canada; 20th century; 60647

The Estate of Harry Goldsmith

*Five barkcloth mask costumes*; belonging to Cubeo Indians from Columbia; 60517  
Irving Goldman

*Four blackware ethnographic ceramics*: platter signed “Marie & Julian,” San Ildefonso Pueblo, N.M.; vessel signed “Juanita,” San Ildefonso Pueblo, N.M.; two bowls, one marked “Sta. Clara” Pueblo, other bowl unmarked; 60546

David W. DeArmand in memory of  
Frances Ullman DeArmand

*22 artifacts from the Rikbaktsá Indians and the Matis Indians of Brazil*; one feather headdress, one pair ear ornaments of land snail shell, one pair bracelets of palm fiber, one pair armbands of monkey teeth, one nose ornament of shell, one facial ornament kit of palm wood sticks wrapped in palm leaf, four swing needles, two pottery bowls, two baby carriers (slings), one fish scoop net of palm fiber, one bow of palm wood, five arrows with bamboo point, and one tool for sharpening arrow points, with rodent incisor; 60567  
Richard Melnyk

*Three Ikat cotton shrouds*; belonging to Toradja People; from Sulawesi, Indonesia; 60595

James Judge

*17 ethnographic artifacts*; including a shofar, Yemen; two phylacteries, a dreidel, a torah house and scroll, Israel; two torah finials and a marriage contract, Iran; a scribe's case, Turkey; a Mezuzah case, India; a lamp, Lebanon; two torah finials, Afghanistan; a torah case with two finials, Iraq; a Hanukkah lamp and a torah pointer, Syria; a Passover bowl, Kurdistan; a skull cap, Bukhara; 17th to 20th centuries; 60570  
The Henry Kaufmann Foundation

*Trophy head (Tsantsa)*; Jivaro Indians; Ecuador; 20th century; 60640  
Kathryn and Theodore Uebel

### Department of Entomology

*Miridae (Heteroptera)*; 60558  
Michael D. Schwartz

*1977 assorted butterflies and moths (Lepidoptera)*; 60543  
Bryant Mather

*2040 assorted moths (Lepidoptera)*; 60542  
George Balogh

*6341 geometridae (Lepidoptera)*; from Guatemala; 60539  
Frederick H. Rindge

*2500 spiders*; from Maine; 60437  
Daniel T. Jennings

*100,000 diptera in alcohol from Malaise trap samples*, assorted families; from Costa Rica; 60431  
Daniel Janzen

### Department of Invertebrates

*1653 lots (8631 specimens) marine mollusks*; from the Panamic molluscan faunal province (West Mexico to Panama); 60586

Helen DuShane

*Collection of malacological books and reprints*; 60488

Bruce Einsohn

*Two paratype specimens Phyllonotus eversoni*; D'Attilio, Myers & Shasky, 1987 (*Mollusca: Gastropoda*); from Cocos Island, Costa Rica; 60476  
Doug von Krieglstein

### Department of Herpetology and Ichthyology

*1032 preserved amphibians and reptiles*; from Massachusetts, New York, Connecticut, Rhode Island and Santa Domingo; 60553

Michael W. Klemens

### Department of Library Services

*15 boxes of photographic documentation collected worldwide by Philip Hiss*; 60569  
Diane Hiss

### Department of Mineral Sciences

*22.56 carat natural emerald crystal*; recovered from the wreck of Nuestra Senora de Atocha in 1986; 60568

James B. Murphy, II and Alden R. Murphy

*Golden brown oval-cut zircon weighing 55.57 cts. and measuring 21.1 × 18 × 13.8 mm.*; from Sri Lanka; 60551  
Arthur A. Rasch

*Four specimens*: enargite, Peru; smithsonite, Namibia; chalcopyrite, Mexico; ferberite, Portugal; 60409  
Carl Krotki

*One terminated bicolored elbaite tourmaline crystal measuring 17.8 × 14.5 × 12.0 cm. weighing 4650 grams*; from Brazil; 60389  
Adele S. Blank

### Office of Volunteer Services

*Photocopying of training materials for the Museum Highlights Tour guide trainees*  
Ross & Cohen







### **REFLECTIONS ON THE FUTURE**

Your bequest or charitable trust to the American Museum of Natural History will help promote an understanding of our natural world for generations to come.

Please consider the significant tax savings for your estate while making a gift to the Museum through a legacy or through other forms of planned giving. A simple bequest in your will may be created with the wording:

“I give and bequeath (percent of estate, securities, cash or other assets) to the American Museum of Natural History, New York, New York, for its general corporate purposes.”

To discuss opportunities for support of the Museum and its programs, please contact David Estridge, Senior Vice President for Development and Public Affairs, American Museum of Natural History, Central Park West at 79th Street, New York, NY 10024-5192. Telephone: (212) 769-5151.



**COVER:** The richness and diversity of materials in the Museum's collections are evidenced in its exhibitions and research facilities. This detail of a rare burial mantle from the Paracas culture of Peru is in the Museum's outstanding collection of South American textiles. It was made between 300 B.C. and 100 B.C. for a person of high social standing. The mantle is made up of 88 embroidered rectangles alternating with 87 woven squares. Fourteen different colored threads were used in the embroidery. The figure is a mythical being, combining both human and animal characteristics, and was often depicted on later Nazca ceramics. It was a common motif and for several centuries was used in increasingly stylized and simplified versions by Nazca artists. Similar textiles and more than 2300 other artifacts may be seen in the Museum's newest permanent exhibition, the Hall of South American Peoples.

