



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

One hundred and seventeen years ago, the American Museum defined its purpose as "encouraging and developing the study of natural science, of advancing the general knowledge of kindred subjects, and to that end of furnishing popular instruction and recreation." Through its history, the Museum has developed its interdisciplinary scientific focus and is today one of the preeminent institutions in the anthropological, mineralogical and zoological sciences.

A staff of 200 scientists and their assistants are involved in studies at the frontiers of the basic sciences. Their research ranges from formulating theories of dinosaur extinction to describing new marine larvae. Their findings are shared with other scientific and cultural institutions and the general public through symposia, articles, books, lectures and exhibitions. The results of their basic research may be applied to technology in areas such as the health sciences, mining and agriculture.

The largest natural history museum in the world, the American Museum has 22 interconnected buildings, 39 exhibition halls, 9 scientific departments, a collection of artifacts and specimens totaling nearly 36 million, five theaters, a library, laboratories, classrooms, service shops and food service facilities. Its collections are managed under some of the most technologically advanced conservation procedures in existence to insure their stability and perpetuation.

The Museum's visitorship averages more than 2.5 million a year, its members number more than 500,000, and the number of children the Museum instructs through its Education Department programs, the Hayden Planetarium and the Naturemax Theater totals 225,000.

A private institution, the Museum receives support from a number of major sources for its programs and facilities. These include the City of New York which provides budgetary funds and owns the buildings, the New York State Council on the Arts, National Endowment for the Arts, National Endowment for the Humanities,

National Science Foundation, Institute of Museum Services, some 300 corporations, 100 private foundations and numerous individual contributors. Additional significant sources of revenue are membership fees and visitor contributions. These sources enable the Museum to maintain its commitment to science and culture.

HIGHLIGHTS

1985/July

- "The Art of Cameroon," a special exhibition reflecting the rich culture of the West African nation, opened in Gallery 1. The exhibition, displaying some 150 objects, including wood carvings, beaded sculptures and jewelry, was made possible by a grant from Mobil.

September

- The Margaret Mead Film Festival, the nation's preeminent showcase for ethnographic films, celebrated its ninth season. Forty-four anthropological documentaries were featured.

October

- The photographic exhibitions, "Tiger, Tiger Burning Bright: An Indian Wildlife Portfolio," and "Vijayanagara: Where Kings and Gods Meet," opened in the Naturemax Gallery as part of the nationwide Festival of India celebration.
- Mamenchisaurus, the first of two recreations of spectacular dinosaur specimens from China, was exhibited in the Roosevelt Memorial Hall. Assembly of the second dinosaur specimen, Tsintaosaurus, also began. Both dinosaur replicas were on exhibition through January.

November

- The exhibition, "Masterpieces of the American West: Selections from the Anschutz Collection," opened in Gallery 3. The work of 65 artists was featured in a 500-piece collection focusing on the American west and native American life. The exhibition was supported by a grant from Mobil.
- The third annual T.C. Schneirla Conference, "The Evolution of Social Behavior and Integrative Levels," featured speakers including B.F. Skinner, Stephen Jay Gould and Niles Eldredge.

December

- The "Brazilian Princess" topaz, at 21,005 carats the world's largest cut gem, arrived at the Museum from an anonymous donor and was put on public exhibition.

1986/January

- Governor Cuomo and Cardinal O'Connor visited the Museum to attend the meeting here of the New York Press Club.
- Museum membership went over the 500,000 mark.
- The New York State Council on the Arts continued to provide operating support with a grant of \$585,000 and provided additional support for the Margaret Mead Film Festival.
- The Mobil Corporation underwrote the Museum's Friday and Saturday evening free admission program for the fifth consecutive year.
- During the second annual "Legislator's Night," the Museum played host to members of the New York State Assembly, New York State Senate, New York City Council, and their families.

February

- Black history month was celebrated at the Museum. Themes ranged from Afro-American cooking to African healing practices. The demonstrations and performances were in the Leonhardt People Center of the Charles A. Dana Education Wing.

March

- The exhibition, "Gypsies: Photographs of Jan Yoor, 1930s — 1970s," opened in the Akeley Gallery, providing authentic views of Gypsy life in diverse situations.

April

- The Ivory-billed Woodpecker, thought to be extinct, was sighted in the mountains of eastern Cuba by a research team led by Lester Short, Chairman of the Department of Ornithology. At least one male and possibly two female Ivory-bills were spotted a total of eight times.
- The Howard Phipps Foundation and the L.A.W. Fund continued to support the restoration of the Theodore Roosevelt Memorial Hall with gifts of \$250,000 and \$118,000, respectively.

May

- "Japan Month" was celebrated at the Leonhardt People Center of the Charles A. Dana Education Wing with performances of Japanese music and dance, and demonstrations of Japanese art.

- The Annie Laurie Aitken Charitable Trust was established as an endowment fund of \$250,000 in her memory.

- The Museum was again accredited by the American Association of Museums.

June

- "Wolves and Humans: Coexistence, Competition and Conflict," an exhibition exploring the biological, social and mythological connections between humans and wolves, opened in Gallery 3. It was organized by the Science Museum of Minnesota.

- "Lost and Found Traditions: Native American Art 1965-1985," a special exhibition of contemporary artworks by American Indians, based on their cultural traditions, premiered in Gallery 1. The exhibition was organized by the American Federation of Arts and supported by grants from the American Can Company Foundation.

- A gift of \$1,826,000 was received from the estate of Clara S. Peck, a longtime friend of the Museum, to perpetuate her memory and help assure the continuation of the Museum's research, education and exhibition programs.

- The films, "On the Wing," "Skyward" and "Nomads of the Deep," opened in the Naturemax Theater. "The Dream Is Alive," a film about the space shuttle, continued to be popular.

- Thomas D. Nicholson, Director of the American Museum, served as General Chairman of the annual meeting of the American Association of Museums. The meeting, in New York City, drew more than 4000 AAM members.

117th ANNUAL REPORT 1985/86 AMERICAN MUSEUM OF NATURAL HISTORY

Page	Contents
2	Report of the President
6	Director's Message
10	Anthropology
14	Astronomy and Planetarium
16	Entomology
21	Herpetology
24	Ichthyology
27	Invertebrates
31	Mammalogy
35	Mineral Sciences
40	Ornithology
44	Vertebrate Paleontology
49	Research Stations
52	Education
53	Exhibition and Graphics
55	Library Services
58	Collections Management
59	Interdepartmental Facilities
59	Grants and Fellowships
60	Publications, Membership and Marketing
64	Administration
66	Development and Public Affairs
70	Officers, Trustees and Staff
75	Members Elected by the Board to Higher Categories
	Contributors
75	Unrestricted Gifts
78	Restricted Gifts
79	Government Grants and Support
79	Gifts-in-Kind
	Financial Statements
A-3	Treasurer's Report
A-4	Statement of the Museum
A-10	Statement of the Planetarium

One hundred and seventeenth Annual Report of the President

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

When the founding Trustees incorporated our institution as a "Museum and Library of Natural History" in 1869, they knew what they were doing. In those days, the essential characteristic of a museum was understood to be its collection—a body of material evidence related clearly to the subjects the Museum would cover in its scholarly, educational and recreational activities. This still holds true today!

The collection our founders expected their successors to gather has now grown to 36 million specimens; and it is still expanding, sometimes by gift, sometimes by transfer from other institutions, occasionally by purchase and continually through field-collecting carried out by our scientific staff in connection with their work. The additions that have swelled our collections of fish in recent years illustrate not only the process and extent of this growth but also its significance for our work.

Three years ago, we acquired 200,000 specimens of North American fish when the Virginia Polytechnic Institute transferred its entire collection to us from its former home in Blacksburg. More recently, we received 105 drums of well-preserved and well-documented material collected from the Hudson River during a survey by several power companies to evaluate the effects of future power plant construction on fish life. In addition, we were given some 23,000 lots (perhaps 250,000 specimens) of larval fishes gathered as part of the same survey, an unexpected treasure trove of underwater fauna poorly known to science. This year, we were given the collections gathered during another Hudson survey, to assist in identifying the possible effects of the Westway pro-

ject on the river's fish life. While Westway may one day be forgotten, the 70 drums of excellent material we received are now in the permanent collections of the Department of Ichthyology, where they are part of what *New York Magazine* jokingly referred to as "more pickled fish than Zabars!"

But all of our fish are not pickled. Since 1982, Herbert R. Axelrod has been gradually transferring to our Department of Vertebrate Paleontology what may be the most significant evidence in any institution of what life was like in the early Cretaceous period, some 90 to 110 million years ago, when a great Southern Hemisphere land mass split apart to become the continents we now know as Africa and South America. Including his substantial gifts this year, Dr. Axelrod has given us nine separate accessions totaling 22,581 specimens of fossil fish and other fossilized faunal material from a site in northeastern Brazil in the state of Ceara, now several hundred miles inland from the sea. Though most of the specimens received from Dr. Axelrod are fossil fish, the collection also includes preserved examples of a very diverse fauna from the late Jurassic and early Cretaceous periods, including turtles, pterosaurs (flying dinosaurs), a crocodile and several thousand insects. The latter is one of the largest groups of fossil insects representative of life in that long ago period. Most insect fossils are known from specimens embedded in amber, as in the example shown in our cover photograph. The examples found in the Brazilian shale are particularly rare and much older.

The significance of the Axelrod collection is beginning to be recognized. It is under study by the research fellow funded by Dr. Axelrod. The collection illustrates what appears to be a restricted inland distribution of a fresh water fauna that was later disturbed when an arm of the sea intruded to introduce marine life forms. The several dozen coelacanth specimens found in the collection thus far illustrate the puzzle. Originally a fresh water group, the coelacanths eventually became marine fishes. The specimens in the Axelrod collection, including the

first complete coelacanth found in South America, represent two distinct populations of this group, one a fresh water genus previously found elsewhere in Brazil and also identified in collections from West Africa and Morocco, and a second which appears to be a marine organism and is thus far known only from this material.

As we continue to split apart the stone concretions and shale slabs in which these specimens are preserved, we expect to further illuminate the diversity and distribution of life during those early millennia when the continents of today took their present form.

Large as our collections are, they represent only a fraction of the diversity of life forms. Members of our scientific staff are continually adding to the Museum's holdings through fieldwork and exchange with colleagues and institutions worldwide. Their relationships with colleagues stimulate gifts, as do the significance and reputation of the Museum and its collections.

In December, the "Brazilian Princess," the world's largest cut

A Pueblo painted wooden ceremonial headdress from Jemez, New Mexico, and a headdress-adorned Hopi Kachina doll, both from the American Museum's collections, occupied an exhibit case adjacent to the oil painting (inset), The Niman Katchinas, by Carl Oscar Borg, in the exhibition, "Masterpieces of the American West: Selections from the Anschutz Collection." Specimens drawn from the anthropological collections gave added dimension to the exhibition.



gem, arrived at the Museum. The nearly flawless 21,005-carat topaz, given by an anonymous donor, became the focus of broad media and public attention. The gem was prominently displayed in the Roosevelt Memorial Hall.

Our mineral and gem resources were enriched also by a diamond and sapphire pendant given to us by Mr. and Mrs. George A. Argabrite. This striking piece of jewelry is on exhibit in the Morgan Hall of Gems.

One specimen that was *not* collected was the Ivory-billed Woodpecker, among the world's rarest birds. During one of the Museum's field trips this year, the bird was located high in the mountains of Cuba. Lester L. Short, Chairman and Curator in the Department of Ornithology, had been invited by the Cuban Direccion de la Flora y Fauna to lead a group of visiting and local ornithologists in search of the Ivory-bill. Dr. Short and his team located the woodpecker near a lumber camp in northern Guantanamo Province. Little solid evidence had been presented over the past 30 years to suggest that the bird still existed in Cuba.

The rarity of the Ivory-bill highlights the importance of scientific collections. The Museum has excellent specimens in its bird collection, acquired many years ago when the species was not endangered. This resource will be carefully conserved and made available to scientists and students long into the future. We are increasingly aware that animal and plant species, and human cultures are fragile and may all too easily be changed or destroyed. Their real or threatened loss adds greater significance to systematics collections. We may not be able to collect tomorrow; the material may not be there.

Clearly the Museum is a magnet for collections. This reflects in part a long tradition of maintaining these materials and of using them to support research and exhibition. Our collections are also the strength and focus of our 38 permanent exhibit halls. Our holdings are supplemented in special exhibitions by collections on loan from other institutions, just as we in turn lend extensively from *our* collections for ex-

hibition at other institutions worldwide. This process adds broader scope and stimulating diversity to our exhibition calendar. This year we achieved a number of outstanding successes in our special exhibition program.

In Gallery 1, "The Art of Cameroon" focused on the rich culture of the West African nation of Cameroon, presenting wood carvings, animal icons, beaded sculptures and ceremonial masks. Many of these superb pieces were borrowed from private collections in Africa, Europe and the United States. Others were loaned by Fons (chiefs) in Cameroon. Their willingness to share their cultural treasures with us made "Cameroon" a very special event. The exhibition was organized by the Smithsonian Institution Traveling Exhibition Service and was supported by a grant from Mobil.

"Masterpieces of the American West," in Gallery 3, presented paintings from the collection of Museum Trustee Philip F. Anschutz portraying the exploration, development and growth of western North America. The exhibition illustrated the diversity of artistic expression inspired by the region. "Masterpieces" was also produced with a grant from Mobil.

The benefit preview "Diamonds and Spurs Ball," held in conjunction with the opening of "Masterpieces," was a highly successful event. We are especially grateful to the organizing committee cochaired by Mrs. Philip F. Anschutz, Mrs. Arthur Ross and Mrs. Henry Clay Frick, II. Mrs. Charles A. Dana, Jr., and Mrs. Goelet were honorary chairmen. The ball and other benefits held during the year, including the festive "Carnivale" Junior Benefit and the annual Children's Halloween Party, generated \$270,000 gross in support of Museum operations.

"Lost and Found Traditions: Native American Art, 1965-1985" displayed artworks by contemporary Native Americans that are based on traditions deeply rooted in the past. The exhibition, which began its national tour here, was supported by a grant from the American Can Company Foundation and partial funding from the National Endowment for the Arts and the Sacred Circles Fund. It

was organized by the American Federation of the Arts.

"Wolves and Humans: Coexistence, Competition and Conflict" illustrated the biological, social and mythological relationships between humans and wolves. "Wolves" came to this museum from the Science Museum of Minnesota. The exhibition was supported by the National Endowment for the Humanities.

The Museum's Education Department and Membership Office used these exhibitions and other events to produce creative programs aimed at reaching new audiences. Facilities of the Charles A. Dana Education Wing—including the Frederick Leonhardt People Center, the Kaufmann and Linder Theaters and the Edith C. Blum Lecture Hall—served as the center for programs focusing on ethnic and cultural diversity.

Among the outstanding lecturers who appeared at the Museum this year were Richard Leakey, the well-known paleontologist whose work has challenged many long-held ideas on human evolution; Stephen P. Maran, Senior Staff Scientist at NASA who discussed Halley's Comet, and Irving Devore, Professor of Anthropology and Biology at Harvard University who spoke on biology and human evolution.

The 1986 Mack Lipkin Man and Nature Lecture, by Stephen Jay Gould, was planned for the fall to accommodate Dr. Gould's schedule. Dr. Mack Lipkin, Sr., in whose honor the lecture series is named, assisted the Museum in obtaining a grant from the Sergei S. Zlinkoff Foundation for the purchase and installation of equipment to aid the hearing impaired during programs in the Main Auditorium, including the Man and Nature Lectures.

The Dana Wing also provided facilities for the 1985 Margaret Mead Film Festival, which continues to build on its long-standing reputation as the nation's preeminent showcase for anthropological films. More than 300 films have had their New York premieres at the Festival since it was started in 1976.

The Museum was host again in January, for the second consecutive year, to elected officials who attended "Legislators Night." Some 400

guests—local, state and national lawmakers and their families—were shown what the Museum offers to their constituents.

Throughout the Museum's history, the City of New York has been a generous and cooperative landlord, and we are grateful for its continued support. As the owner of our buildings, the City provides funds for capital projects, assists in the security and maintenance of the facilities and provides power and heat for the institution. During the past year, City capital funds supported restoration of the Theodore Roosevelt Memorial Plaza, our main entrance. Renovations within Roosevelt Memorial Hall are scheduled to begin in 1987, with support from the City and from private sources.

During the past year, total City support for the Museum's operations amounted to \$8,318,813. The Trustees are grateful to Mayor Edward I. Koch, Comptroller Harrison J. Goldin, Council President Andrew Stein, Borough President David N. Dinkins, the members of the City Council, Cultural Affairs Commissioner Bess Myerson, and Parks and Recreation Commissioner Henry J. Stern for their support.

The New York State Council on the Arts awarded \$591,000 for general operating support and special projects. The Museum thanks Governor Mario M. Cuomo, members of the New York State Legislature, and Kitty Carlisle Hart, Chairman of the New York State Council on the Arts, and her associates for this generous funding. Through the efforts of State Senator Roy M. Goodman, the Museum was awarded a grant from the Natural Heritage Trust for collections management.

The Federal government, through a variety of agencies, provides important designated funding to support specific projects. The National Science Foundation awarded several grants totaling \$287,000. The Institute of Museum Services provided \$75,000 in general operating support, the maximum amount awarded in this category. The IMS also provided a grant to assist in conserving the Andean Textile collection, part of which will be ex-

hibited in the new Hall of South American Peoples. The National Endowment for the Humanities approved a planning grant for the projected Mangbetu exhibition, based on the American Museum's Congo expeditions of 1909-15. The National Endowment for the Arts made a grant for conservation equipment.

The Museum's partnership with the business community grows increasingly strong. Thanks to the efforts of Trustee Donald C. Platten, corporate contributions to the General Fund surpassed \$1 million for the second year in a row. Gifts from corporations matching their employees' contributions continued to increase, as did the number of firms providing free admission to the Museum for employees and their families.

The Museum continues to work with the City and the State toward bringing together our New World anthropology collections and those of the Museum of the American Indian. It is our belief that the combination of these two magnificent collections in a new building on this site will provide unequalled opportunities for scholarly research and public exhibition.

It is with deep regret that I report the death of Honorary Trustee Malcolm P. Aldrich. Elected to his first term on our Board in 1938, Mr. Aldrich became an Honorary Trustee in 1969. He was generous in his support of field research by Museum scientists. He played a key role in the planning and establishment of the Hall of North American Mammals. Mr. Aldrich will be sorely missed by his friends at the Museum.

Despite our accomplishments, more needs to be done. The Museum must continue to expand, to better preserve and make available its collections to scholars for study. It must also present these collections to the public at large through exhibitions of the highest educational quality.

The coming years will present the Museum with new challenges and vast opportunities. The American Museum will continue to pursue the goals stated by its founders when they created what was to become the finest natural history museum in the world.



Robert G. Goelet,
President

Director's Message

Four thousand delegates attended the annual meeting of the American Association of Museums in New York City in June. I had the honor to be the general chairman of the meeting, and, as such, met many of my colleagues from all around the country.

The program covered a broad range of topics relating to museums of all sizes and interests, and to the many different kinds of professionals employed in them. In view of the recent conference and publication on "Museums for a New Century," it is not surprising that many of the sessions dealt with the future.

There were panels on the ethical implications of international trade in cultural property, the cognitive processes through which Museum visitors learn, and the application of demographic theory to fund raising. Clearly, museums were represented at the meeting by thoughtful professionals concerned with bringing museums forward into an era of even greater quality, service and sensitivity.

Museums in this country are highly successful and serve society well. They are doing the job for which they were created. They have superb collections, their most essential resource. They are more popular than ever among a large and diverse constituency of highly discerning visitors. The public and the institutions of our society are, moreover, very supportive of their regional and local museums and of those serving national and international purposes. Museum employees are highly professional and carry out their work skillfully and productively; a concerted effort to improve recruiting and training, and an absolutely necessary commitment to competitive professional salaries has attracted a new and excellent level of employee.

These qualities are particularly true of the American Museum of Natural History. We are widely recognized and respected as a thriving, highly successful organization with an outstanding record of achievement in collection management, exhibition, scientific research, 6 educational service, programs,

resource utilization, personnel selection and financial management.

Our founding trustees and the City of New York struck a bargain many years ago that gave us a charge and a promise. The charge was to create in New York America's leading institution for scholarship and education in the natural sciences. The promise was the plan for a great and noble structure in which to carry out that purpose.

I believe we have carried out the charge. We have the respect and admiration of our colleagues and of our sister institutions worldwide. Repeated studies of visitor attitudes demonstrate that we serve the public well and enjoy its confidence. Our collections, research, publications, exhibits, membership, educational services, library, and national and international influence rank with the best in the world.

But the promise is not yet fulfilled. The great and grand museum structure planned to help us carry out our purposes is only 60 percent completed. Moreover, the partial building complex as it stands suffers from all the ills of an incomplete plan. It forces inefficient and wasteful compromises which we must accept to function. Management and operations are adversely affected when lack of space, worn infrastructure and make-do compromises come into conflict with burgeoning programs.

Ironically, success has led to our most serious problem. Our Museum is slowly choking for lack of space. Though it covers four square city blocks and contains 1.4 million square feet of space, the need for additional space at the American Museum is desperate. Resources and programs have already outgrown the capacity of the building to support them. Additional space is needed to provide adequately for what we have, and to support continuing growth at which we must aim.

An institution of this kind cannot stand still. Our scientific research, collections, exhibitions and educational service cannot rest on the successes of the past. The world is changing, science is changing, public tastes and expectations are

changing, and the Museum must be prepared to adapt to them. Collection growth and management in particular will demand enormous amounts of space. Developing technologies and public demand to preserve the world's resources make it increasingly important to acquire and conserve the physical evidence on which an understanding of nature inevitably rests.

The American Museum of Natural History has been carefully developed and nurtured into America's preeminent museum of the natural sciences. This achievement was carried out in the full expectation that it would eventually be completed, in stages as needed, in accordance with the plan created for it. The time has come now for the next stage in that construction, forced on us inexorably by our goals, our success and a demanding society.

Unless we plan and build new spaces for our needs now, our progress will slowly grind to a halt. New programs are already being postponed or canceled because there is no room for the staff they require. Our Museum Shop, and the necessary revenue it generates, has reached the limit of its expansion in the present buildings. The burgeoning and highly successful Membership program is struggling to meet our growing income needs in make-do spaces that stifle management. We are forced to discard as trash furnishings, fixtures,

Planners of the new Hall of South American Peoples survey the space on the second floor that at one time housed the old South American exhibition. To install the bigger, more comprehensive and visually complex South American exhibition many physical and architectural changes had to be made, including lowering the ceiling, changing the electrical and lighting systems, and adding air conditioning. Left to right are: Craig Morris, Chairman of the Department of Anthropology; Laila Williamson, Anthropological Exhibit Associate; Robert L. Carneiro, Curator, and Eugene B. Bergmann, Senior Exhibit Designer.



usable exhibit cases and carpets, because we have absolutely no storage space left. We have postponed new exhibitions of our permanent collections indefinitely because we are simply out of exhibit halls, leaving wonderful materials in our collections hidden from public view. We have had to discard valued and useful library materials to make room in our overcrowded stacks for essential new acquisitions, and this process will soon approach serious proportions. Families from New York City and the surrounding suburbs crowd local streets searching in desperation for parking, and then give up their plans to visit.

During the years since 1970, we have met pressing space demands in a number of ways. Based, in part, on a Master Plan study completed in 1972 (which, incidentally, concluded that the Museum needed an additional 500,000 square feet of new space for its program *then* and for growth requirements through 1987), we have identified and followed a number of strategies for adding to and using existing space more efficiently in a manner compatible with what new buildings would eventually provide. These strategies included adding building extensions in interior courtyards (such as the 11-story Childs Frick Wing, the Perkin Building, the American Museum Restaurant, and the Blum lecture hall); constructing mezzanines to enlarge existing gallery spaces, or adding new floors where ceiling heights permitted (such as the new Anthropology storage wing in Building 8, the new Halls of Asian Peoples and South American Peoples, the Roosevelt Auditorium, and the Museum Shop book wing); and converting older, poorly utilized spaces to new functions (such as the Food Express and kitchen, the Kaufmann and Linder Theaters, the Children's Museum Shop on the lower level, and renovated offices for Development and Public Affairs, Micropaleontology Press, Graphics, and General Services).

Former inefficient storage spaces have been rearranged and renovated, giving us new public rest rooms, collections management spaces, offices, photocopying

equipment, computer workstations, a new suite of laboratories for Herpetology, and the beautiful new Arthur Ross Hall of Meteorites. Corridors are being used for all sorts of previously unthought-of purposes. The Akeley Gallery and the Center Gallery used to be empty corridors for public visitors to walk through. Now they double as important sites for temporary exhibitions. Previously spacious corridors are now filled (to the extent allowed by fire laws) with modern compact storage units which serve an urgent need in protecting the collections. Existing rooms that were underutilized because of architectural constraints or poor location have been redesigned and rebuilt. A large old-fashioned teaching hall was demolished and redesigned to yield the Natural Science Center, Calder Laboratory, People Center and two new rest rooms. Multiple uses have been found for precious existing space in prime locations. Most notable is the installation of the retractable screen in the Main Auditorium, allowing for both the projection of giant IMAX films and use as a conventional auditorium.

These strategies have been highly successful. They have resulted not only in the creation of new space within existing limits but also the renovation, relighting, painting, and establishment of comfortable and attractive areas where dark and often inaccessible spaces existed previously.

They can still be applied, but in much more limited ways. We have already exploited the most obvious and efficient opportunities, adding thereby about 225,000 square feet of net usable space for our programs, and increasing by nearly 20 percent the space available for our work. These processes may still yield another five percent or so, but under conditions of marginal utility. Then we will be at about the end of these strategies. The only alternative I can see is to construct new buildings.

The solutions we have found, and their value in helping us advance our work, are not without a major penalty. Given the constraints, we have had to settle for what is available, and the compromises are not always the most efficient solutions. For example, we have added a

great deal of needed new storage space in Mammalogy and Anthropology, but it is widely scattered around the buildings. We have met demands for more and better space in Ichthyology and Herpetology, but at the price of segregating them and their employees from the other zoological departments. To accomplish a given goal we have often had to disrupt several other operations. For example, to achieve the most recent increase in collections space in Ichthyology we had to move both Micropaleontology Press and General Services, substantially increasing the cost and delaying the achievement of our goal. We thought we had the solution to "growing pains" in our Membership and *Natural History* offices some years ago, but when we finally cleared the way toward doing it we found that the program had more than outgrown the potentials of the solution we had in mind.

Such measures are no longer enough, and their price in compromise is becoming too high. We are running out of both space and time. We need new space now; we must have new buildings in which to provide it within five years. Planning for them must begin now.

Our current exhibition plans alone will require at least 80,000 square feet of gallery space. These include the major new Hall of Human Biology now in design, a new and much larger installation of our prized Northwest Coast Indian collection, a new Hall of Southwest Indian material, a long overdue hall of insects, and a hall of evolutionary biology to teach and represent the latest concepts in the sciences we practice. Our plans also include a new, well-equipped and well-located special exhibition gallery large enough to accommodate the needs of major temporary shows built from our own outstanding collections or "showcase" collections from throughout the world.

The needs in collections conservation, management and growth are equally great. Overburdened storerooms must be thinned. We need adequate space for the students and visiting scholars our vast and significant collections attract. We need space to manage effectively and responsibly the con-

tinually growing collections loan program that we support. Effective conservation of irreplaceable but also fragile materials, from costumes and textiles to dinosaur bones (yes, they are fragile too, given the inexorable ravages of time and uncontrolled atmospheric exposure), place exceptional demands on space that we can no longer meet in our present buildings.

And there is always the matter of collections growth. Our study collection is a dynamic resource, growing as we better sample the world, and as our scientific experiences bring new insights into what we need to know. Equally important is the increasing awareness of diversity in the world's resources. The estimate of the number of species that comprise the world's biota has increased from three million to 30 million in only a decade. A scientific collection of the fauna, geological resources and material evidence of the diverse human societies of the world should be at least as important to humanity as an inventory of celestial bodies, and we should be prepared to support it. What the collection needs most of all is adequate and effective space for its long-range conservation and its accessibility to scientific investigators. The collections of the Museum were intended to grow, to be as dynamic and vital as its library of scholarly works. *Both* need space to grow in, and for ours it is overdue.

Another exciting and much publicized need for new space lies in the opportunity to merge the resources in New World Anthropology of our Museum with those of the Museum of the American Indian-Heye Foundation. It is too early as yet to know the outcome of our proposal to support that plan with new buildings, adequate operating funds, and a commitment to scientific and education excellence. However, we continue to trust that ways will be found to overcome the obstacles that may exist.

But with or without that special opportunity, new buildings are an inevitable requirement for our future. One day the Museum will extend north along Columbus Avenue and west from Central Park to join and

close the "square" on the northwest corner and to link all of its sides through the center. These buildings are as much a part of the American Museum's destiny as the pink marble structure that dominates 77th Street facing south, or the grand New York State Memorial to Theodore Roosevelt that faces Central Park to the east.

All are part of the overall plan that will, when completed, eliminate the cul-de-sacs that inconvenience visitors and staff alike, make it possible to use existing space even more efficiently, and encourage new programs we have not yet dreamed of for students, scholars, museum members, visitors and the entire world community. It is clearly time to take the next step in this plan if we are to prepare with other American museums for the "New Century." With the confidence, support and conviction of our Trustees and our New York City partners we can do so. Every square foot of new space erected now will return full value in future years to New York, its citizens, its visitors, and the scholars and scientists and students the world over who will use the Museum to the fullest in their quest to discover, to teach, to understand, to conserve and to preserve the world of nature around us.



Thomas D. Nicholson,
Director

Department of Anthropology

The Department of Anthropology made major strides in research, exhibition and collection management. Field research was carried out on four continents. Books and monographs relating to the Museum's research in the fields of North and South American archeology were published, as well as numerous articles dealing with these areas and with African, Asian and South American ethnology and primatology. Increasing efforts have been devoted to the preparation of the new and permanent Hall of South American Peoples, one of the principal activities of the department. Anthropology curators have responsibility for the hall in terms of theme, and in the selection of artifacts, the writing of label copy and conception of supplementary illustrative material on the cultures exhibited. The department's conservators have been heavily involved in maintaining the objects for exhibition in the new Hall, and in setting standards of lighting, temperature and humidity to protect the irreplaceable collections.

Collection Management A landmark in the department's collection management program was passed as the transfer of the African ethnographic collection into a new compact storage facility was begun. By using movable storage units, the 9000-square-foot ultramodern facility drastically reduces the amount of aisle space needed to gain access to the collections. The system greatly increases the efficient use of the Museum's scarce space. The department also plans to install a computerized system for major catalog and storage information.

With the support of the Museum

administration, a program was planned to reorganize and augment the non-curatorial staff over a two-year period. The new program will make many aspects of the collection management program, which was supported by grants over the past several years, a part of the regular departmental operation. Other aspects, such as increased support for conservation and curatorial assistance, are new. The position of Associate Registrar was created for management of the department's collections and their gradual reorganization and transfer to recently renovated storage facilities. An Assistant Registrar for Loans will manage materials for the department on loans outside the Museum and will also be responsible for anthropological materials borrowed from other institutions, mainly for temporary exhibitions. An Assistant Registrar for Data Management will direct the computer-based system of information for the objects in the collections.

Assistants for African and Asian ethnology, North and South American ethnology and North and South American archeology will join the existing Scientific Assistant in physical anthropology. These staff members will assist the curators with the full range of their research, exhibition and collection-related duties in various areas. A new Textile Conservator and Assistant Objects Conservator will be added to the staff in 1987. This increased staff, augmented by grants and the commitment of the Museum's funds which will be used to purchase equipment, will substantially improve the departmental program of conservation.

South American Archeology

Craig Morris, Chairman and Curator, worked on the new Hall of South American Peoples. Exhibits on the Inka, Tiwanaku, Wari and Chancay cultures were prepared. A large topical section on Andean metals and metallurgy was prepared in collaboration with Heather Lechtman, Director of the Center for the Study of Archaeological and Ethnographic Materials at M.I.T.

A book, coauthored by Donald E. Thompson, Professor of Anthropology at the University of Wisconsin, was published by Thames and Hudson in its "New Aspects of Antiquity" series. It is based on research at the Inka city of Huanuco Pampa over the last several years. Computer-based statistical research on the extensive collections from excavations in that city are continuing.

A second long-term project, the study of 3000 years of the history and development of the Chincha and Pisco Valleys in the south coast of Peru also continued. During the 1985 field season of the project, excavations were carried out at La Centinela, capital of the Chincha kingdom in the 14th and 15th centuries. Excavation work in a compound built there by the Inka uncovered a series of manufacturing and public ceremonial areas. The research was funded by the Tinker Foundation, the Richard Lounsbery Foundation and the National Geographic Society.

John Hyslop, Research Fellow, in collaboration with the Junius B. Bird Publication Committee, published "The Preceramic Excavations at Huaca Prieta, Chicama Valley, Peru," in the Museum's *Anthropological Papers*. It describes

Members of the Department of Anthropology's Object Conservation Laboratory prepare artifacts for the new Hall of South American Peoples. The large, painted bark mask at the left is from the Tikuna tribe of northwest Brazil. Department conservators helped to set the standards for lighting and environment control in the new hall. An additional two-year program to further augment the collections management staff was started this year.



the results of research on the Peruvian north coast which were left unfinished at the death of Junius Bird, Curator Emeritus. A monograph was also completed on his work in southern Chile, and a translation into Spanish was prepared of his "Excavations in northern Chile."

Formation of the State Robert L. Carneiro, Curator, continued his research on the role of resource concentration in building up the population density needed for state formation. Dr. Carneiro postulates that before the coming of agriculture the concentration of wild food resources in certain areas had already drawn people to these areas in significant numbers. A paper based on this research was presented at the V. Gordon Childe Colloquium in Mexico City in July.

Dr. Carneiro completed a manuscript comparing the war practices of the chiefdoms of the Cauca Valley in Colombia with those of the Fiji Islands. This paper was prepared and given at an Advanced Seminar on Warfare at the School of American Research in Santa Fe, in March.

He also continued work on the Hall of South American Peoples. The sections on hunting, gardening, fishing, gathering, fibers, fabrics and pottery-making were completed.

Shanti Nagar The chief activity of Stanley A. Freed, Curator, in collaboration with Research Associate, Ruth S. Freed, was the analysis of data collected in 1958-59, 1977-78, 1983 and 1986 concerning life in the north Indian village of Shanti Nagar. Their current research chiefly involves writing two monographs about life in that village. One monograph concerns politics, government, and the introduction of elections by universal adult suffrage and the secret ballot. The second monograph centers on ghosts, based on beliefs about life and death, and probes the causes of death by examining the relations that ghosts have with the living.

African Ethnology Enid Schildkrout, Curator, continued the editing of a volume of 33 papers on the African Kingdom of Asante which were presented at a symposium held at the Museum in October, 1984. A biography of a Hausa woman, based on fieldwork data collected in northern Nigeria between 1976 and 1981 is now in press, and an interview with anthropologist Irving Goldman will appear in *American Ethnologist*.

Dr. Schildkrout conducted research on the Museum's collection from the Lang-Chapin Congo Expedition of 1909-1915. She received a planning grant from the National Endowment for the Humanities for a major exhibition of this material, "African Reflections: The Art of the Mangbetu," which will be shown at the Museum. Dr. Schildkrout supervised the installation of the exhibition "Art of Cameroon," which opened in July, 1985. She also curated the exhibition "Gypsies: Photographs of Jan Yoores, 1930s-1970s," which opened in the Akeley Gallery in March.

Origins of Macaques In July, 1985, Ian Tattersall, Curator, visited several European museums to study collections of macaque and lemur crania. These investigations were related to his long-term interests in the origins of the *Macaca fascicularis* population of Mauritius and the systematics of the primates of Madagascar. During the rest of the year, research activity focused on the completion of several projects funded by the Richard Lounsbery Foundation. These included an analysis of the ecological strategies and environmental effects of the macaques of Mauritius, in collaboration with R.W. Sussman, Associate Professor of Anthropology at Washington University, St. Louis; and examination of the morphological distinctions and geographical distributions of the genus *Propithecus* in Madagascar. He also conducted an analysis, in collaboration with Dr. Andrea Dunaif, M.D., of the Mount Sinai School of Medicine, of the glucose and insulin values obtained during oral

glucose tolerance testing of free-ranging Mauritius macaques.

Most of Dr. Tattersall's time during the year, however, was taken up with the new Hall of Human Biology and planning for the temporary exhibition "Dark Caves, Bright Visions: Life in Ice Age Europe."

St. Catherines Island David Hurst Thomas, Curator, lead a field crew of 12 in several months of excavation at the *convento* of Mission Santa Catalina, St. Catherines Island, Ga. It is perhaps the best preserved 16th-century building in the United States. The research was sponsored by the Edward John Noble and St. Catherines Island foundations. The excavation continued a project that began on St. Catherines Island in 1974.

Dr. Thomas conducted a two week horseback survey seeking additional high altitude (12,000 ft.) archeological sites in the Toiyabe Range of central Nevada. This research was cosponsored by the Richard Lounsbery Foundation and the United States Forest Service. It continues his two-decade interest in Great Basin archeology, particularly the excavations at Alta Toiyabe Village.

He also completed a revision of his 1976 statistics textbook, to be entitled "Refiguring anthropology: first principles of probability and statistics" (Waveland Press; published in May, 1986) and, in collaboration with Research Associate Clark Spencer Larsen, a monograph entitled "The anthropology of St. Catherines Island: 5. later mortuary patterning." Material culture analysts Deborah Mayer O'Brien, Lorann S.A. Pendleton, and Debra Peter each contributed chapters. He completed another monograph entitled "The archeology of Mission Santa Catalina de Guale: 1. search and discovery." Material cultural analyst Lorann S.A. Pendleton contributed one chapter. This is the first volume in a new series on the last 10 years of excavations on St. Catherines Island.

Asian Family Rituals Laurel Kendall, Assistant Curator, continued her research on working women and weddings in Asia. She

has been concerned with the changing form and content of family rituals, changes in substantive exchanges of ritual goods, and the relationship between these developments and the transformed perspectives and experiences of the men and women who marry.

Dr. Kendall spent six weeks in Korea conducting interviews with brides, grooms, and their families. Cases were drawn from peasant and lower-middle class families and from a contrasting universe of urban upper-middle class families. The marriage experiences of the parents of brides and grooms, collected in detail for both groups, provide an essential historical dimension for this study. Dr. Kendall returned to Korea for one month in the autumn of 1985 to complete her study of "A Korean shaman and the context of her storytelling," a field trip sponsored by the Eppley Foundation for Scientific Research.

Biographical Research Dr. Harry L. Shapiro, Curator Emeritus, continued work on his biography of E.A. Hooton, a distinguished physical anthropologist. It is due to appear in a series issued by the Columbia University Press.

Scientific Publications:

Beelitz, Paul

1986. The ancestors project. Curator, vol. 29, no. 1, pp. 25-51.

Buettner-Janusch, John, and Ian Tattersall

1985. An annotated catalogue of Malagasy primates (families Lemuridae, Indridae, Daubentoniidae, Melgaladapidae, Cheirogaleidae) in the collections of the American Museum of Natural History. Amer. Mus. Novitates, no. 2834, pp. 1-45.

Callaway, Barbara, and Enid Schildkrout

1986. Law, education and social change: implications for Hausa Muslim women in Nigeria. In Iglitzen, L. and R. Ross (eds.), Women in the world, 1975-1985. The women's decade, 2nd ed., ABC-Clio Press, Santa Barbara, pp. 181-206.

Carneiro, Robert L.

1986. Uso do Solo e Classificação de Floresta (Kuikúro). Suma Etnológica Brasileira, Darcy Ribeiro, (ed.) Etnobiologia, Vozes; Finep, Petrópolis, Brazil, vol. 1, pp. 47-56.

Freed, Stanley A., and Ruth S. Freed

1985. Two decades of sterilisation, modernisation, and population growth in a rural context. Econ. and Polit. Weekly, vol. XX, no. 49, pp. 2171-2175.

Garrison, Ervan, James G. Baker, and David Hurst Thomas

1985. Magnetic prospection and the discovery of mission Santa Catalina de Guala. Jour Field Archaeol., vol. 12, pp. 299-313.

Kendall, Laurel

1985. Ritual silks and kowtow money: the bride as daughter-in-law in Korean wedding rituals. Ethnol., vol. 24, no. 4, pp. 253-268.

1985. Things Japanese: something old, something new. Reviews in Anthropol., vol. 12, no. 3, pp. 212-219.

Morris, Craig

1985. Storage and redistribution in the economy of the Inca state. In Les Techniques de Conservation des grains à Longue Terme, Editions Du Centre National de la Recherche Scientifique, Paris, pp. 323-330.

Morris, Craig, and Donald E. Thompson

1985. Huánuco Pampa, an Inca city and its hinterland. Thames and Hudson, London and New York, 181 pp.

Schildkrout, Enid

1986. Entrepreneurial activities of women and children among the Islamic Hausa of northern Nigeria. In Greenfield, Sidney M. and Arnold, Strickon (eds.), Entrepreneurship and social change, monographs in economic anthropology, no. 2. Lanham: Univ. Press of Amer. and the Soc. for Econ. Anthropol., pp. 195-223.

1986. Widows in Hausa society: ritual phase or social status. In Potash, B. (ed.), Widows in African societies, choices and constraints, Stanford Univ. Press, pp. 131-152.

Shapiro, Harry L.

1985. The role of the American Museum of Natural History in the 20th century. Paleoanthropology. In Delson, Eric (ed.), Ancestors: the hard evidence. Alan R. Liss Inc., New York, pp. 6-8.

Tattersall, Ian

1985. [Review of] Madagascar. Jolly, A., P. Oberlé, and R. Albignac (eds.), Amer. Sci., vol. 73, p. 587.

Tattersall, Ian, and R.W. Sussman

1985. Homing behavior in an artificially-released female Mauritian long-tailed macaque. Mammalia, vol. 49, pp. 325-328.

Tattersall, Ian, Eric Delson, and John Van Couvering

1985. The ancestors project: an expurgated history. In Delson, Eric (ed.), Ancestors: the hard evidence. Alan R. Liss, New York, pp. 1-5.

Thomas, David Hurst

1986. Refiguring anthropology: first principles of probability and statistics. Waveland Press, Chicago, Ill., 532 pp.

1986. Contemporary hunter-gatherer archaeology in America. In Meltzer, D.J., D.D. Fowler, and J.A. Sabloff (eds.), American archaeology: past and present. Smithsonian Inst. Press, Washington, D.C. pp. 237-276.

1986. Points on points. Amer. Antiquity, vol. 51, no. 3, pp. 619-627.

1986. Memorial to Martin Alexander Baumhoff, Jour. Calif. Great Basin Athropol., vol. 6, no. 1, pp. 147-153.

Williams, Leonard, Robert L. Bettinger, and David Hurst Thomas

1985. Preface to Notions to numbers: Great Basin settlements as polythetic sets. In Carr, Christopher (ed.), For concordance in archaeological analysis: bridging data structure, quantitative techniques and theory. Westport Pub. Inc., Kansas City, Mo., pp. 274-296.

Bird, Junius B. (posthumously), and John Hyslop

1985. The preceramic excavations at Huaca Prieta, Chicama Valley, Peru. Hyslop, John (ed.), Amer. Mus. Anthropol. Papers, vol. 62:1, pp. 279.

Abstracts and Popular Publications:

Beelitz, Paul

1986. Images of family history. Faces: the magazine about people, vol. 2, no. 8, pp. 15-17.

Freed, Stanley A.

1985. Potlach. Faces: the magazine about people, vol. 2, no. 3, pp.11-15.

Freed, Stanley A. and Ruth S. Freed

1986. The egg business lays an egg. Faces: the magazine about people, vol. 2, no. 6, pp. 28-30.

Gelber, Carol

1986. Fishing with birds and spider webs, a look at fishing in Japan and Ifaluk. Faces: the magazine about people, vol. 2, no. 9, pp. 10-13.

Hatoff, Brian, and David Hurst Thomas

1985. The people of the past: the hidden cave experience. Native Amer. Ann., vol. 1, pp. 62-67, 69.

Kendall, Laurel

1986. Grandmother Kim's sixtieth birthday party. Faces: the magazine about people, vol. 2, no. 7, pp. 26-29.

1985. Hungry ghosts in Japan. Faces: the magazine about people, vol. 2, no. 1, pp. 15-17.

Notes:

1. In the bibliographies, the names and 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.

1985. The Korean gentleman and his hat. *Faces: the magazine about people*, vol. 1, no. 9, pp. 20-23.
1985. [Review of] Alexandre Guillemoz: *Les Algues, Les Anciens, Les Dieux*. *Asian Folklore Studies*, vol. 44, no. 1, pp. 126-128.
1985. [Review of] Roger J. Janelli and Dawnhee Yim Janelli: ancestor worship and Korean society. *The Jour. of Korean Studies*, vol. 5, pp. 191-195.
- Schildkrout, Enid
1985. Greeting a patriarch. *Faces: the magazine about people*, vol. 1, no. 10, pp. 20-23.
- Shapiro, Harry L.
1985. Polynesian nostalgia. *Rotunda*, vol. 10, no. 9, p. 2.
- Williamson, Laila
1986. Fishing in the Amazon. *Faces: the magazine about people*, vol. 2, no. 9, pp. 24-27.

Astronomy and the American Museum-Hayden Planetarium

Since the American Museum-Hayden Planetarium opened its doors to the public in October, 1935, millions of people have learned about new developments in astronomy by viewing Sky Shows that enlighten and entertain. Planetarium attendance was up again this year, with a total of 598,526 visitors. The latest shows deal with the most recent observations of distant planets by the Voyager spacecraft, and a historical journey back to the time when our planet was being born. As the Planetarium's 50th Anniversary year continues, so does its commitment to educate the public through a broad array of special programs and courses.

Sky Shows From July through late March, the Planetarium celebrated its 50th Anniversary with a special Sky Show entitled "Hayden: The Golden Years," narrated by Charlton Heston. The program looked at major discoveries in astronomy over the past five

decades and then looked ahead to possible developments in space over the next 50 years.

Shown as a double feature with "Hayden: The Golden Years" was a 20-minute program, "Halley's Comet: Once in a Lifetime." From July through December, the show was narrated by William Shatner. An updated version of "Halley's Comet," narrated by Leonard Nimoy, was presented from January through late April. In March, this latter version was augmented to include images of the comet taken by Soviet and European intercepting spacecraft. "Halley's Comet: Once in a Lifetime" was made possible in part by contributions in memory of Georgette Wagner-Saveth.

During late November and December, the Planetarium presented its annual holiday favorite, "The Star of Christmas," which investigates scientific possibilities for the "star" that led the Wise Men to Bethlehem almost 2000 years ago.

In late March, "Starborn: Earth's Odyssey Through Time and Space," narrated by Gregory Peck, premiered. This Sky Show transports its audience five billion years back in time to trace the story of our planet from its violent formation to the space age.

Beginning in late April "Voyage to the Outer Planets" joined "Starborn" as a double feature. "Voyage" tells of the epic journeys of discovery by the two Voyager spacecrafts to Jupiter, Saturn, Uranus and beyond.

In addition, on the first Saturday of each month, the Planetarium continued its very successful program for preschoolers, "Wonderful Sky," featuring the "Sesame Street" Muppets.®*

During July and August, the Planetarium presented "The Skies of Summer," a Sky Show which served as a guide to the season's nightly parade of planets, stars and special astronomical events.

Learning Opportunities During the school year, from October through June, a full spectrum of programs for school children, with topics ranging from solar system astronomy to the search for life in space, was offered.

A total of 449,886 visitors attended public and school Sky Show performances.

During the three academic terms, a record 977 persons enrolled in courses for children and adults, including Halley's Comet, Planetary Weather and Climate, and Solar System Astronomy.

Lasers, Live Concerts, and More On Friday and Saturday evenings, laser programs were offered in cooperation with Audio Visual Imagineering, Inc. In March, "Laser Beatles," featuring the music of the Beatles, was introduced.

In December and January, four sold-out performances of Vivaldi's "The Four Seasons" were given in the Sky Theater by Music for Occasions. The Zeiss projector provided a unique "concert under the stars," and the Planetarium's wide array of special effects helped to create seasonal moods, from summer showers to soft winter snows.

In addition, the Planetarium hosted sold-out Members' previews of "Hayden: The Golden Years," "Halley's Comet: Once in a Lifetime," and "Starborn." The previews included the popular "behind-the-scenes" meetings with production staff who showed how the artwork and special effects are created.

Mayor Edward I. Koch, right, and Museum President Robert G. Goelet respond to each other's sense of humor during the American Museum-Hayden Planetarium's Golden Anniversary celebration. More than 300 guests, including school children, were invited to the October ceremony which was also attended by science fiction writer Issac Asimov and astronaut Jeffrey Hoffman. During the past five decades the Planetarium has been visited by more than 25 million people, earning its reputation as one of the world's leading planetariums and one of New York City's major cultural and educational attractions.



On October 7, the Planetarium held its special 50th Anniversary luncheon celebration. Guests included Mayor Edward I. Koch, science fiction writer Isaac Asimov, Astronaut Jeffrey Hoffman, NASA scientist Stephen Maran, and Director of Hopkins Observatory at Williams College in Massachusetts Jay Pasachoff. The event was underwritten in part by Carl Zeiss, Inc.

Special programs and events were created and hosted for the American Institute of Aeronautics and Astronautics, the New York Society of Security Analysts, Ogilvy and Mather Direct, Lily Tomlin, Schick, and Salomon Bros.

Gifts The Planetarium received two astrolabes (antique astronomical instruments) from the estate of Emanuel M. Weil, and "QUASAR," a work of art in metal by Argentine artist Aldo Sessa. "QUASAR" was given on behalf of the Argentine people from Vice President Victor H. Martinez.

Renovation and Restoration As part of the Planetarium's 50th Anniversary, major renovation and restoration work continued. New doors and a new marquee facing were installed at the Planetarium's main entrance.

New equipment was installed in the Guggenheim Space Theater, including projectors and computers, and an advanced sound system capable of producing quadrasonic sound. The work was financed through earnings from the Planetarium's Laser Program.

Faded black-and-white illuminated murals in the exhibit halls were replaced with color transparencies of celestial objects photographed from some of the world's leading observatories. This work was financed by I.B.M.

Exhibitions The Planetarium's Artwall featured "Hayden: 50 Years Ago," a special exhibition of photographs from the Museum's archives showing scenes from the construction and early operating years of the Planetarium.

Also on view were exhibits and models illustrating suggested designs for a permanently inhabited space

station to be placed in orbit in the 1990s. These were on loan from Boeing, Rockwell International and Martin Marietta Aerospace.

Beginning in May, a collection of the works of Helmut Wimmer, the Planetarium's Art Supervisor for the past 32 years was presented. A special 1:2-scale replica of the Sky Theater with its original Zeiss Model II Star projector was also put on view. The projector was created by Ernest Deike, a technician at the Planetarium in the 1930s. The replica appeared at the 1939 New York World's Fair and was lent to the Planetarium by Randy Liebermann, its owner.

The Richard S. Perkin Library

Through the continued generous support of the Perkin family, the Richard S. Perkin Library again served the Planetarium staff and the general public as one of the best collections of astronomical literature in this part of the country. This year, among those utilizing the Library's resources, were Reader's Digest, CBS, NBC and Time, Inc., as well as other planetariums from around the world.

Abstracts and Popular Publications:

- Branley, Franklyn M.
1986. From Sputnik to Space Shuttles. T.Y. Crowell, 52 pp.
1986. What the Moon Is Like. Rev. edition, T.Y. Crowell, 32 pp.
1986. Journey into a Black Hole. T.Y. Crowell, 32 pp.
1986. Mysteries of the Satellite. E.P. Dutton, 72 pp.
- Kitt, Sandra
1985. Asimov, I., and Sandra Kitt, Illustrators. Asimov's Guide to Halley's Comet, Walker & Co., New York, Cover, pp. 9, 14, 17, 75, 85.
- Lesser, Thomas A.
1985 "Skywatch", a monthly astronomical /86. article, *St. Thomas This Week*, St. Thomas, United States Virgin Islands.
1985. [Review of] "Halley: Comet 1986," Franklyn M. Branley, Dutton Books, New York, 1982, in *Recent Pub. Nat. Hist.* vol. 3, no. 3, pp. 2-3.

Department of Entomology

Specimens from the world's widespread and varied populations of insects and arachnids provide a wealth of information for the study of phylogenetic relationships and biotic distributions. To acquire specimens for such studies researchers from the Department of Entomology travel to regions throughout the globe. The department's collection, now numbering some 16 million specimens, continues to be enlarged through this field-work, as well as through donations and exchanges.

Classifying Bugs Randall T. Schuh, Curator and Chairman, published in the *Annual Review of Entomology* an article entitled "The influence of cladistics on Heteropteran classification." He surveyed systematic work on Heteroptera which has used cladistic methods, and summarized the impact this work has had on the general classification of the true bugs, by comparing the currently accepted notions of heteropteran relationships with the scheme proposed by China and Miller in 1959. This survey is one of the first of its type to be undertaken for a major group of insects and shows the strong influence cladistic methodology has had.

Dr. Schuh also prepared and submitted a paper to the *Annals de la Societe Entomologique de France* in honor of the 70th birthday of Jacques Carayon, a renowned French heteropterist. In it he described a new genus, *Schizopteromiris*, and four new species of litter-dwelling plant bugs of the subfamily Cylapinae from Australia, Lord Howe Island, and New Caledonia.

These bugs are unusual in the Miridae not only in their beetlelike appearance, but also in their habits, because very few members of the family are known to live in litter. Their cryptic habits suggest

that their distribution, which is similar to several other groups of insects from the area, may be of an extremely ancient nature and the result of drifting of continental fragments which were previously much closer.

North American Phylinae Fauna

Dr. Schuh revised the North American *Ephedra*-feeding genus *Merinocapus*. He also sorted several thousand specimens and examined holotypes of all North American species of the genus *Pilophorus* and an assemblage of *Artemisia* feeding species, most of which had been placed in the nominal genus *Europiella*. The former group of about 45 valid species was found to contain numerous specific synonyms as well as a small number of new species. The latter group of species was found to be monophyletic. This fact has been previously obscured because members had been placed in more than one genus and unrelated bugs had been placed in *Europiella*. The male genitalia of both of these groups were dissected and illustrated by Curatorial Assistant Michael D. Schwartz. The project was funded by the National Science Foundation.

Revisionary Studies Gary M. Stonedahl, Kalbfleisch Research Fellow and Research Associate, studied the plant bug tribe Ecritotarsini, publishing descriptions of a new genus and three species from southeast Asia. He also brought to near completion a revisionary study of six other Old World genera, including new species.

With Dr. Schuh, he prepared a revision of the orthotyline genus *Squamocoris* which included the description of a new genus, *Ramentomiris*, for two new species from Baja California. The majority of the specimens studied were derived from Dr. Schuh's NSF-supported fieldwork in the western United States and Mexico. The results of cooperative work with Dr. Schuh on the analysis of biogeographic patterns among plant

bugs in the Indo-Pacific were presented at the annual meeting of the Willi Hennig Society and submitted for publication in the journal *Cladistics*.

Dr. Stonedahl also completed, in cooperation with Mr. Schwartz, revisions of the North American orthotyline plant bug genera *Pseudopsallus*, *Noctuocoris*, and *Oaxacoris*. The first, dealing with 20 valid species, was published as a *Novitates*. Dr. Stonedahl also collaborated with J.D. McIver, of Oregon State University, on biological studies of antlike Miridae in the western United States.

Phylogenetics of Rove Beetles

Curator Lee Herman began a revision of Paederinae, the second largest subfamily of Staphylinidae, or rove beetles. This monograph, which he expects to complete in six to nine years, will concentrate on recognizing monophyletic genera and subtribes, propose a phylogenetic scheme of relationships among the genera and summarize what is known about the group.

The Paederinae, in which the number of species has nearly doubled in the last 50 years, currently includes more than 5500 species distributed among 215 genera in 14 subtribes. The species occur on all continents except Antarctica, and many oceanic and continental islands. The taxic diversity is greatest in the tropical and subtropical regions and diminishes at higher latitudes and altitudes.

Most species are found in moist leaf litter and ground debris, especially near small streams. They may also be found under the bark of logs, on leaves of bushes and trees (and even high in the canopy), in ant nests and on the shore of streams in gravel.

The species are predators. The larvae have two instars. The adults are quick and agile and exhibit a great diversity of form and structure that makes the group attractive for study.

To undertake this kind of project, access to a collection with high taxic and geographic diversity is mandatory. Dr. Herman borrowed the entire collection of Paederinae

of the Field Museum of Natural History in Chicago which includes more than 53,000 specimens, 2100 species and 1500 types. By combining the Field Museum's collection with the American Museum's, 170 (or 80 percent) of the genera of Paederinae are represented. Dr. Herman curated the identified Paederinae collections of both museums, sorted more than 50,000 unidentified specimens to genus, and dissected the entire body of 270 specimens of 100 genera. He will dissect others as material becomes available.

A checklist of the Paederinae was assembled as the first step toward preparing a catalog of the subfamily. The checklist includes the name, author, reference and general distribution for more than 5500 valid taxa and more than 10,000 available names. The checklist will be completed upon verification of each entry.

Southern Hemisphere Spiders

Curator Norman I. Platnick concentrated on the taxonomy of the "hypochoiloid" spiders, which are the most primitive members of the suborder Araneomorphae (true, or typical, spiders). In collaboration with Research Associate Raymond R. Forster and M.R. Gray of the Australian Museum he completed studies of the northern hemisphere family Hypochilidae and the southern hemisphere family Austrochilidae.

The hypochoilids include two genera—*Hypochoilus* from the United States, and *Ectatosticta* from China. A brief field trip to North Carolina allowed Dr. Platnick to collect specimens and analyze the distributions of three new species of *Hypochoilus* from that state. In addition, *Ectatosticta* was studied for the first time on the basis of newly available specimens from China.

In the Austrochilidae, Dr. Platnick's recent NSF-supported fieldwork in Chile (including a six-week trip undertaken with Dr. Schuh in January and February) provided material showing that the single species previously reported from Chile is actually a diverse



assemblage of seven species in two genera.

During the fall, the department hosted Weatherhead Fellow Song Daxiang, Director of the Department of Invertebrate Zoology, Institute of Zoology, Academia Sinica, Beijing. Thanks to support from the Weatherhead Fund for Asian Studies, Drs. Platnick and Song were able to initiate joint studies of the Chinese fauna of the spider family Gnaphosidae; their first joint paper, on the zelotine species, is in press.

Drs. Platnick and Forster began work for Cornell University Press on the production of a successor to "The Spider Book" of J.H. Comstock. The new book will expand the previous coverage, which was limited to North American taxa, and attempt to summarize our knowledge of the diversity and habits of spiders on a worldwide basis.

Inch Worm Moths Curator Frederick H. Rindge conducted his long range studies of the New World Geometridae. He examined moths of the genus *Eupithecia* from Chile. The members of this genus form one of the largest groups in the Larentiinae, if not in the entire Geometridae, as they occur throughout much of the

world. Excellent diagnostic characters are being found in the male antennae, as well as in the genitalic structures of both sexes.

A generic study of the Melanolophiini, a tribe of the Ennominae from North America, Mexico and Guatemala, was also started by Dr. Rindge. The generic characters had been confused in the past; in fact, it is difficult to properly place a species in the correct genus. Forthcoming analysis of the generic characters should remedy this situation.

Dr. Rindge was awarded the Karl Jordan Medal for outstanding original research in taxonomy of the Lepidoptera. The medal was presented at the 37th annual meeting of the Lepidopterists' Society, which was held at Carleton University, Ottawa, Ontario in late May.

Bee Behavior Jerome G. Rozen, Jr., Deputy Director for Research and Curator, continued his studies of immature stages, ecology, behavior and adult anatomy of bees. With Roy R. Snelling of the Los Angeles County Museum of Natural History, he investigated the nesting biology of a species of *Exomalopsis* from California and its cleptoparasitic nest-mate *Melanomada*. That study triggered a revision of *Melanomada*.

In late summer, Dr. Rozen, with his wife, Barbara, investigated the flower relationships and nesting biology of matinal species of *Caupolicana* (Colletidae) and *Martinapis* (Anthophoridae) near the Museum's Southwestern Research Station. The results are currently in press.

In October, Dr. Rozen joined a group of bee specialists from the United States and Mexico at the first meeting of the Programa Cooperativo sobre la Apifauna Mexicana (PCAM) at the Estacion de Biologia Chamela in Jalisco, Mexico. While there, Dr. Rozen and Ricardo Ayala of the Estacion de Biologia Chamela studied the behavior and ecology of *Peponapis*, all species of which are believed to pollinate squashes and gourds.

Dr. Rozen also pursued several

projects stemming from his prior fieldwork in Pakistan. His study of the natural history of the parasitic Old World nomadine *Pasites maculatus* (Anthophoridae) and its host *Pseudapis diversipes* (Halictidae) is ready for publication. He also surveyed the ovariole number of a wide range of bees. The results confirm the work of several Japanese scientists, showing that the number of ovarioles among solitary bees is remarkably constant, with the Anthophoridae and Apidae normally having four ovarioles per ovary, whereas the more primitive families have three. Cleptoparasitic bees of the anthophorid subfamily Nomadinae have five or more ovarioles per ovary, presumably an adaptation for laying numerous eggs within a short period of time.

Thievery in Ants Howard Topoff, Research Associate, carried forward behavioral studies of ants belonging to the genus *Polyergus*. These insects are social parasites that have lost the ability to forage for food, or even rear their own brood. To compensate, *Polyergus* has retained one crucial adaptation—the ability to get other ants to do it all for them. They accomplish this by raiding the nests of the related genus *Formica* and stealing their pupae, which are reared in the host's nest and become imprinted to the *Polyergus* workers.

Dr. Topoff and his associates found that the frequency of slave raids is dependent on the nutritional state of the mixed-species colony. When field colonies of *Polyergus* were artificially overfed, slave-raiding behavior decreased markedly. It appears that raiding behavior in *Polyergus* is closely tied to food, as is the case in many species of army ants.

In another study, Dr. Topoff and his associates examined the process of orientation by which *Polyergus* raiders locate target nests of *Formica*. They found that scouts and raiders rely on the position of the sun and on polarized light for navigating during slave raids. On the return trip, however, booty-laden workers use a combination of chemical and

Norman I. Platnick, Curator in the Department of Entomology, prepares specimen labels for the ground-dwelling spiders he collected at Puyehue National Park in the rain forests of south-central Chile. Dr. Platnick, in research supported by the National Science Foundation, is revising the taxonomy of several families of Chilean spiders whose closest relatives are found in Australia and New Zealand.

optical stimuli to find their home nest.

Fossil Termites Kumar Krishna, Research Associate, completed a paper with Solomon Bacchus of the British Museum, describing a new amber fossil termite, *Cryptotermes yamini*, from Hispaniola. This amber fossil is of Upper Oligocene age (roughly 26 million years).

The well-preserved specimen represents the second fossil species assigned to *Cryptotermes*, a genus found today in the warm temperate and tropical regions of the world. Dr. Krishna is completing a study of two amber fossil species of the genus *Nasutitermes* from Mexico and Hispaniola, the first report of the Nasutitermitinae from the fossil record.

Collection Growth and Management The department is in charge of one of the world's great collections of insects and spiders. Each year the collections grow through gifts, purchases, and fieldwork by the curators. This year, nearly 67,000 new specimens were acquired. Among these were several thousand ground-dwelling spiders collected as the result of Dr. Platnick's study of the Chilean spider fauna. These representatives of formerly obscure groups help to give the American Museum the finest existing collections of spiders from temperate South America. The department takes particular pride in receipt of the Paul Grey collection of *Speyeria*, the premiere assemblage of a group of colorful North American butterflies.

Scientific Publications:

Cazier, Mont A.

1985. A revision of the North American flies belonging to the genus *Raphiomidas* (Diptera: Apioceridae). Bull. Amer. Mus. Nat. Hist., vol. 182, pp. 181-263, figs. 1-44.

Forster, Raymond R., and Norman I. Platnick

1985. A review of the austral spider family Orsolobidae (Arachnida: Araneae), with notes on the superfamily Dysderoidea. Bull. Amer. Mus. Nat. Hist., vol. 181, pp. 1-229, figs. 1-889.

Goldstein, M., and H. Topoff

1985. Reaction of the ant *Novomessor albigetosus* Mayr to intruders in the nest area (Hymenoptera: Formicidae). Insectes Soc., vol. 32, pp. 173-185.

Herman, Lee

1986. Revision of *Bledius*. Part IV. Classification of species groups, phylogeny, natural history, and catalogue (Coleoptera, Staphylinidae, Oxytelinae). Bull. Amer. Mus. Nat. Hist., vol. 184, pp. 1-355, figs. 1-728, tables 1-9.

Johnson, Kurt

"1985"

- [1986] *Mitoura millerorum* (Clench) and its occurrence in the United States (Lycaenidae). Jour. Lepidopterists' Soc., vol. 39, pp. 119-124, figs. 1, 2.

Johnson, Kurt, Rick Rozycki, and David Matusik

1985. Species status and the hitherto unrecognized male of *Papilio diaphora* Staudinger (1891), (Lepidoptera: Papilionidae). Jour. New York Ent. Soc., vol. 93, pp. 1089-1095, figs. 1-4.

LaMon, B., and H. Topoff

1985. Social facilitation of eclosion in the fire ant *Solenopsis invicta*. Develop. Psychobiol., vol. 18, pp. 367-374.

Lattin, John D., and Michael D. Schwartz

1986. A review of *Acetropis americana* Knight in North America (Hemiptera: Miridae: Stenodemiini). Jour. New York Ent. Soc., vol. 94, pp. 32-38, 18 figs.

McDonald, P., and H. Topoff

1985. Social control of behavioral development in the ant *Novomessor albigetosus* (Mayr). Jour. Comp. Psychol., vol. 99, pp. 3-14.

Millidge, A.F.

1985. Some linyphiid spiders from South America (Araneae: Linyphiidae). Amer. Mus. Novitates, no. 2836, pp. 1-78, figs. 1-289.

Platnick, Norman I.

1985. [Review of] Annual Review of Ecology and Systematics, Volume 15. Cladistics, vol. 1, pp. 204-208.

1985. Notes on the spider genus *Ellica* (Araneae: Gnaphosidae). Jour. New York Ent. Soc., vol. 93, pp. 1073-1081, figs. 1-14.

1985. [Review of] The Spiders of Great Britain and Ireland, by Michael J. Roberts. *Ibid.*, vol. 93, pp. 1279-1280.

1985. On the Chilean spiders of the family Palpimanidae. Jour. Arachnol., vol. 13, pp. 399-400, figs. 1, 2.

1986. A revision of the spider genus *Trochanteria* (Araneae: Gnaphosidae). Bull. British Arachnol. Soc., vol. 7, pp. 29-33, figs. 1-17.

1986. On justifying cladistics. Cladistics, vol. 2, pp. 83-85.

- Platnick, Norman I., and Pablo A. Goloboff
1985. On the monophyly of the spider suborder Mesothelae (Arachnida: Araneae). Jour. New York Ent. Soc., vol. 93, pp. 1265-1270, figs. 1-4.

Raven, Robert J.

1985. The spider infraorder Mygalomorphae (Araneae): Cladistics and systematics. Bull. Amer. Mus. Nat. Hist., vol. 182, pp. 1-180, figs. 1-259, tables 1-9.

Rindge, Frederick H.

"1985"

- [1986] A generic replacement name in the Nacophorini (Geometridae). Jour. Lepidopterists' Soc., vol. 39, p. 145.

1986. Generic descriptions of New World Lithinini (Lepidoptera: Geometridae). Amer. Mus. Novitates, no. 2838, pp. 1-68, figs. 1-80, tables 1-6.

Rozen, Jerome G., Jr.

1985. Evolutionary relationships of the bee subfamily Panurginae. Nat. Geog. Res. Rep. (1978 projects), vol. 19, pp. 481-484.

Schuh, Randall T.

1986. The influence of cladistics on heteropteran classification. Ann. Rev. Ent., vol. 31, pp. 67-93, figs. 1-11.

1986. *Merinocapsus froeschneri*, a new species of phylinae Miridae from western North America, with notes on the genus (Heteroptera). Jour. New York Ent. Soc., vol. 94, pp. 217-225, figs. 1-20.

Shear, William A.

1985. *Marwe coarctata*, a remarkable new cyphophthalmid from a limestone cave in Kenya (Arachnida: Opiliones). Amer. Mus. Novitates, no. 2830, pp. 1-6, figs. 1-8.

Stonedahl, Gary M.

1985. *Phytocoris adenostomae*, a new mirine plant bug (Heteroptera: Miridae) from southern California. Jour. New York Ent. Soc., vol. 93, pp. 1271-1274, figs. 1-7.

1986. *Sylopomiris*, a new genus and three species of Eccritotarsini (Heteroptera: Miridae: Bryocorinae) from Viet Nam and Malaya. Jour. New York Ent. Soc., vol. 94, pp. 226-234, 18 figs.

Stonedahl, Gary M., and John D. Lattin

1986. The Corixidae or water-boatmen of Oregon and Washington (Hemiptera: Heteroptera). Oregon State Univ. Agric. Exp. Sta. Tech. Bull., no. 144, 36 pp.

Stonedahl, Gary M., and Michael D. Schwartz

1986. Revision of the plant bug genus *Pseudopsallus* Van Duzee (Heteroptera: Miridae). Amer. Mus. Novitates, no. 2842, pp. 1-58, figs. 1-220, tables 1, 2.

- Topoff, H.
1985. Effect of overfeeding on raiding behavior in the western slave-making ant *Polyergus breviceps*. Nat. Geogr. Res., vol. 1, pp. 437-441.
- Topoff, H., M. Inez-Pagani, M. Goldstein, and L. Mack
1985. Orientation behavior of the slave-making ant *Polyergus breviceps* in an oak-woodland habitat. Jour. New York Ent. Soc., vol. 93, pp. 1041-1046.
- Topoff, H., M. Inez-Pagani, L. Mack, and M. Goldstein
1985. Behavioral ecology of the slave-making ant *Polyergus breviceps* in a desert habitat. S.W. Nat., vol. 30, pp. 289-295.
- Topoff, H., B. LaMon, L. Goodloe, and M. Goldstein
1985. Ecology of raiding behavior in the western slave-making ant *Polyergus breviceps* (Formicidae). S.W. Nat., vol. 30, pp. 259-267.
- Wheeler, Quentin D.
1986. Revision of the genera of Lymexylidae (Coleoptera: Cucujiformia). Bull. Amer. Mus. Nat. Hist., vol. 183, pp. 113-210, figs. 1-308, tables 1-4.

Department of Herpetology

This department is committed to increasing knowledge of the biology and diversity of the world's amphibians and reptiles. Fieldwork as close by as Long Island and as far away as Amazonian Brazil helped to enrich one of the world's major herpetological collections, and added depth to a wide range of departmental research. In addition to new specimens collected by the staff, an important collection of approximately 4000 specimens was donated by the Virginia Polytechnic Institute.

Amphibian Poisons Most amphibians seem to be distasteful to at least some potential predators, and a relatively few species are dangerously toxic. Chairman and Curator Charles W. Myers completed a survey of toxic and noxious substances produced by amphibians, in collaboration with Research Associate John Daly

and Noel Whittaker, both of the National Institutes of Health.

Most biologically active compounds in amphibian skin are derived from the cutaneous granular glands, which are a shared character of all adult amphibians, including caecilians, salamanders, frogs and toads. Data are available for more than a fourth of the nearly 400 genera comprising the three living orders of Amphibia.

Many species secrete unidentified substances judged to be noxious based on predator aversion or human taste. Additionally, amphibians produce hundreds of compounds whose molecular structures are approximately known. These substances are classified by Drs. Daly, Myers and Whittaker in four broad categories: biogenic amines, peptides, bufodienolides (bufogenins) and alkaloids.

Most compounds seem to occur only in the skin of the adult amphibians; but the noxious and dangerously toxic properties of eggs and larvae of certain toads and salamanders can be attributed to bufodienolides and the tetrodotoxin alkaloids, which do occur in other tissues as well as in skin. Predator aversion and various antipredator behaviors, and bright warning colorations of some amphibians clearly prove the defensive value of these diverse metabolites.

Research in the Tropics Dr. Myers gathered data on a rare species of small Amazonian poison frog while participating in a collecting transect across the new Brazilian State of Rondônia. The trip was made at the invitation of Research Associate Paulo E. Vanzolini, Director of the Museu de Zoologia da Universidade de São Paulo.

New roads into this remote region in the southern Amazon basin of western Brazil are resulting in human immigration and settlement on a major scale. Dr. Vanzolini is attempting to sample the Rondônian fauna while the rain forest is still standing and to provide data that may result in the preservation of some areas of

critical habitat.

Dr. Cole and Senior Scientific Assistant Carol R. Townsend spent March in Suriname, where they investigated all-female populations of shiny lizards (*Gymnophthalmus*) and collected other reptiles and amphibians.

Curator Richard G. Zweifel made significant progress on a revisionary study of *Sphenophryne*, a genus of microhylid frogs with which he has had considerable field experience in New Guinea and Australia. He visited the British Museum (Natural History) in April to study type specimens and other material relevant to his research on tropical microhylids.

Results from Neblina The recent two-year international expedition to Cerro de la Neblina, an immense equatorial table mountain on the Venezuela-Brazil border, was reported in the 115th and 116th annual reports of the Museum. Six members of the Department of Herpetology participated in different segments of the expedition; one member was Field Associate Alfredo Paolillo of Caracas, who spent a week this year studying Neblina specimens at the American Museum.

The plants and animals collected will provide material for study for years to come, and Dr. Zweifel has completed the first herpetological manuscript of Neblina—a description of a new genus and species of frog of the family Microhylidae. Because there is no recent comprehensive work on the South American members of this family, Dr. Zweifel found it necessary to make extensive comparisons among the named genera in order to assess the relationships of the new Neblina frog.

Unisexual Lizards Dr. Cole's research concerns a variety of investigations in reproduction, genetics, hybridization, evolutionary origin and systematics of whiptail lizards (*Cnemidophorus*) and shiny lizards (*Gymnophthalmus*), including unisexual (all-female) and bisexual species. Dr. Cole spent the summer collecting *Cnemido-*

phorus in the American Southwest and in Mexico, assisted by Ms. Townsend and by Francisco Soberón M., a student from the Universidad Nacional Autónoma de México. Dr. Cole spent a week in the laboratory of Research Associate Herbert C. Dessauer at the Louisiana State University Medical Center, New Orleans, working on biochemical genetics of unisexual lizards.

Dr. Cole published guidelines for systematists to consider in dealing with the taxonomy of unisexual and parthenogenetic species. He also initiated a new project in collaboration with Oscar G. Ward, a cytogeneticist at the University of Arizona. They are comparing activity of the ribosomal RNA genes in unisexual and bisexual lizards.

The Museum's unique colonies of whiptail and shiny lizards provide important data concerning the origin of clonal inheritance and polyploidy in vertebrates that reproduce by means of unfertilized eggs.

Endangered Sea Turtles

Associate Anne Meylan is working on various aspects of the ecology, behavior and migrations of sea turtles, with a principal focus on feeding ecology of the hawksbill (*Eretmochelys imbricata*), a tropical reef-dwelling sea turtle. Although most of Dr. Meylan's work is in tropical waters, she quite unexpectedly found herself doing cold weather fieldwork in New York.

Late in 1985, the department was alerted by Samuel S. Sadove, research director of the Okeanos Ocean Research Foundation, that dozens of sea turtles were killed by what appeared to be an unprecedented cold-stunning episode in Long Island Sound. Dr. Meylan, Dr. Cole and Ms. Townsend assisted with the necropsy work organized by Mr. Sadove at the foundation. This work may shed new light on the ecological geography and migrations of Kemp's ridley (*Lepidochelys kempi*), probably the most endangered of all sea turtles. This rare species unaccountably made up the bulk of the sample, which also included loggerheads and green sea turtles.

Collection Utilization and Growth

The department's worldwide collection of amphibians and reptiles is heavily used by the scientific community. A total of 3843 specimens were lent to or returned by 104 researchers at other institutions in this country and abroad. Many scientists also come to New York in order to study specimens on the Museum premises. The department received on average one professional visitor every 3.5 working days.

About 28 percent of the 6112 newly accessioned specimens resulted from fieldwork by staff members in the United States, Mexico, and South America. Senior Scientific Assistant Michael W. Klemens contributed superb collections of amphibians and reptiles from his fieldwork in the northeastern U.S. A collection of sea turtles from Long Island Sound, including the rare Kemp's ridley, donated by the Okeanos Ocean Research Foundation, is also particularly noteworthy.

However, the largest accession, comprising 64 percent of the newly acquired specimens, was a collection transfer from the Virginia Polytechnic Institute in Blacksburg. This collection reflects the richness in salamanders of Virginia's fauna. It is the third "orphan" collection of amphibians and reptiles since 1980 to be given a permanent home at the American Museum.

Grants In the second year of a three-year facilities grant of \$142,488 from the National Science Foundation, the department's primary grant-related activity involved taxonomically updating and moving the frog holdings into a new room that had been previously furnished for this important collection.

NSF funding was received for the final year of Curator Charles J. Cole's five-year grant of \$140,000 for studies of unisexual species of reptiles. Dr. Cole also received his third grant in five years from the National Geographic Society, in support of fieldwork on unisexual lizards in Suriname.

Dr. Myers received a fifth annual award from the Swedish pharmaceutical company Astra

Läkemedel AB, for continuing fieldwork on tropical poison frogs.

Scientific Publications:

- Bjorndal, Karen A., Archie Carr, Anne Meylan, and Jeanne A. Mortimer
1985. Reproductive biology of the hawksbill *Eretmochelys imbricata* at Tortuguero, Costa Rica, with notes on the ecology of the species in the Caribbean. *Biol. Conservation*, vol. 34, no. 4, pp. 353-368.
- Cole, Charles, J.
1985. Taxonomy of parthenogenetic species of hybrid origin. *Syst. Zool.*, vol. 34, no. 3, pp. 359-363.
- Daly, John W., T.F. Spande, N. Whittaker, R.J. Highet, D. Feigl, N. Nishimori, T. Tokuyama, and Charles W. Myers
1986. Alkaloids from dendrobatid frogs: structures of two omega-hydroxy congeners of 3-butyl-5-propylindolizidine and occurrence of 2,5-disubstituted pyrrolidines and 2,6-disubstituted piperidine. *Jour. Nat. Products*, vol. 49, pp. 265-280.
- Dessauer, Herbert C., and Charles J. Cole
1986. Clonal inheritance in parthenogenetic whiptail lizards: biochemical evidence. *Jour. Heredity*, vol. 77, no. 1, pp. 8-12.
- Meylan, Anne
1985. The role of sponge collagens in the diet of the hawksbill turtle (*Eretmochelys imbricata*), pp. 191-196. In A. Bairati and R. Garrone (eds.), *Biology of Invertebrate and Lower Vertebrate Collagens*. Plenum Publ. Corp.
- Meylan, Anne, Peter Meylan, and Argelis Ruiz
1985. Nesting of *Dermochelys coriacea* in Caribbean Panama. *Jour. Herpetol.*, vol. 19, no. 2, pp. 293-297.

On a wintry Long Island beach, Anne Barkau Meylan, Associate in the Department of Herpetology, holds an immature Kemp's ridley, one of several dozen sea turtles stunned by low temperatures in Long Island Sound in December, 1985. Although three species of sea turtles were affected, the majority were Kemp's ridleys. A rare species seldom seen in New York waters and one of the most endangered of all sea turtles, Kemp's ridley is known to nest at only one beach on the east coast of Mexico. Those found dead on the beach were autopsied at the Okeanos Ocean Research Foundation and transferred to the Department of Herpetology's research collections which contain 255,000 specimens from all over the world.



Myers, Charles W., and Linda S. Ford
1986. On *Atopophrynus*, a recently described frog wrongly assigned to the Dendrobatidae. *Amer. Mus. Novitates*, no. 2843, pp. 1-15.

- Zweifel, Richard G.
1985. Asterophryinae, pp. 349-355. In D.R. Frost (ed.), *Amphibian species of the world*. Assoc. Syst. Coll. & Allen Press., Lawrence, Kansas.
1985. Genyophryinae, pp. 363-374. In D.R. Frost (ed.), *Amphibian species of the world*. Assoc. Syst. Coll. & Allen Press., Lawrence, Kansas.
1985. Australian frogs of the family Microhylidae. *Bull. Amer. Mus. Nat. Hist.*, vol. 182, art. 3, pp. 265-388.

Abstracts and Popular Publications:

- Bogert, Charles M.
1985. [Foreword to] *Biology of Amphibians*, by W.E. Duellman and L. Trueb. McGraw-Hill Book Co., New York, pp. xi-xiv.
Cole, Charles J.
1986. Unisexuele hagedissen in Suriname. *De West* (Paramaribo newspaper), April 30, p. 5.
Meylan, Anne
1985. Sponge predation by the hawksbill turtle, *Eretmochelys imbricata*: Structural and biochemical defenses of the prey. Abstracts and Program, Combined meeting Soc. Study Amphib. Rept. and Herpetologists' League, August, 1985, Tampa, Florida.
1985. The hawksbill turtle (*Eretmochelys imbricata*): A preeminent spongivore on coral reefs, p. 244. In C. Gabrie, J.L. Toffart, and B. Salvat (eds.), *Proc. 5th Internatl. Coral Reef Congress*, vol. 2. Antenne Museum-Ephe, Moorea, French Polynesia.

Department of Ichthyology

Recent studies carried out by the department involved new species from Asia and tropical America, ecology of local species and the behavior of electric fishes native to Africa. Continuing osteological studies, which have prompted significant growth and reorganization of the skeleton collection, disclosed interrelationships among major groups of fishes. A completed Ph.D. thesis described the osteology and relationships of the striped bass and its close relatives. New activities for the department included the expansion of its collection facilities to accommodate marine larvae.

Desert Pupfishes and Livebearers from Mexico

Michael L. Smith, Kalbfleisch Assistant Curator, prepared descriptions of newly discovered Mexican livebearers (family Goodeidae). His research, supported by the National Science Foundation, aims to discover the interrelationships of goodeids. Thus far, he has discovered extensive variation in the histological structure of the male urogenital organ. In these fishes the organ is elastic, muscular, possibly erectile, and intromittent, serving for the transfer of sperm. Dr. Smith also continued his previous surveys of desert populations of pupfishes (genus *Cyprinodon*), which inhabit isolated springs in the Southwest. He believes that pupfishes, even though they survive in these extremely harsh environments, are not desert-adapted organisms. Deserts are short-lived phenomena in geological time. Apparently, pupfishes survive in them only coincidentally because of their tolerance to variable heat and salinity.

Codlike Pharyngognath and Labyrinth Fishes Donn E. Rosen, Curator, working under a

grant from the National Science Foundation, continued studies of the interrelationships of advanced teleosts. With Colin Patterson, Research Associate, he finished a review of the major group of paracanthopterygian fishes.

He also began studies on labyrinth fishes (including the climbing perch *Anabas*) and pharyngognath fishes (including wrasses and parrotfishes). For the latter, he finds evidence that the group should be expanded to include haemuloids (grunts), sparoids (porgies), and gerreids (mojarras). If confirmed, this discovery would greatly simplify the problem of interrelationships of the percoids, perhaps the most difficult remaining obstacle to a natural classification of bony fishes.

Marine Larval Fishes C. Lavett Smith, Curator, in collaboration with James C. Tyler, Research Associate, collected larval fishes in St. Croix, Virgin Islands, and Carrie Bow Cay, Belize. They have discovered that marine fish larvae appear to fall into two groups. One contains larvae that have specializations such as hypertrophied fin and cranial spines, stalked eyes, trailing hindgut extensions, extremes of body shape

Michael L. Smith, Kalbfleisch Assistant Curator in the Department of Ichthyology, hiked seven miles across the salt flats of California's Death Valley to observe these Cottonball Marsh pupfish, a species named for the one marsh in which it can be found. The fish survive in water with salinity as high as two-and-a-half times that of sea water, the highest salinity level tolerated by any vertebrate in nature. Dr. Smith believes that pupfish are not desert-adapted organisms, but are ecological generalists able to survive under whatever climate prevails, including the present desert.



and special pigment patterns. The other group consists of relatively unspecialized larvae. Apparently, the specialized larvae are adapted for long-distance transport by ocean currents. The unspecialized larvae avoid currents and long-distance travel. Drs. Smith and Tyler are exploring these facts and their implications for biogeography and resource management.

Species of Herrings Gareth Nelson, Chairman and Curator, completed studies of newly discovered species of the herring family Clupeidae. In collaboration with Linda McCarthy of ARAMCO in Dhahran, Saudi Arabia, he determined the characteristics of two previously unknown species of Persian Gulf gizzard shads (genus *Nematalosa*). He also determined the characteristics of a new species of South American freshwater sardines (genus *Rhinosardinia*), based partly on material collected in Suriname and Venezuela by Richard P. Vari, Research Associate. Those studies were made possible through the cooperation of other museums, particularly the Naturhistorisches Museum, Vienna, the British Museum (Natural History), the California Academy of Sciences, the Field Museum of Natural History, the Academy of Natural Sciences of Philadelphia and the Smithsonian Institution.

Catalogs of Herrings and Anchovies of the World Peter J.P. Whitehead, Research Associate, completed a world catalog of the herring family (Clupeidae) for the Food and Agricultural Organization of the United Nations. Working with Dr. Nelson, he is close to completion of a similar catalog for the anchovy family (Engraulidae). Together, both families number more than 300 species, among which are the world's most important commercial fishes.

Communication by Way of Electricity Peter Moller, Research Associate, and Jacques Serrier, Associate, studied the behavior of the electric elephant fishes of Africa. In experiments with the LINEX device, developed

or apart, they found that a stationary fish can encourage or discourage an approaching fish by emitting particular electric signals.

Marine Ecology Joseph W. Rachlin, Research Associate, continued studies on food preferences of local marine fishes. With Lehman College graduate student Barbara Warkentine, he discovered that estimating food availability by artificial sampling consistently gives a biased result. He found that better results are obtained by study of the food consumed by the entire fish community. On the whole, fishes are apparently better samplers of the environment than humans. James Van Tassell, Field Associate, in collaboration with James K. Dooley, Associate Professor at Adelphi University, Garden City, and Alberto Brito, Assistant Professor at the Universidad de la Laguna, Tenerife, published an annotated list of shorefishes of the Canary Islands. Representative specimens of this 10-year study are currently being cataloged into the permanent collection of the department.

Freshwater Ecology C. Lavett Smith, Curator, and Barbara A. Brown, Scientific Assistant, continued their survey of the fishes of the Mary Flagler Cary Arboretum. Dr. Smith also edited a volume on fishery research in the Hudson River, planned for publication by the State University of New York Press. Dr. Rachlin developed measurement techniques for cellular characteristics to determine the effect of metal pollutants present in the Hudson-Raritan estuary on various marine and freshwater algae. Dr. Moller explored behavior of elephant fishes in the Moa River, Sierra Leone.

Striped Bass John Waldman, graduate student in the American Museum/City University of New York joint program in evolutionary biology, completed his doctoral thesis on the systematics of the striped bass (genus *Morone*) and its relatives, showing the geographical interrelationships among the four North American and two European species.

Skeletons For a brief period, the department had no backlog of skeletal material, since all of it was prepared and cataloged. Through the efforts of Barbara A. Brown, Scientific Assistant, 2400 specimens were added to the permanent collection. These included 1800 specimens donated to the department in 1979 by R.W. Casteel, a Research Associate in the Department of Anthropology.

With these additions, the department's collection of fish skeletons is now possibly the most extensive in the world. Newly acquired material, now awaiting preparation as skeletons, includes 250 specimens obtained through the cooperation of Richard L. Lord of the Fulton Fish Market Information Service.

Scientific Publications:

Atz, James W.

1985. The use of phylogenetic trees in comparative endocrinology. B. Lofts and W.N. Holmes, eds. Current trends in comparative endocrinology. Proceedings of the Ninth International Symposium on Comparative Endocrinology, Hong Kong, December 7-11, 1981, vol. 2, pp. 1143-1145.

1986. *Fundulus heteroclitus* in the laboratory: a history. Amer. Zool., vol. 26, pp. 111-120.

Daget, J., and C. Lavett Smith.

1986. Serranidae (Serranidae s. str. + Moronidae). J. Daget, J.P. Gosse & D.F.E. Thys van den Audenaerde, eds. Checklist of the freshwater fishes of Africa. Institut Royal des Sciences Naturelles de Belgique, pp. 299-303.

Dooley, J.K., James Van Tassell, and A. Brito

1985. An annotated checklist of the shorefishes of the Canary Islands. Amer. Mus. Novitates, no. 2824, pp. 1-49.

Grande, Lance, and Gareth Nelson

1985. Interrelationships of fossil and recent anchovies (Teleostei: Engrauloidea) and description of a new species from the Miocene of Cyprus. Amer. Mus. Novitates, no. 2826, pp. 1-16.

Litman, G., L. Berger, K. Murphy, R. Litman, F. Podlaski, K. Hinds, C.L. Jahn, G. Dingerkus* (Sponsors: D.E. Rosen and G. Nelson), and B.W. Erikson

1984. Phylogenetic diversification of immunoglobulin VH genes. Dev. Comp. Imm., vol. 8, pp. 499-514.

- Miller, R.R., and Michael L. Smith
1986. Origin and geography of the fishes of central Mexico. C.H. Hocutt and E.O. Wiley, eds. The zoogeography of North American freshwater fishes. John Wiley and Sons, New York, pp. 487-517.
- Moller, Peter, and Jacques Serrier
1986. Species recognition in mormyrid weakly electric fish. *Anim. Behav.*, vol. 34, pp. 333-339.
- Nelson, Gareth
1985. A decade of challenge: the future of biogeography. A.E. Leviton and M.L. Aldrich, eds. Plate tectonics and biogeography. *Earth Sci. Hist. (Journal of the Earth Sciences Society)*, vol. 4, pp. 187-196.
1986. Class and individual: a reply to M. Ghiselin. *Cladistics*, vol. 1, pp. 386-389.
- Rachlin, Joseph W., T.E. Jensen, and B.E. Warkentine
1985. Morphometric analysis of the response of *Anabaena flos-aquae* and *Anabaena variabilis* (Cyanophyceae) to selected concentrations of zinc. *Arch. Environ. Contam. Toxicol.*, vol. 14, pp. 395-402.
- Rachlin, Joseph W., and B.E. Warkentine
1986. Growth rate of the silver hake (whiting) from the New York Bight. *Ann. New York Acad. Sci.*, vol. 463, pp. 209-210.
- Rivlin, K.A., G. Dale, and Joseph W. Rachlin
1986. Karyotypic analysis of three species of cardinal fish (Apogonidae) and its implications for the taxonomic status of the genera *Apogon* and *Phaeoptyx*. *Ann. New York Acad. Sci.*, vol. 463, pp. 211-213.
- Rosen, Donn E.
1985. An essay on euteleostean classification. *Amer. Mus. Novitates*, no. 2827, pp. 1-57.
1985. Geological hierarchies and biogeographic congruence in the Caribbean. *Ann. Missouri Bot. Gard.*, vol. 72, pp. 636-659.
- Schmidt, R.E., and Carl J. Ferraris, Jr.* (Sponsors: D.E. Rosen and G. Nelson)
1985. A new species of *Parotocinclus* (Pisces: Loricariidae) from Guyana. *Proc. Biol. Soc. Wash.*, vol. 98, pp. 341-346.
- Siebert, Darrell J.* (Sponsors: D.E. Rosen and G. Nelson), and W.L. Minckley
1986. Two new catostomid fishes (Cypriniformes) from northern Sierra Madre Occidental of Mexico. *Amer. Mus. Novitates*, no. 2849, pp. 1-17.
- Smith, C. Lavett
1986. The inland fishes of New York State. New York State Department of Environmental Conservation. 523 pp.
- Smith, Michael L., and R.R. Miller
1985. Conservation of desert spring habitats and their endemic fauna in northern Chihuahua, Mexico. *Proc. Desert Fishes Council*, vol. 13, pp. 54-63.
1986. The evolution of the Rio Grande basin as inferred from its fish fauna. C.H. Hocutt and E.O. Wiley, eds. The zoogeography of North American freshwater fishes. John Wiley and Sons, New York, pp. 457-485.
1986. Mexican goodeid fishes of the genus *Characodon*, with description of a new species. *Amer. Mus. Novitates*, no. 2851, pp. 1-14.
- Van Devender, T.R., A.M. Rea, and Michael L. Smith.
1985. The Sangamon interglacial vertebrate fauna from Rancho la Brisca, Sonora, Mexico. *Trans. San Diego Soc. Nat. Hist.*, vol. 21, pp. 23-55.
- Warkentine, B.E., and Joseph W. Rachlin
1986. Growth characteristics of two sympatric species of flatfish. *Ann. New York Acad. Sci.*, vol. 463, pp. 241-242.
- Whitehead, P.J.P., and G.G. Teugels
1985. The west African pygmy herring *Sierrathrissa leonensis*: general features, visceral anatomy, and osteology. *Amer. Mus. Novitates*, no. 2835, pp. 1-44.

Abstracts and Popular Publications:

- Dingerkus, Guido* (Sponsors: D.E. Rosen and G. Nelson)
1984. Karyotypic analysis of the Australian lungfish, *Neoceratodus forsteri*. *Amer. Zool.*, vol. 24, p. 83a.
1985. Sharkwatchers' guide. Simon and Schuster, New York, 144 pp.
1985. Sharks, skates, rays, and chimaeras. K.E. Banister and A. Campbell, eds. *Encyclopedia of aquatic life*. Equinox, Oxford, pp. 128-143.
1986. [Review of] *Sharks of the world: an annotated and illustrated catalogue of shark species known to date*, by L.J.V. Compagno. *Canadian Jour. Fish. Aquat. Sci.*, vol. 43, pp. 1095-1097.
- Nelson, Gareth
1985. [Review of] *The great chain of history: William Buckland and the English school of geology*, by N.A. Rupke. *Cladistics*, vol. 1, pp. 303-304.
- Nelson, Gareth, and M.-M. Chang
1986. [Obituary of] Erik Stensiö 1891-1984. *Copeia* 1986, p. 558.
- Serrier, Jacques, and Peter Moller
1985. Social communication in weakly electric fish: the fate of stereotyped electric organ discharge displays. *Ethologie*, vol. 85, p. 104.

Department of Invertebrates

The Department of Invertebrates is devoted to research into the systematics, evolution and ecology of living and fossil non-vertebrate multicellular animals. The genealogical and environmental diversity of this segment of life is truly vast. Though significant holdings of nearly all fossil and Recent invertebrate groups are maintained in the collections, research activities of the staff are necessarily more narrowly focused. Research concentrates on marine invertebrates, the inhabitants of modern and ancient seas. Important discoveries were made about fossil and Recent gastropods (snails) and clams, the extinct ammonites and their closest living relative, the pearly nautilus, bryozoans ("moss animals"), nemerteans ("ribbon worms"), trilobites, brachiopods and crustacean physiology and microbiology. The connection was stressed between biological facts and the development of a coherent body of theory to explain the evolution of life on Earth.

Major Acquisitions There were 94 accessions to the collection of living mollusks, with a total of 7554 lots and approximately 21,700 specimens. Notable among these accessions were the gift of Constance K. Duprey of the holotype of *Teramachia dupreyae* Emerson, and the important collections donated by Kay C. Vaught, Helen DuShane, Alice Denison Barlow and Mr. and Mrs. Leon Juster. Associate Curator Judith E. Winston and Assistant Curator Neil H. Landman added significant lots of bryozoans and Late Cretaceous (especially scaphitid) ammonites, respectively, to the collections.



Biotic Evolution Niles Eldredge, Chairman and Curator, pursued his interests in general processes of biotic evolution, completing manuscripts on the interactions of economic and informational (genealogic) systems in evolution, and the bearing of such processes on the evolution of social systems. With Marjorie Grene, Boeschstein Research Fellow in the department, he continued his investigation into the nature of species, and the fundamental structure of biological hierarchies. Progress was also made on the systematics of southern hemisphere Siluro-Devonian calmonioid trilobites.

Triassic Gastropods Roger L. Batten, Curator, completed a study of a Lower Triassic gastropod fauna from the Moenkopi Formation in the San Rafael Swell in southeastern Utah. The fauna contains 26 species and 16 genera of gastropods, and is twice as diverse as the Lower Triassic faunas of the southern Alps and southern China—the only two other faunas known of comparable age. Unlike many other groups of organisms that were strongly affected by the great extinction event that marks the Permo-Triassic boundary, Triassic gastropods in general bear a strong resemblance to Late Paleozoic faunas. Gastropods

were more severely affected by the later mass extinction at the close of the Triassic Period.

New Volutid Shell Discovered Shrimp boats trawling in deep water some 200 miles off the northwest coast of Australia have encountered an interesting and previously largely unknown biota living on the continental slope. From the mollusks discovered there, William K. Emerson, Curator, described a spectacular new species of volutid gastropod, *Teramachia dupreyae*, named in honor of the donor of the holotypic specimen, Constance K. Duprey, an avid shell collector.

Nemertean Worms The research efforts of Ernst Kirsteuer, Curator, centered on the revision of the family Ototyphlonemertidae, which are interstitial marine ribbon worms. He has discovered that a reported occurrence of two Atlantic species in the Galapagos Islands is in error; the species are actually new to science, bringing to 27 the number of recognized species of ototyphlonemerteans. Within this assemblage of taxa, three species groups can be distinguished by statolith composition and proboscis stylet structures. He has included ultrastructural details of statocysts in his study, and is now incorporating information on the ultrastructure of proboscis stylets as well.

Fossil and Living Cephalopod Mollusks Neil H. Landman, Assistant Curator, has continued his dual approach to the biology and evolutionary history of the shelled cephalopods. He has concentrated on the systematics and life history of the scaphitids, a group of the extinct ammonites abundant in the Late Cretaceous seaways of North America. For comparison with ammonites, he has also been studying the pearly nautilus—the only extant shelled cephalopod. With John Arnold, Professor of Cytology at the University of Hawaii, he has been investigating the embryology of *Nautilus*, based on the first live embryos ever obtained.

Marine Bryozoans Judith E. Winston, Associate Curator, has continued research on bryozoan systematics and the function of bryozoan avicularia. She extended her fieldwork to tropical species (Panama), showing that avicularia in these, as well as antarctic species, can capture small worms, crustaceans and other organisms trespassing on their colonies. In other research, she has shown that bryozoans may also produce chemical defenses against predators or disease.

Biological Diversification Joel Cracraft, Kalbfleisch Research Fellow, has been investigating the theory and methodology of speciation analysis and the role that different concepts of species play in the reconstruction of patterns of speciation. He is also focusing on the theory of speciation and extinction rate control and is analyzing data from the marine invertebrate fossil record and from the Recent vertebrate biota bearing on the factors controlling these rates.

Hierarchy Theory Marjorie Grene, Boeschstein Research Fellow, has been investigating problems connected with the concept of hierarchy in biology. In particular, she has discovered that several distinct concepts lie under the general term "hierarchy." Dr. Grene has focused on the historical roots of the use of these concepts in biology, discovering that the term is more recent in origin than might have been expected. She presented some of the results of her analysis at the Schneirla Conference at the Museum in October, 1985. On a related topic, with Dr. Eldredge, Dr. Grene has been exploring biological ontology, with particular emphasis on the nature of species.

245-Million-Year-Old Biotic Crisis Norman D. Newell, Curator Emeritus, and Research Associate Donald W. Boyd, of the University of Wyoming, have continued their investigations into the paleobiology of fossil marine bivalves near the Permo-Triassic boundary, the better to understand the mass extinctions and evolutionary changes during one of the most

These youngsters and their father learned that the interesting rocks with unusual patterns they found on a field trip were actually 300-million-year-old plant fossils and 365-million-year-old coral fossils. Sidney Horenstein, right, Senior Scientific Assistant in the Department of Invertebrates, evaluated the family's collection during the Museum's annual Identification Day.

critical episodes in the history of the earth. The study involved collecting and field studies in the western United States, and intensive laboratory work at the Museum during Dr. Boyd's sabbatical leave.

Paleozoic and Mesozoic

Brachiopods Howard Feldman, Research Associate, pursued his interests in Jurassic brachiopods of the Ethiopian Province of the Middle East, concentrating on the systematics of the rhynchonellids and terebratulids. He has also continued his analysis of brachiopods of the Devonian Onondaga limestone of New York State.

Symbiosis Research Associate John J. Lee and colleagues have demonstrated that a strict host-specific relationship between diatom-bearing larger foraminifera and their endosymbiotic algae does not exist. He also continued his investigation of the contribution of feeding to the carbon budgets of two species of larger foraminifera at the H. Steinmetz Marine Biology Laboratory of Hebrew University at Elat on the Red Sea.

Neurohormones in Green

Crabs Linda H. Mantel, Research Associate, has pursued her interests in neurohormones of the green crab *Carcinus maenas*. These substances, produced in cells of the central nervous system, are released into the blood of the crab when it is transferred to a dilute medium. The hormones act on cells in the gills, which regulate the balance of salt and water in the blood. It is likely that the neurohormones act on cells through a "second messenger" (an intracellular signal), just as they do in humans.

Massive Sulphide

Deposits Leslie F. Marcus, Research Associate, continues to aid the department with his expertise in computing. He has begun development of an expert system for the analysis of massive sulphide deposits using interactive color graphics on a desk top computer under a grant from the United States Geological Survey.

Parasitology Research Associate Horace W. Stunkard, recognized as the dean of parasitologists, completed his 65th year at the Museum, overseeing curation of his extensive collections that were donated to the department. He contributed his vast knowledge and biological experience to the department's general research atmosphere.

Department Outreach During the year, the department made 58 loans to research scientists at other institutions. There were 119 visitors to the collections. Departmental members continued to serve on the faculties of several local universities, lecture to scientific and lay audiences, and participate in Museum Discovery Tours programs. Several staff members participated in exhibition work and in programs of the Museum's Department of Education.

Scientific Publications:

- Batten, Roger L.
1985. Permian gastropods from Perak, Malaysia., Pt. 3, the murchisoniids, cerithiids, loxonematids and subulitids. *Amer. Mus. Novitates*, no. 2829, pp. 1-40, figs. 1-62.
- Cracraft, Joel
1985. Historical biogeography and patterns of differentiation within the South American avifauna: areas of endemism. *Amer. Ornithol. Union, Ornithol. Monogr.* 36:49-84.
1985. Species selection, macroevolutionary analysis, and the "hierarchical theory" of evolution. *Syst. Zool.* 34:222-229.
1985. Biological diversification and its causes. *Ann. Missouri Bot. Garden* 72:794-822.
1985. Monophyly and phylogenetic relationships of the Pelecaniformes: A numerical cladistic analysis. *Auk* 102: 834-853.
- Eldredge, Niles
1985. Unfinished synthesis. Biological hierarchies and modern evolutionary thought. Oxford University Press, N.Y. 237 pp.
1985. The ontology of species. In Vrba, E.S., *Transvaal Mus. Monogr.*, no. 4, pp. 17-20.
1985. Evolutionary tempos and modes: A paleontological perspective. In Godfrey, L. (ed.), *What Darwin Began: Issues in Evolution*. Allyn and Bacon, Boston, pp. 113-137.

- Emerson, William K.
1985. *Teramachia dupreyae* new species, from off Western Australia (Gastropoda: Volutidae). *The Nautilus*, vol. 99, no. 4, pp. 102-107, 8 figs.
1986. On the type species of *Metula* H. and A. Adams 1853: *Buccinum clathratum* A. Adams and Reeve, 1850 (Gastropoda: Buccinidae). *The Nautilus*, vol. 100, no. 1, pp. 27-30, 5 figs.
- Feldman, Howard R.
1985. Brachiopods of the Onondaga limestone in central and south-eastern New York. *Bull. Amer. Mus. Nat. Hist.*, vol. 179, pp. 289-377.
1985. *Oleneothyris subfragilis* (d'Orbigny) 1850, a replacement name for the brachiopod *Oleneothyris fragilis* (Morton) 1828. *Jour. Paleontol.*, vol. 56, no. 6, p. 1485.
1986. Cladistic analysis of a Jurassic rhynchonellid brachiopod genus from the Middle Eastern Ethiopian province. *Geol., Soc. Amer. Abstracts with programs*, vol. 18, no. 1, p. 16.
- Funk, V.A., and Joel Cracraft
1985. The implications of phylogenetic analysis for comparative biology: the thirtieth annual systematics symposium. *Ann. Missouri Bot. Garden* 72:591-595.
- Gail, Francis, Norman Weiss, and Sidney Horenstein
1985. An investigation of deterioration of Bethel white granite. In J.H. Matthys and J.G. Borchelp, (eds.), *Proceedings of the Third North American Masonry Conference*, University of Texas, paper 56, pp. 1-7.
- Hakansson, E., and J.E. Winston
1985. Interstitial bryozoans: unexpected life forms in a high energy environment. In C. Nielsen and G.P. Larwood, (eds.), *Bryozoa: Ordovician to Recent*, Fredensborg, Olsen and Olsen, pp. 125-134.
- Jackson, J.B.C., J.E. Winston, and A.G. Coates
1985. Niche-breadth, geographic range, and extinction of Caribbean reef-associated cheilostome Bryozoa and Scleractinia. *Proc. 5e Congres Internat. Sur les recifs coralliens*, Tahiti, vol. 4, pp. 151-158.
- Kirsteuer, Ernst
1986. Nemertina. In W. Sterrer, (ed.), *Marine Fauna and Flora of Bermuda*. John Wiley and Sons, New York. pp. 208-211, 1 pl.
- Landman, Neil H., and Klaus Bandel
1985. Internal structures in the early whorls of Mesozoic ammonites. *Amer. Mus. Novitates*, no. 2823, pp. 1-21.
1986. Shell abnormalities in scaphitid ammonites. *Lethaia*, vol. 19, pp. 211-224.
- Lee, J.J.
1986. Protozoa as indicators of Ecosystems. *Insect Sci. and its Applic.*, vol. 7, pp. 349-353.

Lee, J.J., C.W. Reimer, and R. Mahoney
1986. Recommendations for the Conservation of SEM Diatom preparations in a Museum repository. SEM 86, vol. 1986, part 4, pp. 1403-1406.

Lee, J.J., and R. Rottger
1986. Report on Post Congress workshop on Marine Protozoa. Insect Sci. and its Applic., vol. 7, pp. 441-445.

Mantel, Linda H., Edward J. Flynn, Mary Katz, and Liza Knapp

1985. Effects of Benzene and Dimethylnaphthalene on homeostatic process in two species of crabs. Mar. Environ. Res., vol. 17, p. 258-261.

Newell, Norman D., and Donald W. Boyd
1985. Permian Scallops of the Pectinacean Family Streblochondriidae. Amer. Mus. Novitates, no. 2831, pp. 1-13, figs. 1-13, tables 1-6.

Sage, Walter E. III, ed.

1985. Malacological articles in some current biological and paleontological serial publications. Malacological Review, vol. 18, nos. 1-2, pp. 203-206.

Winston, Judith E., and A.W. Bernheimer

1986. Hemolytic activity in an Antarctic bryozoan. J. Nat. Hist., vol. 20, pp. 369-374.

Winston, Judith E., and B.F. Heimberg

1986. Bryozoans from Bali, Lombok and Komodo. Amer. Mus. Novitates, no. 2847, pp. 1-49.

Abstracts and Popular Publications:

Arnold, John M., and Neil H. Landman
1986. Embryonic development of Nautilus. AAAS Annual Meeting, Abstracts.

Batten, Roger L.

1986. Robert Parr Whitfield, Hall's chief assistant: he stayed too long. (Abstract) northeast section, Geological Society of America, Annual Meeting, March 11-14, 1986.

Colon-Urban, R., L. Reyes, and J.E.

Winston

1985. Antibiotic substances from several Antarctic bryozoans (Abstract). Amer. Zool., vol. 24, p. 52A.

Eldredge, Niles

1985. [Review of] The Problems of Evolution by Mark Ridley. Nature 315:519.

Emerson, William K.

1985. Status report: William E. Old, Jr. Malacology Fund. American Malacological Union News, vol. 16, no. 2, p. 6.

Horensstein, Sidney

1985. What's in a Stone. Through the ages, vol. 41, no. 4, pp. 20-21.

1986. Alligators in New York's sewers. Faces, vol. 2, no. 4, pp. 9-11.

Landman, Neil H.

1985. Early ontogeny of Mesozoic ammonites and nautilids. 2nd International Cephalopod Symposium, Cephalopods: Present and Past, Abstracts. p. 31.

Landman, Neil H., W. Bruce Saunders, Judith E. Winston, and Peter J. Harries.

1985. Epizoans on live Nautilus. Geol. Soc. America. Abstracts with Program, vol. 17, no. 7, p. 637.

Sage, Walter E. III

1985. News of New Species. Hawaiian Shell News, vol. 33, no. 7, p. 11, vol. 33, no. 9, p. 11; vol. 33, no. 11, pp. 10,11.

1985. [Review of] Terebridae (Mollusca: Gastropoda) by Umberto Aubry, M.D. N.Y. Shell Club Notes, no. 295, pp. 9,10.

1985. [Review of] Catalogue of the Living Bivalvia of the Eastern Pacific Ocean: Bering Strait to Cape Horn by F.R. Bernard. The Littorina, vol. 10, no. 3, p. 3.

1985. [Review of] Cowries of the World by C.M. Burgess, M.D. Hawaiian Shell News, vol. 33, no. 8, pp. 1, 10.

1985. [Review of] Crustaceans and Mollusks Trawled off Suriname and French Guiana by Masatsune Takeda and Takashi Okutani. N.Y. Shell Club Notes, no. 296, pp. 9, 10.

1985. COA 1985—Philadelphia, Pennsylvania. N.Y. Shell Club Notes, no. 296, pp. 15, 16.

1985. AMU 1985—Kingston, Rhode Island. N.Y. Shell Club Notes, no. 296, pp. 16, 17.

1985. [Review of] World-wide Snails: Biogeographical studies on Non-marine Mollusks, edited by Alan Solem and A.C. Van Bruggen. Hawaiian Shell News, vol. 33, no. 11, p. 8.

1985. [Review of] Archaeogastropod Biology and the systematics of the Genus Tricolia (Trochacea: Tricoliidae) in the Indo-West Pacific by Robert Robertson. N.Y. Shell Club Notes, no. 297, pp. 4, 5.

1985. [Review of] Illustrated Catalogue of Latiaxis and its Related Groups, Family Coralliophilidae by Sadao Kosuge and Masaji Suzuki. N.Y. Shell Club Notes, no. 297, pp. 11, 12.

1986. News of New Species. Hawaiian Shell News, vol. 34, no. 1, p. 11; vol. 34, no. 3, p. 6; vol. 34, no. 4, p. 11.

1986. [Review of] Monograph of Living Chitons (Mollusca: Polyplacophora). Volume 1, Order Neoloricata: Lepidopleurina by Piet Kaas and Richard A. Van Belle. Hawaiian Shell News, vol. 34, no. 2, p. 6.

Winston, Judith E.

1985. Life history studies of Disporella and Drepanophora in Jamaica (abstr.) In Bryozoa: Ordovician to Recent, C. Nielsen and G.P. Larwood, eds. Fredenborg, Olsen and Olsen p. xx.

Winston, Judith E., and B.F. Heimberg

1985. The role of bryozoans in the benthic community at Low Island, Antarctica, (Abstract). Amer. Zool, vol. 25, p. 10A.

Department of Mammalogy

The American Museum's collection of mammals now numbers more than 260,000 specimens, consisting chiefly of study skins and skulls, skeletons and materials preserved in alcohol. It is perhaps the most broadly representative accumulation of its type—in worldwide scope and in variety of species—in the Western Hemisphere. It contains the original sources of data used by researchers to answer questions about evolution and geographic distributions of mammals.

Collections Work has concentrated on rehabilitating, reorganizing, expanding and curating the department's huge collection of large mammals. Whales, bears, camels, buffalo, cattle and hippos from around the world were among the groups that were processed. Skulls had to be matched with postcranial skeletons and sometimes numbered and stored in adequate trays and cabinets.

For the first time the department's valuable series of large mammals are properly curated and accessible to users.

By the end of May, the department had 267 loans outstanding, including 4759 specimens, and 149 visitors spent 678 days studying in the department.

Gifts The department accepts gifts of mammal specimens from private donors providing the material is properly preserved and comes with adequate collecting data. In addition to the specimens brought in by Curator Sydney Anderson from his Bolivian work, nearly 100 bats and rodents were donated by J.J. Rasweiler and T.J. McCarthy, and a magnificent set of mostly North American trophy heads was donated by Patricia Wynne.

Mammals of Bolivia Studies of the mammals of Bolivia have been conducted in the laboratory and in 31

the field, with support from the National Science Foundation. Dr. Anderson is collaborating with the Museum of Southeastern Biology at the University of New Mexico and the Museo Nacional de Historia Natural (MNHN), La Paz, Bolivia. The Bolivian Expedition of 1985 lasted from June 26 to Sept. 25.

In addition to Dr. Anderson, participants included: graduate student Nancy Olds from the American Museum, Isabel D. Mercado T. from MNHN, Luis Ruedas from Fordham University, Otto Carlos Jordan, a veterinarian from Santa Cruz, and Joseph A. Cook, Alan W. Dickerman, Scott Gardner, Brett R. Riddle and Terry L. Yates from the University of New Mexico.

In all, the team spent 686 days in the field, and collected more than 1600 mammals.

South American Mammals Work has been conducted on a collaborative three-volume treatise on South American mammals which will be published by the University of Chicago Press. Alfred Gardner of the United States Fish and Wildlife Service, and James L. Patton of the Museum of Vertebrate Zoology are to be co-editors with Dr. Anderson.

Three members of the department, Curator Emeritus Karl F. Koopman, Chairman and Curator Guy G. Musser, and Assistant Curator Robert S. Voss, are among the contributors.

Dr. Koopman is bringing his expertise on South American bats to the project. He has already completed a section on systematics of the subfamily Carollinae which will be published in the first volume.

Drs. Musser and Voss are preparing taxonomic and distributional accounts of several groups of muroid rodents native to South America. Reports about rodents will form most of volume three.

Bats Dr. Koopman, although retired, has actively continued his work on taxonomy, geographic distributions and phylogenetic relationships of bats. He is writing a comprehensive treatise on "Systematics of Chiroptera" for the *Handbuch der Zoologie* series. He

is also collaborating with Scientific Assistant Marie Lawrence on a study initiated by her about the taxonomy and biology of the New Guinean *Syconycteris australis*, a nectar-feeding bat.

Sulawesi Mammals Dr. Musser's investigations into the mammals native to the island of Sulawesi have provided new information about the fauna and its relationships in that part of the Indo-Australian region.

As part of a symposium on Biogeographic Evolution of the Malay Archipelago held in July during the Third International Congress of Systematic and Evolutionary Biology, Dr. Musser contributed a chapter about the mammals of Sulawesi. He discussed the distributional patterns, natural histories and fossil records of the 122 species (in 55 genera and 15 families) of flying and nonvolant mammals native to Sulawesi and nearby offshore islands.

Dr. Musser also reviewed the non-native species recorded from Sulawesi, illustrated special regional and altitudinal patterns of the endemic species, presented an assessment of the overall relationships of the Sulawesi mammal fauna to other mammals found in that vast region from the Sunda Shelf to New Guinea and Australia and discussed the origins and antiquity of various groups of native species.

In addition, Dr. Musser explained the oceanic character of Sulawesi and the unbalanced nature and isolation of its mammalian fauna in the context of migration by overwater dispersal—not over land bridges or by tectonic rafting—and concluded with a view of the Pleistocene fauna and its relationship to the living species.

Among the native mammals of Sulawesi are two species of endemic tarsiers. Tarsiers in general have been the subject of intensive study for many years by a variety of primatologists. A check of the recent literature will reveal that there is wide recognition of three species: one from Sulawesi, one from the southern Philippines, and a single species from Borneo,

Sumatra and smaller islands on the Sunda Shelf. There are really two species endemic to Sulawesi.

Dr. Musser and his collaborator, Marion Dagosto, have finished a manuscript documenting the morphological and ecological limits of each of the Sulawesi tarsiers and their relationships to the Philippine and Sundanese species.

Tarsius spectrum is the common tarsier on the mainland and nearby islands of Sulawesi. It has been found in most of the major regions of the island.

The other species, *Tarsius pumilus*, is known only by two specimens in museum collections. The small mammal fauna of central Sulawesi contains a suite of species that are endemic to the mountains in that part of the island. *Tarsius pumilus* is part of this assemblage and probably does not occur on the peninsular arms. Careful study of the native tarsiers will help contribute toward understanding the diversity and relationships of the Sulawesi fauna.

Sea Hares Conducting research on the inking behavior of *Aplysia dactylomela* in Puerto Rico, Curator Ethel Tobach, in collaboration with Gary Greenberg of Wichita State University and Graziano Fiority of the Zoological Station of Naples, studied the behavior of *Aplysia* when in proximity with predators or prey.

William Coull, right, and Helmut Sommer, Senior Technicians in the Department of Mammalogy, examine the skull of a wild sheep, part of the department's collection of large mammals. The collection was expanded and reorganized this year to make it more easily accessible to visiting scientists. Last year, 149 researchers spent the equivalent of 678 days studying the department's specimens.



No inking response occurred, although sea hares and the other organisms tended to move away from each other. Also, presence of either ink or opaline (also released by sea hares under stress) does not inhibit or enhance inking behavior.

Social/Emotional Behavior

The implications of the effects of serotonin in behavioral and physiological processes has been reported in recent articles. In Fawnhooded rats, which have a serotonin deficiency, expression of serotonin function is evident in its developmental pattern and response to noxious stimuli. These rats and their putative ancestors, the Wistar and Long-Evans stocks, were studied by Dr. Tobach and Shanin Sakhi of York College of the City University of New York in an avoidance-conditioning situation.

The Fawnhooded rats learned to avoid a mild shock early in the observations. The Long-Evans stock took longer to avoid shock, but was more efficient at doing so with repeated experiences. The Wistar stock learned quickly but did not retain the pattern. Thus, although the peripheral serotonin pattern is similar in the Long-Evans and Wistar stocks, the behavior pattern does not reflect this.

The evolutionary relationship between chemical characteristics of foods and sensory discrimination of foraging animals emphasizes the significance of genetic-behavioral studies. Fawnhooded rats have a particular taste sensitivity to bitter substances which seems to be related to serotonin deficiency. By giving these animals a diet containing no amino acid except tryptophan (the precursor of serotonin), Dr. Tobach and her graduate students Teresa Pacheco and Hiroshi Yamashita will elucidate the Fawnhooded rats' response to 1-tryptophan's bitter taste and its physiological effects. The study may have implications for the wider problem of coevolution of biochemical characteristics of prey plants and sensory characteristics of their animal predators.

Social adjustments of spiny mice (*Acomys cahirinus*) pups are being examined in an environment that re-creates their desert habitat. The

mice are precocious and demonstrate early depth perception.

Because the pups characteristically climb and jump within a day or two of birth, the pattern of goal-directed social interaction is complex. Dr. Tobach, in collaboration with Alexander Skholnick of the University of Michigan, is studying the interactions between groups of spiny mice, their close relatives and more distantly related conspecifics.

Mammals of New Jersey

Research was conducted on the mammals of New Jersey by Curator Richard G. Van Gelder. As a small state (45th in size) with a dense population (1st; 1000/sq. mi.), increasing loss of land to house-building, and many kinds of pollution, it is important to monitor the changes that are taking place in the state's mammals.

During the year a unique program was initiated by arranging a cooperative mammal-study venture mainly through New Jersey Audubon Society members. At present, some 60 cooperators throughout the state are documenting the presence of mammal species in various areas and collecting data on life history and habits. The records are to be published annually by the New Jersey Audubon Society.

New Curator Last fall, Dr. Voss joined the department as Thorne Research Fellow. In May he was appointed Assistant Curator. For most of the year Dr. Voss has been analyzing geographic patterns of morphological variation among populations of the Neotropical genus *Zygodontomys*. These mice are ecologically restricted to open (non-forest) vegetation formations, and their presently disjunct geographic distribution is plausibly attributed to vicariance of a once-continuous savanna biome. Geographic variation is characterized by morphological uniformity across much of the northern Neo-tropics from Costa Rica to the Orinoco delta but with morphologically distinctive peripheral isolates in the arid intermontane valleys of Colombia, in savanna enclaves of the upper Rio Negro drainage and the Guiana shield, and on continental-shelf

islands (where body size is consistently and conspicuously larger than in adjacent mainland populations).

Dr. Voss is interested in relating estimated genetic covariance structures underlying morphological traits to known patterns of geographic variation in the same characters. This could facilitate inference of genetic divergence from morphometric contrasts and suggest which (if any) of the observed morphological attributes may have been subjected to directional selection.

Scientific Publications:

- Anderson, Sydney
1985. Developments in information retrieval systems. *Acta Zool. Fennica*, vol. 170, pp. 61-63.
1985. The theory of range-size (RS) distributions. *Amer. Mus. Novitates*, no. 2833, pp. 1-20, figs. 1-13.
1985. Lista preliminar de mamíferos bolivianos. *Cuadernos, Acad. Nac. Cienc. Bolivia*, vol. 65, *Cienc. Naturaleza*, no. 6, *Mus. Nac. Hist. Nat., Zoologica*, no. 3, pp. 5-16.
- Barros, M.A., and J.L. Patton
1985. Genome evolution in pocket gopher (genus *Thomomys*) - III Fluorochrome revealed heterochromatin heterogeneity. *Chromosoma*, vol. 92, pp. 337-343, 1 figure.
- Buettner-Janusch, J., and I. Tattersall
1985. An annotated catalogue of Malagasy Primates (Families Lemnidae, Indridae, Daubentonidae, Megaladapidae, Cheirogaleidae) in the collections of the American Museum of Natural History. *Amer. Mus. Novitates*, no. 2834, pp. 1-45, 1 figure.
- Carleton, Michael D., and C. Brian Robbins
1985. On the status and affinities of *Hybomys Planifrons* (Miller, 1900) (Rodentia: Muridae). *Proc. Biol. Soc. Wash.*, vol. 98, no. 4, pp. 956-1003, figs. 1-17, tables 1-5.
- Daly, J.C., and James L. Patton
1986. Growth, reproduction, and sexual dimorphism in *Thomomys bottae* pocket gophers. *Jour. Mammal.*, vol. 67, no. 2, pp. 256-265, figs. 1-3, tables 1-3.
- Elder, F.F.B., and M. Raymond Lee
1985. Chromosomes of *Sigmodon ochrognathus*, *Sigmodon fulviventer* suggests a realignment of *Sigmodon* species groups. *Jour. Mammal.*, vol. 66, pp. 511-518, figs. 1-5.

- Emmons, Louise H.
See Gautier-Hion, Duplantier, Quiris, Feer, Sourd, Decoux, Emmons, Dubost, Erad, Hecketsweiler, Mougazi, Rousillon, and Thiollay; Patton and Emmons.
- Gautier-Hion, A., J.-M. Duplantier, R. Quiris, F. Feer, C. Sourd, J.-P. Decoux, G. Dubost, Louise H. Emmons, C. Erard, P. Hecketsweiler, A. Mougazi, C. Rousillon, and J.-M. Thiollay
1985. Fruit characters as a basis of fruit choice and seed dispersal by a tropical forest vertebrate community. *Oecologia*, vol. 65, pp. 324-337, figs. 1-2, tables 1-5.
- Goldman, M., J.L. DeSantis, and E. Tobach
1986. Responses of fry of a male mouth brooding species (*Sarotherodon melanothron*) to light and conspecifics. *Anim. Behav.*, vol. 34, pp. 1262-1268.
- Griffiths, T.A.
1985. Molar cusp patterns in the bat genus *Brachyphylla*: some functional and systematic observations. *Jour. Mammal*, vol. 66, no. 3, pp. 544-549, 1 figure.
- Koopman, Karl F.
1986. Sudan bats revisited: An update of "Bats of the Sudan." *Cimbebasia*, ser. A., vol. 8, no. 2, pp. 10-13.
- Layne, James N., and D. Glover
1985. Activity patterns of the common long-nosed armadillo *Dasypus novemcinctus* in South-Central Florida. In G. Gene Montgomery, (ed.), *The Evolution and Ecology of Armadillos, Sloths, and Vermilinguas*, Smithsonian Inst. Press, pp. 407-417, figs. 1-5, tables 1-2.
- Lee, M. Raymond
See Elder and Lee.
- McCarthy, Timothy J.
1986. The occurrence of the neotropical cacomistle (*Bassariscus sumichrasti*) in Belize. *Belize Audubon Society Bulletin*, vol. 18, no. 1, pp. 3-5.
- McLellan, Laura John
1986. Notes on bats of Sudan. *Amer. Mus. Novitates*, no. 2839, pp. 1-12, figs. 1, 2.
- Musser, Guy G., Lawrence R. Heaney, and Dioscoro S. Rabor
1985. Philippine rats: A new species of *Crateromys* from Dinagat Island. *Amer. Mus. Novitates*, no. 2821, pp. 1-25, figs. 1-11, tables 1-4.
- Musser, Guy G., A. van de Weerd, and Elizabeth Strasser
1986. A replacement name for *Floresomys* Musser, 1981 (*Muridae*) and new material of that taxon from Flores, Indonesia. *Amer. Mus. Novitates*, no. 2850, pp. 1-10, figs. 1-5, tables 1-2.
- Patton, James L.
1985. Population structure and the genetics of speciation in pocket gophers, genus *Thomomys*. *Acta Zool. Fennica*, vol. 170, pp. 109-114.
- Patton, James L.
See Barros and Patton; Daly and Patton; Zink, Smith and Patton.
- Patton, James L., and L.H. Emmons
1985. A review of the genus *Isothrix* (Rodentia: Echimyidae). *Amer. Mus. Novitates*, no. 2817, pp. 1-14, tables 1-6.
- Schaller, G., Hu Jinchu, Pan Wenshi, and Zhu Jing
1985. *The Giant Pandas of Wolong*. Univ. Chicago Press, 298 pp., figs. 1-8.5, tables 1-8.3.
- 1985 Tobach, E.
/86. See Goldman, DeSantis and Tobach.
- Van Gelder, Richard G.
1985. Records of New Jersey mammals.
/86. Records of New Jersey birds, vol. 9, no. 4, p. 67.
- Wolfe, J.L.
1985. Population ecology of the Rice Rat (*Oryzomys palustris*) in a coastal marsh. *J. Zool. (Lond.)*, vol. 205, pp. 235-244, figs. 1-3, tables 1-3.
- Zink, R.M., M.F. Smith, and J.L. Patton
1985. Associations between heterozygosity and morphological variance. *Jour. Heredity*, vol. 76, pp. 415-420.

Abstracts and Popular Publications:

- Bohall-Wood, P., and James N. Layne
1986. The golden mouse. *Fla. Wildlife*, vol. 40, pp. 16-19.
- Dagosto, M., and Guy G. Musser
1986. [Abstract] The status of *T. pumilus*. *American Journal of Physical Anthropology*, vol. 69, no. 2, p. 192.
- Griffiths, Thomas A.
1985. [Review of] van Zyll de Jong, C. G. *Handbook of Canadian Mammals*, 2. *Bats*. *Bat Research News*, vol. 26, no. 3, pp. 29-30.
- Layne, James N.
See Bohall-Wood and Layne; Millar and Layne.
- Layne, James N.
1985. Audubon's Caracara. *Fla. Wildlife*, vol. 39, pp. 40-42.
- McCarthy, Timothy J.
1985. Cartographic resources in Mexico. *Association of Systematics Collections (ASC) Newsletter*, vol. 13, no. 6, p. 55.
- Millar, J.S., and James N. Layne
1985. What is the rodent specialist group? Program and Abstracts 4th International Theriological Congress, Edmonton, Canada, 13-20 August.

- Schaller, G.
1985. *Wildlife in the middle kingdom*. *Defenders*, vol. 60, no. 3, pp. 10-15.
1986. *Secrets of the wild panda*. *National Geographic*, vol. 169, no. 3, pp. 284-309.
- Tobach, Ethel
1985. [Review of] *Comparative Psychology*. Donald A. Dewsbury, Hutchinson Ross; distr. by Van Nostrand Reinhold. *Recent Pub. Nat. Hist.*, vol. 3, no. 2, pp. 3-4.

1985. [Review of] *Evolving Hierarchical Systems*. Stanley N. Salthe. *Recent Pub. Nat. Hist.*, vol. 3, no. 4, pp. 4-6.

- Van Gelder, Richard G.
1986. *Von tieren und menschen. Gestern-heute-morgen. Animals and Man. Past, Present, Future*. J. Theilade & Co., Ringsted, Denmark, 79 pp., German Edition.

Department of Mineral Sciences

The Department of Mineral Sciences manages extensive collections of minerals, gems, rocks, ore deposits and meteorites. Four curators and their support staff carry out research programs aimed at better understanding the processes operative within the Earth and in the solar system based on evidence culled from the collections. Research this year focused on a variety of topics, including jadeites, a fossil geothermal ore deposit in Peru, a gold deposit in Chile, gem deposits in Pakistan, chondritic and ureilitic meteorites, the reconstruction of a basaltic planet, and studies of metal meteorites using the synchrotron radiation facility at Brookhaven National Laboratories. A single crystal X-ray diffractometer facility was added to the research capabilities of the department, and a petrology curatorship was established.

Acquisitions and Loans The mineral and gem collection increased by 433 specimens, with 222 acquired by donation, 81 by exchange and 130 by purchase. The most notable gift, given by an anonymous donor, was the Brazilian Princess, a 21,005 carat blue topaz from the Minas Gerais state of Brazil. The faceted gem is the largest cut stone in the world. Its unique characteristics attracted considerable attention from the public and the media.

Other notable acquisitions included multicolored tourmalines from Mozambique; cerussites from worldwide localities; a 45-pound boulder of jadeite as well as ruby-red spinel crystals, both from Burma; yellow anglesite crystals from Toussit, Morocco; fluorite crystals from Hardin Co., Ill., and epidote and pink morganite crystals from gem deposits in Pakistan.

A total of 226 mineral and gem specimens were lent last year to 16 institutions, including the Oak Ridge National Laboratories; universities such as Cal Tech, Stanford, Columbia, Princeton, Washington and Tokyo, N.Y.U. Dental School, and the U.S. Department of Energy.

The meteorite collections acquired 28 new specimens through purchase, exchange, and donation. Notable acquisitions included Camel Donga (Australia), Colomera (Spain), Melvern Lake (Kansas), La Criolla (Argentina), Alvord (Iowa), Colony (Oklahoma), Mossiel (Australia), Julesburg (Colorado) and Vetluga (USSR).

Several impact glasses were also acquired, including a tektite from China and irghizites and zhamanshinites from Siberia. Thirty specimens were loaned to a wide variety of institutions including UCLA, Iowa State University, the University of Tokyo and the Newark Museum.

A Single Crystal Diffractometer

A grant of \$33,000 was received from the National Science Foundation to fund the computer upgrading of a Picker FACS-1 single crystal X-ray diffractometer which was donated to the Museum by the Department of Geological and Geophysical Sciences at Princeton University. The instrument is used to measure and refine crystal structures of minerals in the Museum's collections and is an important mineralogical research tool. The cost of purchasing a new instrument of this type is currently about \$160,000, thus the contributions from Princeton and the NSF were especially appreciated. The facility will be available to the local scientific community.

Education and Exhibition

Educational activities in the department involved graduate students, adult education programs and special interest groups. Associate Curator George E. Harlow taught a course on Advanced Mineralogy to graduate students at Columbia University. The course involved crystal chemistry and analytical techniques and how they can be used to help solve petrologic problems.

A seven-week course on the "Gems of the Earth" was taught at the Museum by Dr. Harlow, Chairman and Curator Martin Prinz, Assistant Curator Demetrius C. Pohl and Senior Scientific Assistant Joseph J. Peters. Dr. Harlow also gave his annual "Weekend in Geology" course, which entails a trip across New Jersey to eastern Pennsylvania.

The departmental staff lectured at various meetings, universities, mineral and gem shows, clubs and to other groups. Dr. Prinz gave talks on meteorites in Houston and in Bourdeaux, France; Dr. Harlow lectured at professional meetings and clubs on his jadeite work; Dr. Pohl talked to 10 different groups, as well as at meetings, on his work in Peru and Chile, and on the mineralogy of Australian localities such as Broken Hill, and Mr. Peters lectured about gem deposits in Pakistan. Traveling exhibits, featuring Pakistani gems and Australian minerals were sent to Tucson, Detroit and several communities in New Jersey.

A new video presentation, "Forever Gold," opened in the Guggenheim Hall of Minerals in March. It presents the story of gold as it relates to natural and human history and was created in coordination with the production company, Concepts New York. The video utilizes two laser discs and dual screen projection equipment.

Silver and Gold After extensive field study in Peru and Chile, Dr. Pohl collected samples which yielded new insights into the origins of the specific ore deposits he studied. Work on the silver vein mines of the Castrovirreyna District in Peru revealed a zoning pattern

which relates the occurrence of various silver minerals to depth below the original land surface. Each silver mineral is related to a specific depth and ore grade.

The deposit is the result of ancient hot springs—a fossil geothermal system. The surface expression of the ore deposits are nearly barren massive silica bodies. Fluid inclusions from various minerals in the veins are being studied to determine the chemical and physical changes in the ore fluids during their ascent to the surface. The recognition of this type of silver mineral zoning has considerable significance in assessing the economic potential of these veins and in locating similar deposits.

In the Sierra Gorda district of Chile, there are a number of small occurrences in which the gold has been shown to be deposited and enriched by chemical processes related to normal weathering. Because of the extreme aridity (no historically recorded rainfall) a suite of unusual iron, copper and lead minerals occurs with the gold. The presence of these minerals, with analyses of groundwaters from the mines, permitted Dr. Pohl to determine the precise geochemical conditions under which the gold migrated and was deposited.

Diamonds may be a girl's best friend, but even Colleen Mehegan, Manager of Special Publications for Natural History magazine, could not pass up the opportunity to match her engagement ring against the "Brazilian Princess," the world's largest cut gem. The light blue topaz, a gift from an anonymous donor, weighs 21,005 carats (nine-and-a-half pounds), and is the size of an automobile headlight. It is among several one-of-a-kind pieces in the Department of Mineral Sciences collections, including the 564-carat "Star of India," the world's largest star sapphire, and the "Morganite Goddess," a four-inch-high figure of the Chinese goddess Kuan-yin considered to be the world's finest morganite carving. Photo by Pat Carroll/Daily News.



Conditions similar to those outlined for Sierra Gorda are common throughout the Atacama Desert and similar gold deposits should occur elsewhere. Examination of the Museum's collections located two other areas in Chile with identical occurrences of gold.

Jadeite Dr. Harlow conducted research on unusual rocks containing 90 percent or more of the mineral jadeite. The jadeite mineral is part of a larger group of common rock-forming minerals called pyroxenes. Jadeite is thought to form at great depth but moderate temperatures by a complex set of chemical reactions. The research provides important data useful in interpreting the time and temperature history of the rocks containing them.

A paper is in press on ureyite, a rare sodium and chromium-rich pyroxene which gives jades an emerald green color. The pyroxene, named after Harold Urey, was found in previously collected Guatemalan samples. It was not previously known to exist in Guatemalan occurrences, although it is present in archeological artifacts from Central America.

A corollary project on chromite, the ore of chromium, coexisting with the ureyite was carried out by Dr. Harlow and graduate student Alison Barry. They studied chromites from three localities, including the Guatemalan occurrences, and found unusual composition changes reflecting the nature of the fluids involved in the process of forming ureyite.

Dr. Harlow studied the fluid inclusions in jadeite of forming ureyite and found that the trapped fluids were very salt-rich—about twice that of seawater. These data are inconsistent with some of the experimental data for the stability conditions for the formation of jadeite, and this will lead to further research to resolve this discrepancy. Results were presented at the International Mineralogical Association meeting at Stanford University in July.

Ureilites One group of meteorites that has continued to challenge researchers' abilities to

understand their origin is called the ureilites. The name is derived from the latter part of the name of one of the first known members of this group, the meteorite Novo Urei from the USSR. This group now consists of 26 meteorites, whereas only a few years ago only three were known. They contain mainly two minerals, olivine and pigeonite (a form of pyroxene), and are held together by a black carbonaceous matrix which consists mainly of graphite and diamond—the low and high pressure forms of pure carbon. The tiny diamonds found in these meteorites were formed by a very high pressure shock event caused by impact on the small planet from which these rocks originated.

Dr. Prinz, Research Associate C.E. Nehru and Scientific Assistant Michael K. Weisberg have been studying all available members of this group to find new insights into their origin. Many important clues were uncovered, resulting in continuing controversy.

The tentative conclusions are that these meteorites were originally derived from primitive carbonaceous chondrites, and were assembled into a small planet which experienced planetary melting and separation by differential sinking and floating in the melt.

The ureilites represent the sunken components, and the presence of a carbon-rich melt produced an oxygen-poor environment. These rocks were kept very hot and the trapped melt was drained away. A severe shock event broke the rocks loose from the planet and froze them in their high temperature state. They eventually landed on Earth. The story is complex and research is continuing in order to better understand the significance of these samples.

A Basaltic Planet Research Fellow Jeremy S. Delaney has been theoretically reconstructing a planet which he calls the Basaltic Achondrite Planetoid or BAP. This planetoid is now known to be represented by more than 80 meteorites—achondrites. It is the third best sampled astronomical body after the Earth and Moon.

Among the achondrite groups

which represent BAP are eucrites (basalts), diogenites (deeper seated pyroxene-rich rocks) and howardites (consolidated surface deposits of basalts and pyroxenites). While it has been suggested previously that all, or nearly all of these groups, may come from a single planet, there have been uncertainties. Previously there was no coherent and consistent model which could accommodate the diversity and complexity represented by each of these groups, and no sequence of events for the history of the planet that could satisfactorily explain it all. It was also necessary to postulate the nature of the missing parts of the planet in order to complete the story.

Dr. Delaney's efforts in reconstructing the planet required a thorough knowledge of all of the components, a knowledge of the chemistry of the starting materials and the evolution of its melts and their separation processes and some creative insights. His completed effort is being published in the Proceedings of the 17th Lunar and Planetary Science Conference.

Another project completed this year by Drs. Prinz, Nehru and Delaney in collaboration with Robert N. Clayton and Toshiko K. Mayeda of the University of Chicago, suggests that the iron meteorite group called III AB together with pallasites (half iron, half olivine) and mesosiderites (half iron, half howardite) may be closely related to these achondrites.

Synchrotron Radiation and Iron Meteorites

The Brookhaven National Laboratories on Long Island contain a large and important facility, the National Synchrotron Light Source, which can generate 2.5 billion electron volts of energy to be used for a variety of scientific purposes. One part of this facility is rapidly being developed for use as a new means of chemically analyzing geological materials for a wide variety of elements which are present at extremely low levels. By using a minute spot beam researchers can analyze an iron meteorite for very low concentrations of the elements copper, gallium and germanium to

determine if these concentrations vary in different areas on a sample surface. This has never before been accomplished and this technology allows for a better understanding of how these objects form in the cores of planets. This research is the result of collaboration between Dr. Delaney, Stephen R. Sutton of Brookhaven and Joseph V. Smith, Research Associate and Louis Block Professor at the University of Chicago, who is spearheading these new analytical developments. Results of the first such studies were presented at a major meeting and are in press.

The facility is rapidly developing new applications as the technical aspects are being mastered. Through its research program the department will participate in applying these techniques so that more can be learned about meteorites and other specimens in the collections.

Further Research Initiatives

Mr. Peters was a co-author, with geologist Ali H. Kazmi and Mineralogist Herbert P. Obodda, of a paper bringing together knowledge of the regional geology and mineralogy of the gem deposits of the Shingus-Dusso area in Gilgit, Pakistan. These gem deposits have been active in recent years, and the department's collections are very strong in material from this area.

Mr. Weisberg carried out a research project on barred olivine chondrules in chondritic meteorites. These chondrules are conspicuous in almost all meteorites of this diverse group, and this study was the first to concentrate on systematically characterizing their pertinent features for all members. Notable similarities and differences giving insights into their origin and significance were uncovered.

Petrology Curatorship Edmond A. Mathez, currently a research assistant professor at the University of Washington, was appointed to the department's newly established Petrology Curatorship. His main research interests center on developing new techniques and concepts for understanding

the role of volatiles in petrologic processes.

Scientific Publications:

Clayton R.N., T.K. Mayeda, M. Prinz, C.E. Nehru, and J.S. Delaney

1986. Oxygen isotope confirmation of a genetic association between achondrites and IIIAB iron meteorites. *Lunar and Planetary Science XVII*, Houston, Texas, pp. 141-142.

Delaney, J.S.

1986. Phase equilibria for basaltic achondrites. *Lunar and Planetary Science XVII*, Houston, Texas, pp. 164-165.

1986. The basaltic achondrite planetoid. *Lunar and Planetary Science XVII*, Houston, Texas, pp. 166-167.

Kazmi, A.H., J.J. Peters, and H.P. Obodda

1985. Gem deposits of the Shingus-Dusso area, Gilgit, Pakistan. *Mineralogical Record*, vol. 16, pp. 393-411.

Peters, T.A., and A. Lombaerde

1986. Native copper from Prospect Park, New Jersey. *Mineralogical Record*, vol. 17, pp. 129-130.

Potter, J.M., D.C. Pohl, R.N. Guillemette, H.B. Ponader, and J.G. Liou

1985. A system for flow through experimental studies of hydrothermal conditions. *Neues Jahrbuch fur Mineralogie Monatshefte*, vol. 7, pp. 329-335.

Prinz, M., M.K. Weisberg, C.E. Nehru, and J.S. Delaney

1986. ALHA 84025: A second Brachina-like meteorite. *Lunar and Planetary Science XVII*, Houston, Texas, pp. 679-680.

1986. North Haig and Nilpena: Paired polymict ureilites with Angra Dos Reis-related and other clasts. *Lunar and Planetary Science XVII*, Houston, Texas, pp. 681-682.

Prinz, M., M.K. Weisberg, C.E. Nehru, J.S. Delaney, and K. Yanai

1986. Mineralogical studies of ureilites: Minor phases and inclusions and their implications. *Lunar and Planetary Science XVII*, Houston, Texas, pp. 683-684.

Sutton, S.R., J.S. Delaney, J.V. Smith, and M. Prinz

1986. PIXE trace element analyses of metal, troilite and schreibersite in iron meteorites. *Lunar and Planetary Science XVII*, Houston, Texas, pp. 853-854.

Weisberg, M.K.

1986. Barred olivine chondrules in ordinary chondrites: Petrologic constraints and implications. *Lunar and Planetary Science XVII*, Houston, Texas, pp. 933-934.

Abstracts and Popular Publications:

Barry, A.E., and G.E. Harlow

1985. Zn, Mn-rich chromites from reaction zones in ureyitic jadeitites. Fall meeting, American Geophysical Union, (Abstract). *EOS*, vol. 66, p. 1148.

Crozaz, G., E. Zinner, and J.S. Delaney

1985. Rare earth element concentrations of mesosiderite merrillite. (Abstract). *Meteoritics*, vol. 20, pp. 629-630.

Harlow, G.E.

1985. Compositional trends in terrestrial ureyite pyroxene. Fall meeting, American Geophysical Union, (Abstract). *EOS*, vol. 66, p. 1127.

1985. [Review of] *Gem and Crystal Treasures* by Peter Bancroft. *American Mineralogist*, vol. 70, p. 1073.

Pohl, D.C.

1985. Supergene gold migration and enrichment, Sierra Gorda, Chile. Fall meeting, American Geophysical Union, (Abstract). *EOS*, vol. 66, p. 1143.

1986. The Castrovirreyna district, Peru: A silver-bearing geothermal system. The Metallurgical Society 115th Annual Meeting, New Orleans, Louisiana, Program with Abstracts, p. 17.

Prinz, M., M.K. Weisberg, C.E. Nehru, and J.S. Delaney

1985. ALHA 81189, a highly unequilibrated enstatite chondrite: Evidence for a multistage history. *Meteoritics*, vol. 20, pp. 731-732.

1985. Layered chondrules: Evidence for multistage histories during chondrule formation. *Meteoritics*, vol. 20, pp. 732-733.

Rasmussen, K.L., J.S. Delaney, and M. Prinz

1985. On the thermal history of the mesosiderite parent body. *Meteoritics*, vol. 20, pp. 738-739.

Verkouteren, R.M., M.E. Lipschutz,

M. Prinz, M.K. Weisberg, and C.E. Nehru
1985. Chondritic inclusions in Cumberland Falls and ALHA 78113 aubrites: Different chips off the same block. *Meteoritics*, vol. 20, pp. 776-777.

Department of Ornithology

The Department of Ornithology's staff carries out far-reaching investigations into the systematics, behavior, biogeography and ecology of birds. Increasingly, they lend their expertise to efforts that will help preserve bird species and their habitats. Through cooperative ventures and advice, the staff has given help to ornithologists in developing countries, especially in Africa and Latin America, where the greatest loss of species occurs. Ivory-billed Woodpeckers, thought to be extinct, were seen in Cuba by a research team led by department Chairman, Lester L. Short.

Curating the department's collections, the world's largest, included preparation for the initial computerization of a segment of the collection as a pilot project. Major contributors to the department, supporting its activities, were Research Associate James C. Greenway, Jr., Research Associate William H. Phelps, Jr., Frank and Mimi Lyon and William F. Sanford. Many collections were obtained by the activities of staff, particularly Assistant Curator George F. Barrowclough, Research Associate Robert W. Dickerman and graduate student Jay Pitocchelli.

It is a confirmation of the department's standing in ornithology that, of 50 invited symposia for the 19th International Ornithological Congress in Ottawa in June, seven were convened by persons associated with the department. No other institution in the world was represented by more than two convenors of symposia.

Ivory-billed Woodpeckers

Lester L. Short, Chairman and Curator, with George B. Reynard, an associate of the Cornell University Laboratory of Ornithology, and

40 Jennifer F.M. Horne, research

associate of the National Museum of Kenya, were successful in locating two and possibly three Ivory-billed Woodpeckers (*Campephilus principalis*) in the high pinelands of eastern Cuba during April. With biologists Giraldo Alayón and Alberto Estrada of the Cuban Bureau of Flora and Fauna, they studied a male and a female woodpecker. This species is perhaps the world's rarest bird. Their explorations and studies resulted in recommendations to the Cuban government, leading to immediate action to cease logging and regulate access to the critical area where the last Ivory-billed Woodpeckers were found. After the search, the investigators went with the leading Cuban ornithologist, Orlando H. Garrido, to the Bay of Pigs in southern Cuba. There, 10 nests of Fernandina's Flicker (*Colaptes fernandinae*) were observed for three days. This ground-walking woodpecker is a species Dr. Short has wanted to study for years. The Cuban studies were supported by the Museum's L.C. Sanford Fund and Mr. and Mrs. Lyon.

Honeyguides With the support of Marianna Collins, Mr. Sanford and the Gallman Memorial Foundation, Dr. Short, together with Ms. Horne, continued studies of honeyguides. These wax-eating, nest-parasitic birds were studied at their beeswax "feeding station." Dr. Short and Ms. Horne color-banded 69 honeyguides of four species. They found that there are dominance hierarchies within and between species at the wax-feeding site. A number of previously unknown behavioral displays were observed and vocalizations recorded on tape, and a report documenting the biology of African honeyguides was published.

Dr. Short convened a symposium on Speciation in Afrotropical Birds and a round-table discussion group on paleotropical ornithology. He also delivered a paper with Ms. Horne on current speciation problems in Afrotropical piciforms at the 19th International Ornithological Congress in Ottawa during June. Both completed their large sections on woodpeckers, honey-

guides and barbets for volume III of "The Birds of Africa." A monographic treatment of the African barbets (Capitonidae) was begun by Dr. Short and Ms. Horne.

Tyrant Flycatchers Wesley E. Lanyon, Lamont Curator, continued studies of the relationships among the higher categories of tyrant flycatchers (Tyrannidae). Limits among the 110 genera and relationships within assemblages of species were determined by study of the morphology of the sound-producing organ, the syrinx, and secondarily by nesting behavior and external morphology. Collaboration with Scott M. Lanyon of the Field Museum of Natural History led to a paper on the generic relationships of *Empidonax euleri* and assignment of this South American flycatcher to a new genus. Another study was begun with Scott Lanyon and John W. Fitzpatrick, Curator at the Field Museum, on the tiny New World today-tyrants.

Wesley Lanyon also planned studies with Robert J. Raikow, professor of zoology at the University of Pittsburgh, on evolution of the New World Furnarii, the oven-bird group and its allies. He also began a long-range study of the Boreal and Black-capped chickadees (*Parus hudsonicus* and *P. atricapillus*)

The Ivory-billed Woodpecker once occupied the southeastern United States and Cuba. It was feared to be extinct, but a team of ornithologists led by Lester L. Short, Chairman and Curator in the Museum's Department of Ornithology, found the birds in the pine-clad mountains of eastern Cuba in April. Dr. Short was invited by the Cuban Dirección de la Flora y Fauna to work with its biologists to verify the existence of the bird. The Cuban form of the Ivory-billed Woodpecker is closely related to the North American form, which was last sighted in the early 1950s.

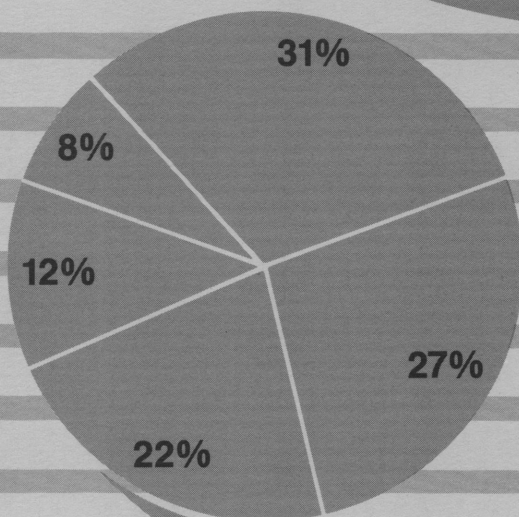
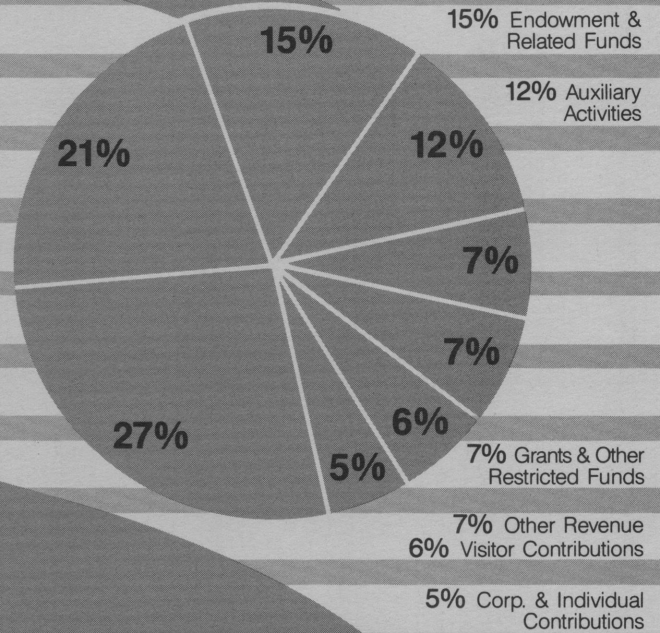
Financial Statements



Revenue 1985-86 39,413,186

27% Natural History Magazine & Membership
21% City of New York (Appropriated Funds 16%)

(Value of Energy Services & Contributions to Pension Costs 5%)



31% Scientific Research, Education & Exhibition

27% Natural History Magazine & Membership
22% Plant Operation & Maintenance

12% Administrative & General
8% Auxiliary Activities

Expenses 1985-1986 37,103,954

Treasurer's Report

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

In reviewing the Balance Sheet it should be noted that investments in marketable securities are recorded at cost and amount to \$130,740,398; they include General Fund of \$7,585,720, Special Funds of \$13,282,837 and Endowment Funds of \$109,871,841. The total market value of these investments on June 30, 1986, amounts to \$157,592,084, as detailed in Note 2 to the financial statements. General Fund investments of \$7,585,720 consist mainly of cash received from Museum members for benefits to be provided in future years and are generally offset by the liability for unearned membership which amounts to \$7,215,094. Special Funds investments of \$13,282,837 consist primarily of funds received for the completion of special programs and projects funded by government agencies, private foundations and individuals, as well as Museum funds set aside for specific programs to be completed in future years. Endowment Funds investments of \$109,871,841 represent funds allocated for endowment purposes by donors or the Board of Trustees since the organization of the Museum in 1869.

The revenue and expenses of the General Fund and Special Funds appear on page A-6 in the Statement of Revenue and Ex-

penses of Current Funds. The total revenues for the funds amounted to \$39,413,186. The total expenses amounted to \$37,103,954.

Revenues exceeded expenses by \$2,969,232 after adjusting for support grants of \$660,000. It should be noted in reviewing this statement, that, while the combined operations of both funds showed an excess of revenue over expenses, the General Fund, which provides continued support for a wide range of scientific, program and administrative activities, had an excess of expenses over revenue after support grants of \$229,182. It should be noted, too, that Special Funds, which are restricted in use for special programs and projects and which may continue for several years, had an excess of revenue over expenses of \$3,198,414.

In fiscal 1985-1986, General Fund revenue amounted to \$30,614,981, an increase of \$2,670,578 over the prior year. The major areas accounting for this increase were the appropriated funds contributed by the City of New York, distributions from Endowment Funds, interest and dividends and auxiliary activities. Appropriated funds increased by \$1,047,732 and largely represented negotiated salary increases and social benefit costs for current and prior years. The increase in distribution from Endowment Funds of \$326,000 resulted from additions to Endowment Funds from bequests and grants and an increase in the market value of Endowment Funds. The increase in interest and dividends, of \$506,191, was due to an increase in funds available for investment as well as a high rate of return on the invested funds. The revenue

from auxiliary activities was increased by \$976,177, as detailed in Note 9.

The General Fund expenses for the year amounted to \$31,504,163, compared to \$28,907,047 in the prior year, an increase of \$2,597,116. The increase in the General Fund expenses for scientific and educational activities, administrative and general, plant operation and maintenance, and Natural History magazine and membership, includes cost-of-living adjustments to the salaries of employees, increased costs for personnel services and supplies purchased from outside vendors, as well as expenditures to increase conservation and fund raising programs, and to carry out physical improvements to the facilities.

While it is too early to assess the full impact of the new tax law on private and public support for institutions like ours, we hope that our many loyal contributors and the government agencies will continue to support the Museum in the broad range of scientific and educational programs it offers.

We look forward to a year of continued growth and success in our role as a leading natural history museum and scientific institution.



Charles H. Mott
Treasurer

Report of Independent Certified Public Accountants

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

We have examined the balance sheets of the AMERICAN MUSEUM of NATURAL HISTORY as of June 30, 1986 and 1985, and the related statements of revenue and expenses of current funds and changes in fund balances for the years then ended. Our examinations were made in accordance with generally accepted auditing standards and, accordingly, included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

In our opinion, the financial statements referred to above present fairly the financial position of the American Museum of Natural History as of June 30, 1986 and 1985, and the results of its operations and changes in its fund balances for the years then ended, in conformity with generally accepted accounting principles applied on a consistent basis.



New York, New York
October 3, 1986

American Museum of Natural History Balance Sheets, June 30, 1986 and 1985

Assets:

Cash
Receivable for securities sold
Accrued interest and dividends receivable
Accounts receivable, less allowance for doubtful accounts
of \$310,000 in 1986 and \$293,000 in 1985
Investments (Note 2)
Planetarium Authority bonds (Note 3)
Inventories (Note 4)
Prepaid expenses and other assets

Liabilities and Funds:

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

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

1986				1985			
Current Funds				Current Funds			
General Fund	Special Funds	Endowment Funds	Total	General Fund	Special Funds	Endowment Funds	Total
\$ 183,055	\$ 1,137	\$ 466	\$ 184,658	\$ 628,611	\$ 541	\$ 119,843	\$ 748,995
		2,489,364	2,489,364			1,663,071	1,663,071
72,326	124,520	996,076	1,192,922	41,721	67,275	1,003,625	1,112,621
1,614,376	225,246	169,159	2,008,781	1,616,523	122,683		1,739,206
7,585,720	13,282,837	109,871,841	130,740,398	6,841,620	10,551,254	90,953,320	108,346,194
	425,000		425,000		425,000		425,000
1,085,578			1,085,578	1,085,227			1,085,227
772,195	3,000		775,195	921,184	84,737		1,005,921
\$11,313,250	\$14,061,740	\$113,526,906	\$138,901,896	\$11,134,886	\$11,251,490	\$93,739,859	\$116,126,235
\$ 2,000,490	\$ 400,485	\$ 183,010	\$ 2,583,985	\$ 2,192,167	\$ 631,072	\$ 614,005	\$ 3,437,244
2,326,848			2,326,848	2,164,985			2,164,985
		2,713,063	2,713,063			1,608,358	1,608,358
7,215,094			7,215,094	7,094,862			7,094,862
(229,182)			(229,182)	(317,128)			(317,128)
	13,661,255		13,661,255		10,620,418		10,620,418
		110,630,833	110,630,833			91,517,496	91,517,496
\$11,313,250	\$14,061,740	\$113,526,906	\$138,901,896	\$11,134,886	\$11,251,490	\$93,739,859	\$116,126,235

Statements of Revenue and Expenses of Current Funds for the years ended June 30, 1986 and 1985

	General Fund		Special Funds		Total	
Revenue:	1986	1985	1986	1985	1986	1985
The City of New York:						
Appropriated funds	\$ 6,416,809	\$ 5,369,077			\$ 6,416,809	\$ 5,369,077
Value of energy services and contributions to pension costs (Notes 10 and 11)	1,902,004	2,168,058			1,902,004	2,168,058
Gifts, bequests and grants	1,791,543	1,633,885	\$ 2,771,610	\$ 2,640,580	4,563,153	4,274,465
Distribution from Endowment Funds (Note 8)	3,046,000	2,720,000	1,197,045	1,051,952	4,243,045	3,771,952
Interest and dividends	1,250,342	744,151	395,110	482,650	1,645,452	1,226,801
Visitors' contributions			2,190,969	2,205,898	2,190,969	2,205,898
Natural History Magazine and membership	10,748,415	10,558,992			10,748,415	10,558,992
Other revenue	712,832	979,381	2,243,471	925,636	2,956,303	1,905,017
Auxiliary activities (Note 9)	4,747,036	3,770,859			4,747,036	3,770,859
Total revenue	30,614,981	27,944,403	8,798,205	7,306,716	39,413,186	35,251,119
Expenses:						
Scientific and educational activities	6,433,619	5,958,460			6,433,619	5,958,460
Exhibition halls and exhibits			1,204,813	1,494,055	1,204,813	1,494,055
Other special purpose programs and projects			3,888,860	3,987,755	3,888,860	3,987,755
Administrative and general	3,860,162	3,437,345	506,118	400,591	4,366,280	3,837,936
Plant operating and maintenance (Note 10)	7,983,427	7,139,209			7,983,427	7,139,209
Natural History Magazine and membership	10,089,137	9,735,716			10,089,137	9,735,716
Auxiliary activities (Note 9)	3,137,818	2,636,317			3,137,818	2,636,317
Total expenses	31,504,163	28,907,047	5,599,791	5,882,401	37,103,954	34,789,448
Excess of revenue over expenses (expenses over revenue) before support grants	(889,182)	(962,644)	3,198,414	1,424,315	2,309,232	461,671
Support grants (Note 13)	660,000	660,000			660,000	660,000
Excess of revenue over expenses (expenses over revenue)	(\$ 229,182)	(\$ 302,644)	\$ 3,198,414	\$1,424,315	\$2,969,232	\$1,121,671

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

Statements of Changes in Fund Balances for the years ended June 30, 1986 and 1985

	Current Funds					
	General Fund		Special Funds		Endowment Funds	
	1986	1985	1986	1985	1986	1985
Balance (deficit), beginning of year	(\$317,128)	(\$279,877)	\$10,620,418	\$ 9,126,039	\$ 91,517,496	\$82,500,162
Additions:						
Gifts, bequests and grants					2,216,535	699,352
Interest and dividend income (Note 8)					3,101,499	2,312,617
Net gain on sale of investments					14,689,130	6,960,917
Excess of revenue over expenses			3,198,414	1,424,315		
Total additions			3,198,414	1,424,315	20,007,164	9,972,886
Deductions:						
Excess of expenses over revenue	229,182	302,644				
General and administrative expenses					521,806	425,047
Contributions to prior service cost (Note 11)					212,470	195,048
Total deductions	229,182	302,644			734,276	620,095
Transfers between funds:						
Financing of: 1985 and 1984 General Fund deficits	317,128	279,877	(174,021)	(30,293)	(143,107)	(249,584)
Special Funds activities		(14,484)	16,444	100,357	(16,444)	(85,873)
Total transfers	317,128	265,393	(157,577)	70,064	(159,551)	(335,457)
Balance (deficit), end of year	(\$229,182)	(\$317,128)	\$13,661,255	\$10,620,418	\$110,630,833	\$91,517,496

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

Notes to Financial Statements

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

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

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

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

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

Interest and dividend income derived from investments of Endowment Funds is distributed to the current funds on a unit basis which reflects the ratio of the related funds invested in the pooled portfolio to total market value (see Note 8).

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

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

Membership income is recognized ratably over the membership term.

2. Investments:

Cost and market values of investments at June 30 are as follows:	1986		1985	
	Cost	Market	Cost	Market
General Fund	\$ 7,585,720	\$ 8,487,269	\$ 6,841,620	\$ 7,237,336
Special Funds	13,282,837	14,867,903	10,551,254	11,159,552
Endowment Funds	109,871,841	134,236,912	90,953,320	104,079,041
	\$130,740,398	\$157,592,084	\$108,346,194	\$122,475,929
The Museum's investments consist of the following:				
Short-term obligations	\$ 15,006,000	\$ 15,006,000	\$ 15,893,601	\$ 15,988,447
Fixed income securities	39,914,063	42,012,355	34,001,226	36,612,887
Common and preferred stocks	74,220,335	98,973,729	57,651,367	69,074,595
Other investments	1,600,000	1,600,000	800,000	800,000
	\$130,740,398	\$157,592,084	\$108,346,194	\$122,475,929

The Museum's investments at June 30, 1986 include a capital contribution of \$1,600,000 to a limited partnership; the total capital contribution will be \$2,000,000. The remaining \$400,000 is due within thirty (30) days after written demand by the General Partner.

The Museum participates in a securities lending program with United States Trust Company of New York ("Custodian"), whereby certain investments are temporarily loaned to brokerage firms. The Museum receives in return cash or securities as collateral in an amount equal to the value of securities loaned. Cash received is reinvested in short-term investments. The income derived from these investments is included in other revenue of the General Fund. The Museum retains all rights of ownership to the securities loaned and, accordingly, receives all related interest and dividend income. Periodically, the collateral received is adjusted to maintain approximately a 100 percent market value relationship to securities loaned. At June 30, 1986 and 1985, the market value of securities loaned amounted to approximately \$14,091,000 and \$18,250,000, respectively, and the market value of the related collateral amounted to approximately \$14,766,000 and \$18,300,000, respectively. Under the terms of the lending agreement, the Custodian has agreed to indemnify the Museum against any loss resulting from the borrower's failure to return securities or a deficiency in collateral.

Net capital gains are included in other revenue.

3. Planetarium Authority Bonds: The American Museum of Natural History and the American Museum of Natural History Planetarium Authority ("Planetarium") are separate legal entities which share the same Board of Trustees and Officers. The Museum has an investment in bonds (\$570,000 principal amount) of the Planetarium and carries this investment at cost. For the years ended June 30, 1986 and 1985, interest income on these bonds (at 4½%) of \$25,650 is included in the General Fund.

4. Inventories:

	1986	1985
Natural History Magazine paper	\$ 722,004	\$ 820,904
Museum Shops merchandise	363,574	264,323
	\$1,085,578	\$1,085,227

5. Special Funds: Included in Special Fund balances (funds received or appropriated for specific purposes) is approximately \$5,480,000 and \$4,484,000 at June 30, 1986 and 1985, respectively, restricted by the donor as to use.

6. Overdrafts: The fund balances at June 30, 1986 and 1985 of Special Funds are net of overdrafts of certain of these funds of approximately \$1,821,000 and \$1,544,000, respectively. These overdrafts represent expenditures in anticipation of transfers from Endowment Funds and/or the General Fund, or receipt of gifts and grants from government or private donors.

7. Endowment Funds: Endowment Funds (including funds functioning as endowment) are:

	June 30, 1986	June 30, 1985
Endowment Funds, income available for:		
Restricted purposes	\$ 47,315,287	\$40,546,451
Unrestricted purposes	15,311,157	13,007,266
Funds functioning as endowment, principal and income available for:		
Restricted purposes	22,735,328	17,836,560
Unrestricted purposes	25,269,061	20,127,219
	\$110,630,833	\$91,517,496

8. Distribution from Endowment Funds: Total interest and dividend income for the Endowment Funds for fiscal 1986 and 1985 was \$7,344,544 and \$6,084,569, respectively. In accordance with the policy adopted by the Board of Trustees, distributions to the General Fund and Special Funds were fixed at 5 percent of the average of the market value of the Endowment Funds for the three preceding years. The distributions were:

	1986	1985
General Fund	\$3,046,000	\$2,720,000
Special Funds	1,197,045	1,051,952
	\$4,243,045	\$3,771,952

The excess income was retained in the Endowment Funds. Of this amount, \$212,470 and \$195,048 in fiscal 1986 and 1985, respectively, was allocated for pension support to the Cultural Institutions Retirement System ("CIRS"), based on the same 5 percent formula.

9. Auxiliary Activities: Revenue and expenses for auxiliary activities in fiscal 1986 and 1985 are:

	1986		1985	
	Revenue	Expenses	Revenue	Expenses
Museum Shops	\$2,074,432	\$1,627,557	\$1,839,898	\$1,498,642
Discovery Tours	758,719	604,997	537,141	457,451
Naturemax	823,095	518,612	474,749	325,154
Other	1,090,790	386,652	919,071	355,070
	\$4,747,036	\$3,137,818	\$3,770,859	\$2,636,317

10. Operating and Maintenance Expenses: Plant operating and maintenance expenses in fiscal 1986 and 1985 include the value of energy services supplied by the City of New York of \$1,480,193 and \$1,758,341, respectively.

11. Pension Plan: The Museum accrues and funds annually the normal cost for eligible employees participating in the CIRS pension plan. To be eligible under this plan, employees must be over 21 and employed for a minimum of one year. The unfunded prior service cost, with interest, is being funded over 30 years, ending in fiscal 2004.

The pension plan of the Museum, which

includes the Planetarium, is administered by CIRS. Total pension costs amounted to approximately \$1,282,000 and \$1,264,000 in fiscal 1986 and 1985, respectively, of which \$45,181 and \$45,085 for fiscal 1986 and 1985, respectively, have been charged to the Planetarium. Of the remaining costs, \$421,811 and \$409,717 in fiscal 1986 and 1985, respectively, were paid directly by the

City of New York to CIRS.

Approximately \$815,000 and \$809,000 in fiscal 1986 and 1985, respectively, were paid by the Museum, of which \$212,470 and \$195,048 in fiscal 1986 and 1985, respectively, were funded through Pension Support Endowment Funds and the balance was charged to current funds. The CIRS Plan is a multiemployer plan and, accordingly, its actuarial present value of vested and nonvested accumulated plan benefits and net assets available for plan benefits are not determinable on an individual institution basis. As of July 1, 1986, the CIRS Plan was changed from a defined benefit plan to a defined benefit/defined contribution 401-K plan.

12. Post-retirement Benefits: The Museum provides health and life insurance for retired employees. These costs, charged to current operations, amounted to \$301,264 and \$285,428 in fiscal 1986 and 1985, respectively.

13. Support Grants: In fiscal 1986 and 1985, support grants were received from the New York State Council on the Arts and the Institute of Museum Services as follows:

	1986	1985
New York State Council on the Arts	\$585,000	\$585,000
Institute of Museum Services	75,000	75,000
	\$660,000	\$660,000

14. Related Party Transactions: The Museum provides certain services to the Planetarium, including accounting, security and maintenance, for which the Planetarium was charged an aggregate amount of \$150,800 in fiscal 1986 and \$190,070 in fiscal 1985. The Planetarium also reimburses the Museum for actual payroll costs. Effective February 1, 1986, the Planetarium was charged actual payroll costs for security services. To compensate the Museum for visitors who enter from the Planetarium, approximately \$63,000 and \$55,000 in fiscal 1986 and 1985, respectively, were paid to the Museum by the Planetarium.

15. Buildings: The buildings occupied by the Museum are owned by the City which appropriates funds for their renovation, improvement and alteration. Funds committed by the City for these capital projects in fiscal 1986 and 1985 amounted to \$1,652,000 and \$39,000, respectively.

16. Reclassifications: Certain amounts in the fiscal 1985 financial statements have been reclassified for comparative purposes.

Report of Independent Certified Public Accountants

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

We have examined the balance sheets of the AMERICAN MUSEUM of NATURAL HISTORY PLANETARIUM AUTHORITY as of June 30, 1986 and 1985, and the related statements of revenue and expenses of unrestricted funds and changes in fund balances for the years then ended. Our examinations were made in accordance with generally accepted auditing standards and, accordingly, included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

In our opinion, the financial statements referred to above present fairly the financial position of the American Museum of Natural History Planetarium Authority at June 30, 1986 and 1985 and the results of its operations and changes in its fund balances for the years then ended, in conformity with generally accepted accounting principles applied on a consistent basis.



New York, New York
September 22, 1986

American Museum of Natural History Planetarium Authority Balance Sheets, June 30, 1986 and 1985

Assets:

Cash
Short-term investments
Receivables and other assets
Planetarium shop inventory

Buildings, at cost (Note 1)

Building improvements and equipment:

Building improvements, at cost
Zeiss planetarium instrument, at cost

Less, accumulated depreciation (Note 2)

Liabilities:

Accounts payable and accrued expenses
Accrued employee benefit costs
4½% Refunding Serial Revenue bonds, past due (Note 3)
Accrued interest, past due (Note 3)

Contributed Capital and Funds:

Contributed capital:

Charles Hayden
Charles Hayden Foundation
The Perkin Fund

Fund balances:

Unrestricted fund deficit
Restricted funds

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

Statements of Revenue and Expenses of Unrestricted Funds for the years ended June 30, 1986 and 1985

1986	1985
\$ 270,031	\$ 178,162
900,000	700,000
20,264	32,067
63,325	58,306
1,253,620	968,535
1,019,210	1,019,210
662,290	662,290
221,928	221,928
884,218	884,218
(598,776)	(532,592)
285,442	351,626
\$2,558,272	\$2,339,371
\$ 57,967	\$ 43,593
74,936	78,999
570,000	570,000
315,450	315,450
1,018,353	1,008,042
156,869	156,869
429,455	429,455
400,000	400,000
986,324	986,324
(186,125)	(533,279)
739,720	878,284
1,539,919	1,331,329
\$2,558,272	\$2,339,371

	1986	1985
Revenue:		
Admission fees, net (Note 5)	\$1,155,636	\$ 984,055
Auxiliary activity, sales booth	302,385	234,225
Special lectures and courses	61,633	60,325
Other revenue	64,736	73,929
Total revenue	1,584,390	1,352,534
Expenses:		
Preparation, presentation and promotion	657,568	605,935
Operation and maintenance	228,082	197,998
Auxiliary activity, sales booth	229,163	182,570
Administrative and general	86,660	80,630
Special lectures and courses	38,257	33,140
Interest on past-due 4½%		
Refunding Serial Revenue bonds (Note 3)	25,650	25,650
Provision for depreciation (Note 2)	66,184	67,536
Total expenses	1,331,564	1,193,459
Excess of revenue over expenses before contributions	252,826	159,075
Contributions	39,250	98,500
Excess of revenue over expenses	\$ 292,076	\$ 257,575

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

Statements of Changes in Fund Balances for the years ended June 30, 1986 and 1985

	Unrestricted Fund		Restricted Funds	
	1986	1985	1986	1985
Balance (deficit), beginning of year	(\$533,279)	(\$847,284)	\$878,284	\$867,963
Additions:				
Contributions			18,000	15,250
Proceeds from special presentations (Note 4)			198,861	253,130
Income from investments			59,477	50,409
Excess of revenue over expenses	292,076	257,575		
Total additions	292,076	257,575	276,338	318,789
Deductions:				
Special purpose programs and projects			18,615	27,034
Special presentation expenses (Note 4)			341,209	225,004
Total deductions			359,824	252,038
Transfers between funds (Note 2)	55,078	56,430	(55,078)	(56,430)
Balance (deficit), end of year	(\$186,125)	(\$533,279)	\$739,720	\$878,284

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

Notes to Financial Statements

1. Summary of Significant Accounting Policies:

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

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

Major building improvements are capitalized and depreciated using the straight-line method over their useful lives. Fully depreciated assets are carried at nominal value. Because of the nature of the ownership of the property, provision for depreciation of the buildings is considered unnecessary.

Short-term investments consist of certificates of deposit and are stated at cost, which approximates market value.

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

Fund balances, whose use is restricted by the donor or by the Board of Trustees, are designated as restricted funds. At June 30, 1986, the amount of these funds restricted by the Trustees amounted to approximately \$682,000.

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

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

4. Special Presentations: The Board of Trustees has designated that the net proceeds from special presentations be set aside in a board designated restricted fund to finance current and future improvements and renovations.

5. Related Party Transactions: The Planetarium participates in the Museum's Cultural Institutions Pension Plan ("CIRS

Plan"), a multiemployer plan, administered by the Cultural Institutions Retirement System. The Planetarium reimbursed the Museum \$45,181 and \$45,085 in fiscal 1986 and 1985, respectively, for its share of pension costs. The Planetarium also reimburses the Museum for actual payroll costs.

The Planetarium receives certain other services, including accounting, security and maintenance services, from the Museum. The aggregate charges for such services in fiscal 1986 and 1985 were \$150,800 and \$190,070, respectively. Effective February 1, 1986, the Planetarium was charged actual payroll costs for security services.

Admission fees paid to enter the Planetarium also include entrance to the Museum. To compensate the Museum for visitors who enter the Museum from the Planetarium, approximately \$63,000 and \$55,000 in fiscal 1986 and 1985, respectively, were paid to the Museum by the Planetarium.

6. Reclassifications: Certain amounts in the fiscal 1985 financial statements have been reclassified for comparative purposes.



in the Adirondack Mountains. The latter investigation is a field study based upon color-banded birds.

South American Biogeography

Curator François Vuilleumier conducted field studies from southernmost Chile to Cape Horn from October to December in collaboration with Tobias Salathé, a researcher at the Tour-du-Valat Biological Station, Camargue, France. They were supported by the L.C. Sanford Fund and the National Geographic Society. Dr. Vuilleumier concentrated on interactions between members of various species pairs under difficult, windy conditions, discovering a hybrid swarm of the buntings *Phrygilus patagonicus* and *P. gayi* on Tierra del Fuego. He also studied the avifauna of the Diego Ramirez Islands where a mainland forest furnariid *Aphrastura spinicauda* was found to be numerous in tussock-grassland. Such studies help to interpret evolutionary patterns, biogeography and shifts in ecological niches.

Dr. Vuilleumier also convened a symposium on New Approaches to Biogeography for the 19th International Ornithological Congress in Ottawa in late June. A manuscript, co-authored with Research Associate Ernst Mayr, evaluating species of birds that were described as new from 1976 to 1980 was submitted for publication. With Dr. Mayr, he began a similar evaluation of bird species described as new up to 1985. His book, co-edited with M. Monasterio, a professor of biology at the University of the Andes, Venezuela, on high altitude tropical biogeography is nearing publication.

Geographic Variation in Juncos

George F. Barrowclough, Assistant Curator, continued his long-term investigation of geographic variation in the genus *Junco*. He collected specimens, including tissues, in the northern Rocky Mountains during July, and made a transect from Georgia to Quebec and Ontario in May and June. Differentiation of isolates and concordance of variation in different sets of characters will be studied using

these fresh specimens. The L.C. Sanford Fund supported the fieldwork. Dr. Barrowclough organized and convened a symposium on the Genetic Structure of Populations for the 19th International Ornithological Congress in Ottawa in June.

Dr. Barrowclough also began a computer-based study of geographic variation in the Spotted Owl (*Strix occidentalis*), a threatened species of which no further specimens can be collected. Using quantitative methods, he is assessing different sets of characters (size, color and plumage patterns) and concordance of their variation. With the assistance of Dr. W. Lanyon, Dr. Barrowclough prepared a program for an initial attempt at computerization of the department's collections, beginning with its nest and egg collection.

Hawks and Owls

Lamont Curator Emeritus Dean Amadon has nearly completed a taxonomic list of the species of hawks and owls of the world with Field Associate John Bull and Joe T. Marshall, Jr., a biologist with the United States Fish and Wildlife Service. He continued field studies of raptorial birds at the Archbold Biological Station in Florida during February. He also prepared an annotated list of books published on birds of prey with Richard R. Olendorff, a biologist with the Bureau of Land Management.

Birds of Paradise Senior Scientific Assistant Mary LeCroy conducted fieldwork in Papua New Guinea, concentrating on display behavior of the Emperor Bird of Paradise (*Paradisaea guilliei*).

Scientific Assistant Allison V. Andors continued studies of the giant fossil bird *Diatryma*, with redescription of its postcranial skeleton. Research Associate Robert Bleiweiss used a scanning electron microscope to study the ultrastructure of racket plumes in different bird families. He compared the structural bases of the wirelike portions of these feathers. He also continued studies of Andean hummingbirds using specimens from 16 museums. Research Associate Walter J. Bock continued wide-

-ranging anatomical research on passerine birds and convened a symposium on Ecological Morphology for the 19th International Ornithological Congress in Ottawa. Mr. Bull, in addition to working on the raptor list with Dr. Amadon, continued preparation of the department's world reference series of birds.

Associate Sadie Coats continued long-term studies of the phylogeny of owls. Dr. Coats is in the process of describing a new species of the genus *Glaucidium* from Peru. Joel Cracraft, jointly sponsored as a Research Fellow by this department and the Department of Invertebrates, conducted research on zoogeography and speciation patterns in birds. He convened a symposium on Historical Biogeography for the 19th International Ornithological Congress in Ottawa.

New Guinea Avifaunas

Jared Diamond, Research Associate, won one of 25 prestigious MacArthur Foundation Fellowships that will enable him to conduct full-time research over the next several years. He continued his research on the avifaunas of western New Guinea islands, concentrating on the behavior of little known species as well as pursuing biogeographic studies. He conducted fieldwork there in January and February. He also studied the department's superb collections of birds from these islands.

Research Associate Robert W. Dickerman conducted field studies in North Carolina, New Mexico and eastern Canada. His research centered on the systematics of nightjars, warblers, grebes, crossbills and red-tailed hawks. Mr. James C. Greenway, Jr., worked on the type-specimen list, assisted by Ms. LeCroy and Associate Richard Sloss. Research Associate G. Stuart Keith continued editing and writing manuscripts for volume II of the handbook "The Birds of Africa," published during the summer of 1986 and for volume III to be published in 1987.

Hormonal Control of Behavior

Cheryl F. Harding, Research Associate, received a Research Scientist Development Award from

the National Institute of Mental Health to conduct full-time research on hormonal modulation of male social behavior. She received an additional award for training minority students in her museum laboratory. Dr. Harding continued her investigations into male hormonal control of behavior in Zebra Finches.

Helen Hays, the Chairwoman of The Great Gull Island Project, contributed to the department in many ways. (See report of the project under Research Stations.)

Nocturnal Birds Ben F. King, writer, explorer and a leading expert on the birds of Asia, was named Field Associate. He conducted avian studies in Sulawesi, Malaya, the Philippines and western China. His research deals with nocturnal birds and their voices.

Chapman Research Fellow Mary C. McKittrick is studying the evolutionary significance of individual limb muscle variation in Eastern Kingbirds (*Tyrannus tyrannus*), and genetic variation in this species using Dr. Barrowclough's laboratory. Chapman Research Fellow Nina Pierpont is investigating geographic variation in the use of habitat and community composition among tropical American woodcreepers (Dendrocolaptidae). She is also studying eye morphology in these birds in relation to their feeding habits. Robert Rockwell was appointed Research Associate in the department; he studies avian reproduction and population dynamics. He convened a symposium on Reproductive Fitness at the 19th International Ornithological Congress in Ottawa.

Research Associate Jean Delacour, dean of the world's ornithologists, died at the age of 95 in November. He was associated with the department for over 40 years and will be missed by his many colleagues and friends.

Awards The Frank M. Chapman Memorial Fund Committee awarded 62 grants totaling \$35,717 to graduate students and professional ornithologists. This program is the largest in the world exclusively granting awards in ornithology.

Scientific Publications:

- Amadon, D.
1986. The Hawaiian honeycreeper revisited. *Elepaio*, vol. 46, pp. 83-84.
- Barrowclough, G.F.
1985. Museum collections and molecular systematics. In *Museum collections: their roles and future in biological research*, E.H. Miller, ed., Brit. Col. Prov. Museum, Victoria, B.C., pp. 43-54, figs. 1-3.
- Barrowclough, G.F., and S.L. Coats
1985. The demography and population genetics of owls, with special reference to the conservation of the spotted owl (*Strix occidentalis*). In *Ecology and management of the Spotted Owl in the Pacific Northwest*, R.J. Gutierrez and A.B. Carey, eds. USDA Forest Service, Portland, Oregon, pp. 74-85, tables 1-8.
- Barrowclough, G.F., see Dickerman *et al.*
- Bleiweiss, R.
1985. Iridescent polychromatism in a female hummingbird: is it related to feeding strategies? *Auk*, vol. 102, pp. 701-713.
- Blondel, J., F. Vuilleumier, L.F. Marcus, and E. Terouanne
1985. Peuplements d'oiseaux sous bioclimat mediterraneen dans trois continents; convergences eco-morphologiques ou non? *Bull. Soc. bot. France*, vol. 131, pp. 345-363, figs. 1-3, tables 1-6.
- Cannell, P.F.* (Sponsor: W.E. Lanyon), see Dickerman *et al.*
- Diamond, J.M.
1985. Population processes in island birds: immigration, extinction, and fluctuations. *Proceedings 1982 Congress of Int'l Council Bird Preserv.*, pp. 17-21.
1985. New distributional records and taxa from the outlying mountain ranges of Irian Jaya. *Emu*, vol. 85, pp. 65-91, figs. 1-6, tables 1-2.
1985. Visual mimicry in birds. *Nat. Geog. Soc. Res. Reports*, vol. 20 (1979 projects), pp. 121-127.
1985. Birds of a karst mountain range and other outlying mountain ranges of West Irian. *Nat. Geog. Soc. Res. Reports*, vol. 21 (1981 and 1983 projects), pp. 123-127.
- Diamond, J.M., and T.J. Case (eds.)
1986. *Community ecology*. Harper and Row, New York, 665 pp.
- Dickerman, R.W.
1985. A new subspecies of *Mecocerculus leucophrys* from Venezuela. *Bull. Brit. Ornith. Club*: 105: pp. 73-75.
1985. Taxonomy of the Lesser Nighthawks (*Chordeiles acutipennis*) of North and Central America. In P.A. Buckley, M.S. Foster, E.S. Morton, R.S. Ridgely and F.G. Buckley, eds. *Neotropical ornithology*, *Ornith. Mon.*, no. 36, pp. 355-359.
1986. Notes on the plumages of the Paramo Seedeater (*Catamenia homochroa*). *Auk*, vol. 103, pp. 227-230.
- Dickerman, R.W., G.F. Barrowclough, P.F. Cannell, W.H. Phelps, Jr., and D.E. Willard
1986. *Philydor hylobius* Wetmore and Phelps is a synonym of *Automolus roraimae* Hellmayr. *Auk*, vol. 103, pp. 431-432.
- Gast, S.E., and B. King
1985. Notes on Philippine Birds, 7. Recent records of the Chinese Egret *Egretta eulophotes* from Luzon, Mindoro and Palawan, Philippines. *Bull. Brit. Ornith. Club*, vol. 105, pp. 139-141.
- Harding, C.F.
1985. Sociobiological hypotheses about rape: a critical look at the data behind the hypotheses. In *Violence against women: a critique of the sociobiology of rape*. S. Sunday and E. Tobach, (eds.), Gordon Press, New York, pp. 23-58, table 1.
1986. The role of androgen metabolism in the activation of male behavior. *Annals New York Acad. Sci.*
- King, B.F. (see Gast, S.E., and)
- Lanyon, W.E.
1985. A phylogeny of the myiarchine flycatchers. In P.A. Buckley, M.S. Foster, E.S. Morton, R.S. Ridgely, and F.G. Buckley, (eds.). *Neotropical ornithology*. *Ornith. Mon.*, no. 36, pp. 361-380.
1986. A phylogeny of the thirty-three genera in the *Empidonax* assemblage of tyrant flycatchers. *Amer. Mus. Novitates*, no. 2846, pp. 1-64.
- Lanyon, W.E., and S.M. Lanyon
1986. Generic status of Euler's Flycatcher: a morphological and biochemical study. *Auk*, vol. 103, pp. 341-350.
- McKittrick, M.C.
1985. Pelvic myology of the kingbirds and their allies (Aves: Tyrannidae). *Ann. Carnegie Mus.*, vol. 54, pp. 275-317.
1985. The myology of the pectoral appendage of kingbirds (*Tyrannus*) and their allies. *Condor*, vol. 87, pp. 402-417.
1986. The possible evolutionary significance of individual variation in the Flexor cruris lateralis muscle of the Tyrannidae (Aves: Passeriformes). *Jour. Zool.*, vol. 209, pp. 1-20.
- Pitocchelli, Jay* (Sponsor: W.E. Lanyon)
1985. Identification of Mourning and MacGillivray's Warblers. *Central Alberta Naturalist* 4 (3): 4.
- Short, Lester L.
1985. Neotropical-Afrotropical barbet and woodpecker radiations: a comparison. In P.A. Buckley, M.S. Foster, E.S. Morton, R.S. Ridgely, and F.G. Buckley, (eds.). *Neotropical ornithology*, *Ornith. Mon.*, no. 36, pp. 559-574.

- Short, L.L., and J.F.M. Horne
1985. Behavioral notes on the nest-parasitic Afrotropical honeyguides (Aves: Indicatoridae). *Amer. Mus. Novitates*, no. 2825, pp. 1-46, figs. 1.
1985. Social behavior and systematics of African barbets (Aves: Capitonidae). *Proc. Int. Symp. African Vertebrates*, pp. 255-278.
1985. Duetting, sociality and speciation with reference to barbets (Capitonidae). *Proc. XVIII Int. Ornith. Congr.*, pp. 1040-1041.

Vuilleumier, F.

1985. Forest birds of Patagonia: ecological geography, speciation, endemism, and faunal history. In P.A. Buckley, M.S. Foster, E.S. Morton, R.S. Ridgely, and F.G. Buckley, (eds.), *Neotropical ornithology*, *Ornith. Mon.*, no. 36, pp. 255-305, figs. 1-2, tables 1-13, appendices 1-10.
1985. Fossil and recent avifaunas and the interamerican interchange. In *The great American biotic interchange*, F.G. Stehli and S.D.F. Webb, (eds.), Plenum Publishing Corp., New York, pp. 387-424, tables 1-7, appendices 1-2.
1985. Fossil evidence on the development of South American avifaunas. *Proc. XVIII Int. Ornith. Congr.*, pp. 348-357, tables 1-5.

Abstracts and Popular Publications:

Bull, J.

1985. [Review of] common birds of Egypt, by Brunn, Bertel. *Courser*, vol. 2, p. 8.

Bull, J., E. Bull, and G. Gold.

1985. Birds of North America, eastern region. Macmillan and Co., New York, pp. 157, col. plates 1-54, figs. 1-4.

Coats, S., and W. H. Phelps, Jr.

1985. (Abstract) The Venezuelan Red Siskin: case history of an endangered species. *Ecology Abstract*, vol. 11, p. 134.

Collado D., C. Harding, M. Walters, and K. Sheridan

1986. (Abstract) The importance of female hormones for male social behavior. *Minority Biomed., Research Support Symposium 1986*, New Orleans, La., pp. B-37

Diamond, J.M.

1985. Voyage of the overloaded ark. *Discover*, vol. 6, pp. 82-92.
1985. The case of the vagrant birds—or, left coast, here we come. *Discover*, vol. 7, pp. 82-84.
1985. Salvaging single-sex populations. *Nature*, vol. 316, p. 104.
1985. Filter-feeding on a grand scale. *Nature*, vol. 316, p. 679.
1985. Future of the world's primates. *Nature*, vol. 317, pp. 577-578.
1985. Why did the Polynesians abandon their mystery islands? *Nature*, vol. 317, p. 764.

1985. Rats as agents of extermination. *Nature*, vol. 318, pp. 602-603.

Diamond, J.M., and R.M. May

1985. A discipline with a time limit. *Nature*, vol. 317, pp. 111-112.

Dickerman, R.W.

1985. [Review of] Ecogeographical variation in size and proportions of Song Sparrows (*Melospiza melodia*), by John Aldrich. *Wilson Bull.*, vol. 97, pp. 586-588.

Harding, C., see, Collado et al. and Powell et al.

Keith, G.S.

1986. [Review of] A field guide to the warblers of Britain and Europe, by Alick Moore. *Auk*, vol. 103, pp. 259-260.

King, B.

1985. The status of the pheasants at Wolong Panda Reserve, west China. *World Pheasant Assn. News*, vol. 7, pp. 11-12.
1985. Wild sightings of Hume's Pheasant in Burma. *World Pheasant Assn. News*, vol. 8, p. 21.
1986. Report on pheasants at Jiuzhaigou and Baihe Panda reserve in NW Sichuan, China. *World Pheasant Assn. News*, vol. 11, pp. 20-22.

Lanyon, W.E.

1985. Ornithological observations during the American Museum of Natural History's Black Sea and Aegean odyssey, September 18 to October 4, *Amer. Mus. Nat. Hist.*, pp. 1-8 (photocopied report).

LeCroy, M.

1985. A gift fit for a king. *Faces: the magazine about people* (December), pp. 5-8.

LeCroy, M., and W.S. Peckover

1985. Birds of paradise. *Paradise* (Air Niugini), no. 50 (January), pp. 5-8.

McKittrick, M.C.

1985. [Review of] *Current ornithology*, vol. 2, R.F. Johnston, ed., Plenum Press. *New York. Quart. Rev. Biol.*, vol. 61, p. 119.

Powell, M., C. Harding, and M. Walters

1986. (Abstract) Estrogen receptors in the brain of male Zebra Finches. *Minority Biomed. Res. Support Symposium 1986*, New Orleans, La., p. B-12.

Short, L.L.

1985. Last chance for the Ivorybill. *Natural History*, vol. 94, pp. 66-68.
1985. Some travel tips for birders. *Linnaean Newsletter*, vol. 39, no. 5, pp. 2-3.
1986. Piciformes group. *Reports of Int. Council Bird Preserv. Specialist Groups, 1982-1986*, pp. 17-19.
- Short, L.L., and F.M. Horne
1985. Notes on some birds of the Arabuko Sokoke Forest. *Scopus*, vol. 9, pp. 117-126.
1985. Notes on some birds of Ol Ari Nyiro, Laikipia Plateau. *Scopus*, vol. 9, pp. 137-141.

Vuilleumier, F.

1985. [Review of] *Oiseaux nicheurs de la haute Vallée de l'Orbe*, by D. Glayre and D. Magnenat. *Auk*, vol. 102, pp. 916-917.

Department of Vertebrate Paleontology

Fossils are the only direct evidence of past life. As such, the fossil record makes a unique contribution to studies of phylogeny, historical biogeography and evolutionary rates and trends. However, paleontologists must apply their special training with the broad perspectives of a natural historian. If they fail to do so, the study of fossils has very little significance to the search for the patterns and causes of life history. The Department of Vertebrate Paleontology is committed to a program of research that reflects both the traditions of the discipline and the modern developments in systematics, biogeography and comparative biology. Work by its curators displays interest in the fossil record as well as in a broad spectrum of evidence, ranging from geophysics to molecular biology.

Programs Supported A wide range of activities in the department continue to receive support from special endowments. The Childs Frick Laboratory Endowment is important to field investigations, laboratory study, and collections maintenance of fossil mammals. The James Carter Memorial Fund for research in Vertebrate Paleontology supported Postdoctoral Fellow Peter Meylan in his studies of trionychoid (soft shelled) turtle systematics. The Carter Fund also allowed several months of visiting research by Chang Mee-mann, Director of the Institute of Vertebrate Paleontology and Anthropology in Beijing, China, and Zhou Mingzhen,

Director of Museum of Natural History, also in Beijing. Funds contributed by Herbert Axelrod continue to augment the dramatic acquisition of Cretaceous fishes from Brazil reported last year. Axelrod funds also support a new Fellow, Stanley Blum, for his full-time research on the Brazilian collection.

Bones Under the Boojum

With support of the National Geographic Society, Michael J. Novacek, Chairman and Associate Curator, conducted a third season of paleontological exploration on the Baja Peninsula. The field crew also included John Flynn, Research Associate and Assistant Professor at Rutgers University, Jeanne Kelly, Senior Laboratory Technician in the department, and graduate students from Rutgers, Yale, Columbia and City University programs. The party worked in the Punta Prieta badlands, a desert area that serves as a habitat for the curious boojum cactus and elephant tree. The July weather this year was especially hot and fossils were rare. Nevertheless, the accumulated findings of three field seasons provided a clear picture of Eocene vertebrate life in this remote corner of the continent. More than ten mammalian species are now known, including several new taxa.

Summer fieldwork during 1985 confirms earlier arguments (published in *Science*, April 13, 1984) that the Baja fauna shows remarkable similarity to earliest Eocene (approximately 50 million years ago) faunas of the Rocky Mountain Basins of Wyoming and Montana. Hence, this research not only establishes an age for the Baja fauna, but also helps document the strong uniformity in the biota of North America during early Eocene times. A final report and taxonomic review of the Baja fauna is being prepared in collaboration with Ismael Ferrusquia, Curator at the Instituto de Geologia, Mexico City.

Coelacanths and Other Fishes

A dramatic discovery is the existence of coelacanths in the large Cretaceous fish collection from Brazil. As a group, coelacanths demonstrated remarkably conser-

vative change over millions of years, so little that Recent coelacanths are referred to as "living fossils." Associate Curator John Maisey identified at least two coelacanth genera, one of which is probably new, from the Brazilian sample. Dr. Maisey also carried out extensive studies on chondrichthyan (shark) anatomy and phylogeny, supported by the National Science Foundation. This work, and a general paper on the phylogeny on the major fish groups, also led him to develop a hypothesis concerning the evolution of the vertebrate skeleton, an argument bolstered by developmental evidence and well-established phylogenies of vertebrates.

Mammal Phylogeny—from

Bushes to Trees The great bushlike radiation of the modern groups of mammals continues to be a major problem in systematics and has attracted a diversity of new approaches, including the use of biochemical evidence. Frick Curator Malcolm McKenna made detailed comparisons of results derived from both molecular and morphological studies and found both approaches to be flawed in similar ways. In addition, Dr. McKenna criticized the typological bent of some molecular studies.

On another topic, Dr. Novacek published a *Bulletin* on the skull of the archaic leptictid insectivores and a proposal for a modified classification of the orders of placental, or eutherian, mammals. In collaboration with graduate student André Wyss, he also completed a review of higher level mammal relationships, and proposed a hypothesis for the evolution of mammalian stapes.

Dr. McKenna reports ongoing editing of his voluminous classification of the mammals. Programs for retrieving and updating entries in the classification file are available both in BASIC for the Museum's Wang-VS system and C language for a UNIX operating system.

Turtles and Tetrapod Phylogeny

Curator Eugene S. Gaffney continued work on the skull and hind limb morphology of the early turtle *Proganochelys*. This pursuit was the basis for comparative study of

captorhinomorph "reptiles" and Recent turtle groups, a study which took him to large comparative collections in Vienna, Salt Lake City and other locations. These comparisons bear on problems of relationships of the major groups of amniote tetrapods.

Dr. Gaffney also began a study in collaboration with workers at Harvard, Berkeley and this Museum of the oldest turtle from North America.

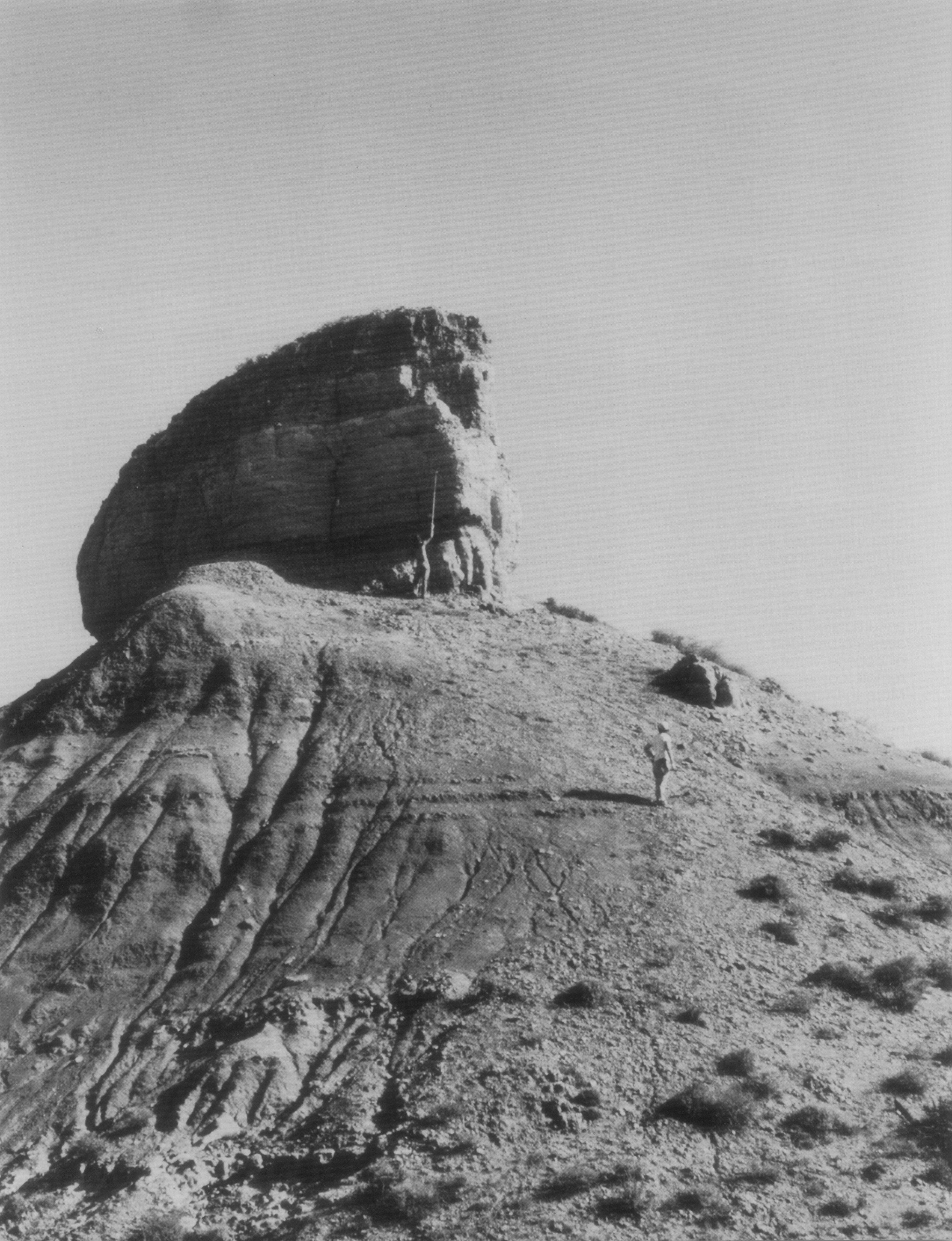
Australian History

Curator Richard Tedford maintained his long-term interest in the fossil history of Australia. He reviewed the large faunal turnover on this continent during the Miocene. He also contributed papers on the history of paleontological exploration of Australia and the systematics of the kangaroo *Sthenurus*. In early February, he visited Australia for collaborative preparation with Rod Wells of Flinders University on a guidebook for the Lake Eyre Basin field excursion for the upcoming International Sedimentological Congress. Dr. Tedford also reports that his comprehensive review of the biostratigraphy of the Oligocene-Pliocene mammals of North America, prepared jointly with several colleagues, is now in press with University of California publications.

South American Exploration

Support from the Eppley Foundation gave Dr. Novacek and a field crew the opportunity to visit the wild, mountainous region of southern Chile in search of fossil mammals. The highlight of the trip was the discovery of a major region of fossil-rich badlands by graduate students Wyss (Columbia University) and Mark Norell (Yale University). Plans are underway to return to this area for intensive fieldwork in January and February, 1987. We anticipate a detailed summary in next year's annual report.

Dr. McKenna, who accompanied Dr. Novacek to southern Chile, also joined José Bonaparte, professor of Paleontology at the University of Tucumán, Argentina, and a crew from Buenos Aires in their field research in northern Patagonia. There, they made several unexpected discoveries of



new Cretaceous mammals. Dr. Maisey returned to Brazil for a brief visit to the rich source of the Axelrod collection of Cretaceous fishes.

Deuterostome Phylogeny—the Big Picture Vertebrates belong within a diverse group of animals, the deuterostomes, whose relationships remain very problematic. Curator Emeritus Bobb Schaeffer considered evidence on the ontogeny of the deuterostomes in fashioning a theory for the phylogeny of these major clades. This work again demonstrates Dr. Schaeffer's remarkable scope of interest and continued productivity. It is therefore most appropriate this year that the Society of Vertebrate Paleontology awarded Dr. Schaeffer the Louis Agassiz Medal for his outstanding contributions to our discipline.

The Scientific Community Research has flowed from the community of scientists represented by our active research associates and Curator Emeriti. The bibliography again documents the wide ranging activities of this program, covering such areas as the origin of birds, Antarctic "reptiles," fossil horses, rodent phylogeny, fossil fishes and hominid paleontology.

Members of an expedition to the badlands of the Punta region of Baja Norte California measure the rock thickness of an exposed face on the main butte in the area. While exploring the 50-million-year-old badlands, researchers uncovered the fossil remains of several Eocene mammals, including evidence of the earliest known horse. At least 12 mammalian species, including several new taxa, have been found in this part of Mexico. The expedition was led by Michael Novacek, Chairman and Associate Curator in the Department of Vertebrate Paleontology.

This year, we regretfully report the untimely death of Len Radinsky, who was both a research associate of this department and a professor in the prestigious Department of Anatomy at the University of Chicago. Dr. Radinsky produced many publications on his innovative research of brain size in fossil mammals and classic studies on the origin of the Perissodactyla. His loss cut short a brilliant scientific career and a productive involvement for many years with this department. He shall be sorely missed by his colleagues.

Scientific Publications:

- Colbert, E.H.
1985. The petrified forest and its vertebrate fauna in Triassic Pangaea. Museum of Northern Arizona, Bull. 54, pp. 33-43.
1986. Mesozoic tetrapod extinctions: A Review. In Dynamics of Extinction, D.K. Elliott (ed.), John Wiley and Sons, Inc. Publishers, New York, pp. 49-62.
- Colbert, E.H., and R.R. Johnson
1985. Introduction to: The Petrified Forest through the Ages. Museum of Northern Arizona, Bull. 54, pp. 1-2.
- Delson, E.
1985. Neogene African catarrhine primates: Climatic influence on evolutionary patterns. South Afr. Jour. Sci., vol. 51, pp. 273-274.
1985. Preface. In E. Delson (ed.), Ancestors: The hard evidence, pp. xi-xii. Alan R. Liss Inc., New York.
1985. Catarrhine evolution. In E. Delson (ed.), Ancestors: The hard evidence, pp. 9-13. Alan R. Liss Inc., New York.
1985. Late Pleistocene human fossils and evolutionary relationships. In E. Delson (ed.), Ancestors: The hard evidence, pp. 296-300. New York, Alan R. Liss Inc.
1985. Palaeobiology and age of *Homo erectus*. Nature, vol. 316, pp. 762-763.
1985. The earliest *Sivapithecus*? Nature, vol. 317, pp. 149-150.
- Emry, R.J., and H-P. Schultz
1986. Vertebrate paleontology. (Biennial review of the discipline) Geotimes, vol. 31, no. 2, pp. 57-59.
- Flynn, J.J., W.A. Berggren, and D.V. Kent
1985. "Paleogene geochronology and chronostratigraphy." In N.J. Snelling (ed.), The Chronology of the Geological Record, Memoirs Geol. Soc. of London, no. 10, pp. 141-195.
- Flynn, J.J., W.A. Berggren, D.V. Kent, and J.A. Van Couvering
1985. "Cenozoic geochronology" Geological Society of America Bull., vol. 96, pp. 1407-1418.

- Flynn, L.J.
1986. Late Cretaceous small mammal horizons from the San Juan Basin, New Mexico, Amer. Mus. Novitates, no. 2845, pp. 1-30.
- Flynn, L.J., L.L. Jacobs, and E.H. Lindsay
1985. Problems in muroid phylogeny: relationships to other rodents and origin of major groups: In W.P. Luckett and J-L. Hartenberger (eds.), Evolutionary Relationships among Rodents: A multidisciplinary analysis. NATO ASI Series, vol. 92, pp. 589-616. Plenum Press, New York, London.
- Flynn, L.J., M. Sarwar, and J.J. Jaeger
1985. Evolution of the rhizomyine zygoma. Palaeovertebrata, vol. 15, no. 3, pp. 129-138.
- Flynn, L.J., L.L. Jacobs, and I.U. Cheema
1986. Baluchimyinae, a new ctenodactylid rodent subfamily from the Miocene of Baluchistan, Pakistan. Amer. Mus. Novitates, no. 2841, pp. 1-58.
- Gaffney, E.S.
1985. Progress toward a natural hierarchy of turtles. In F. De Broin and E. Jimenez-Fuentes (eds.), Studia Palaeocheloniologica, pp. 125-131. Studia Geologica Salamanticensia, vol. 1, especial. Ediciones Universidad de Salamanca.
- Grande, L.
1985. Recent and fossil clupeomorph fishes with materials for revision of the subgroups of Clupeoids. Bull. Amer. Mus. Nat. Hist., vol. 181, art. 2, pp. 231-373.
1985. The use of paleontology in systematics and biogeography, and a time control refinement for historical biogeography. Paleobiol., vol. 11, no. 2, pp. 1-11.
1985. Fish fossils in the Eocene Green River formation of southwestern Wyoming. Natl. Geogr. Res. Reports, vol. 21, pp. 201-205.
1986. The first articulated teleost described from Cretaceous freshwater deposits of North America. Paleontology, vol. 29, part 2, pp. 365-371.
- Grande, L., and G. Nelson
1985. Interrelationships of fossil and Recent anchovies (Teleostei: Engrauloidea) and a description of a new species from the Miocene of Cyprus. Amer. Mus. Novitates, no. 2826, pp. 1-16.
- Grande, L., and J. T. Eastman
1986. A review of Antarctic ichthyofaunas, in light of new fossil discoveries. Palaeontology, vol. 29, part 1, pp. 113-137.
- Hook, R.W., and D. Baird
1986. The diamond coal mine of Linton, Ohio, and its Pennsylvanian-age vertebrates. Jour. Vert. Paleol., vol. 6, no. 2, pp. 174-190.

- Lillegraven, J.A., and M.C. McKenna
1986. Fossil mammals from the "Mesaverde" formation (Late Cretaceous, Judithian) of the Bighorn and Wind River Basins, Wyoming, with definitions of Late Cretaceous North American Land-Mammal "Ages." *Amer. Mus. Novitates*, no. 2840, pp. 1-68.
- MacFadden, B.J.
1985. Patterns of phylogeny and rates of evolution in fossil horses: Hipparions from the Miocene and Pliocene of North America. *Paleobiol.*, vol. 11, no. 3, pp. 245-257.
1986. Late Hemphillian monodactyl horses (Mammalia: Equidae) from the Bone Valley Formation of central Florida. *Jour. Paleontol.*, vol. 60, no. 2, pp. 466-475.
- Maisey, J.G.
1986. The Upper Jurassic hexanchoid elasmobranch *Notidanoides*, n.g. *Neues Jahrb. Geol. Paläont. Abhandl.*, vol. 172, no. 1, pp. 83-106.
- McKenna, Malcolm C.
1985. The great American terrestrial interchange and reorganized oceanic circulation in the latest Tertiary. *South Afr. Jour. Sci.*, vol. 81, no. 5, p. 258.
- Meylan, P.A., and W. Auffenberg
1986. New land tortoises (Testudines: Testudinidae) from the Miocene of Africa. *Zool. Jour. Linn. Soc.*, vol. 86, pp. 279-307.
- Novacek, M.J.
1985. The Sespedeictinae, a new subfamily of hedgehoglike insectivores. *Amer. Mus. Novitates*, no. 2822, pp. 1-24.
1985. Cranial evidence for rodent affinities. In W.P. Luckett and J-L. Hartenberger (eds.), *Evolutionary Relationships among Rodents: a multidisciplinary analysis*. NATO ASI Series, vol. 92, pp. 59-81. Plenum Press, New York, London.
1986. The primitive eutherian dental formula. *Jour. Vert. Paleol.*, vol. 6, no. 2, pp. 191-196.
1986. The skull of leptictid insectivorans and the higher-level classification of eutherian mammals. *Bull. Amer. Mus. Nat. Hist.*, vol. 183, art.1, pp. 1-111.
- Ostrom, J.H.
1984. Introduction to *Archaeopteryx*. In J.H. Ostrom, M. Hecht, P. Wellnhofer and G. Riehl (eds.) *Proceedings of the International Archaeopteryx Conference*. Eichstätt, pp. 9-20.
1984. The meaning of *Archaeopteryx*. In *Proceedings of the International Archaeopteryx Conference*, Eichstätt, pp. 161-176.
1984. The Yale *Archaeopteryx*: the one that flew the coop. In *Proceedings of the International Archaeopteryx Conference*, Eichstätt, pp. 359-367.
- Rosenberger, A.L., and E. Strasser* (Sponsor: E. Delson)
1985. Toothcomb origins: Support for the grooming hypothesis. *Primates*, vol. 26, pp. 73-84.
- Schaeffer, B., and C. Patterson
1985. Comments on western hemisphere Jurassic fishes. *Ameghiniana*, vol. 21, pp. 332-334.
- Sereno, P.C.* (Sponsor: E.S. Gaffney)
1986. Phylogeny of the bird-hipped dinosaurs (Order Ornithischia). *Natl. Geogr. Res. Repts.*, vol. 2, pp. 234-256.
- Tattersall, I., J.A. van Couvering, and E. Delson
1985. The "Ancestors" project: An expurgated history. In E. Delson (ed.), *Ancestors: The hard evidence*, pp. 1-5. Alan R. Liss Inc., New York.
- Tedford, R.H.
1985. Late Miocene turn-over of the Australian mammal fauna. *South Afr. Jour. Sci.*, vol. 81, pp. 262-263.
- Tedford, R.H., J.B. Swinehart, R.M. Hunt, and M.R. Voorhies
1985. Uppermost White River and lowermost Arikaree rocks and faunas, White River Valley, northwestern Nebraska, and their correlation with South Dakota. In J.E. Martin (ed.), *Fossiliferous Cenozoic deposits of western South Dakota and northwestern Nebraska*. *Dakoterra*, vol. 2, part 2, pp. 335-352. Museum of Geol., South Dakota School of Mines and Technology.
- Wahlert, J.H.
1985. Cranial foramina in rodents. In W.P. Luckett and J-L. Hartenberger (eds), *Evolutionary Relationships among Rodents: A multidisciplinary analysis*. NATO ASI Series, vol. 92, pp. 311-332. Plenum Press, New York, London.
- Wahlert, J.H., and W. von Koenigswald
1985. Specialized enamel in incisors of eomyid rodents. *Amer. Mus. Novitates*, no. 2832, pp. 1-12.
- Woodburne, M.O., R.H. Tedford, M. Archer, W.D. Turnbull, M.D. Plane and E.L. Lundelius
1985. Biochronology of the continental mammal record of Australia and New Guinea. *Spec. Publ.*, South Austr. Dept. Mines and Energy, vol. 5, pp. 347-363.
- Abstracts and Popular Publications:**
Colbert, E.H.
1985. *Dinosaurs. An illustrated history. (Australian Edition). Reader's Digest Services Pty. Ltd., Surry Hills, N.S.W., Australia.* 224 pp.
1985. Rachel H. Nichols (Memorial). *Society of Vertebrate Paleontology News Bulletin*, no. 134, pp. 61-62.
1985. *Foreword to: bones for Barnum Brown*, by Roland T. Bird. Texas Christian University Press, Fort Worth, pp. vii-viii.
1985. Wandering lands and animals. The Story of Continental Drift and Animal Populations. Dover Publications, New York, xxv and 323 pp.
- Delson, E.
1986. (Abstract) Cercopithecoid biochronology of South African Plio-Pleistocene hominid localities. In *The Longest Record: The human career in Africa. Symposium in honor of Prof. J. Desmond Clark. Volume of abstracts*, pp. 27-28. Berkeley, California.
- Grande, L.
1985. (Abstract) Higher interrelationships of anchovies (Engrauloidea: Clupeomorpha) with a review of their fossil record. *Amer. Soc. Ichthyologists and Herpetologists*, 65th meeting.
1986. (Abstract) *Hypsidoris farsonensis* (Teleostei: Siluriformes) and its phylogenetic relationships. *Amer. Soc. Ichthyologists and Herpetologists*, 66th meeting.
- Lozinsky, R.P., and R.H. Tedford
1986. (Abstract) Stratigraphy of the Santa Fe Group (Oligo-Pleistocene) in the Gabaldon Badlands, north-central New Mexico. *Geol. Soc. Amer.*, vol. 18, no. 5, p. 391.
- MacFadden, B.J.
1985. Drifting continents, mammals, and time scales: Current development in South America. (Essay Review.) *Jour. Vert. Paleont.*, vol. 5, no. 2, pp. 169-174.
- McKenna, M.C.
1986. [Review of] Glirology, evolutionary relationships among rodents: A multidisciplinary analysis, W.P. Luckett and J-L. Hartenberger (eds.), *Science*, vol. 231, pp. 166-167.
- Novacek, M.J.
1986. [Review of] A biogeographic event. The Great American Biotic Interchange, by F. G. Stehli and S.D. Webb, *Science*, vol. 231, pp. 1021-1022.
- Ostrom, J.H.
1985. What might have been. *Yale Peabody Museum. Discovery*, vol. 18, no. 1, pp. 26-29.

Research Stations

The Museum's research stations provide investigators with near optimal conditions to study terrestrial animal and plant ecology, systematics, behavior and developmental biology. The research stations also give undergraduate and graduate students the opportunity to advance their field training in the natural sciences. The appeal of these natural sites is attributable to the diversity of habitats available, the characteristics of the biota present and the degree to which the study areas are protected from the environmental perturbations of civilization. The Museum owns or is affiliated with a number of field stations which provide scientists and students laboratory space, library facilities and living accommodations.

St. Catherines Island The St. Catherines Island Research Program, funded by the Edward J. Noble Foundation, is administered through the office of the Deputy Director for Research. Projects conducted on St. Catherines Island, one of the barrier islands off the Georgia coast, focus not only on the traditionally supported scientific areas but also on historical research, a field new to the program.

Thomas Peter Bennett, former President of the Philadelphia Academy of Natural Sciences and currently Director of the Florida State Museum at Gainesville, conducted historical research on the East Florida Expedition of 1817-1818. This was the first expedition of the newly formed Academy of Natural Sciences (founded in 1812) and America's first institutionally sponsored expedition.

The Academy of Natural Sciences East Florida Expedition followed a previous route—that of the 18th-century naturalist William Bartram who visited several of the

barrier islands, including St. Catherines Island, and recorded his floral and faunal observations. The east Florida journey merits considerable historical attention because each of its four participants (William Maclure, George Ord, Thomas Say and Titian Peale) are ranked today as seminal figures in the development of the natural sciences in America.

Dr. Bennett will integrate his existing research material with the extensive notes, photographs and other source material obtained on this field trip. The project will result in a number of publications. He has already discussed the expedition's scope and implications in seminar presentations and speeches. Other lectures are scheduled during the coming year.

Harold B. Rollins, professor in the Department of Geology and Planetary Sciences at the University of Pittsburgh and research associate at the American Museum of Natural History, conducted a study of the morphological variation of the common quahog, *Mercenaria mercenaria*, in various environmental settings on St. Catherines Island.

Although *M. mercenaria* has received more research attention than any other marine bivalve of the eastern coast of the United States, considerable controversy clouds the understanding of basic group dynamics in this animal. The majority of studies have provided evidence of a major winter hiatus in development in *M. mercenaria*. It has been suggested, however, that the major growth halt in St. Catherines Island specimens of *M. mercenaria* occurs in late summer.

This controversy is perhaps reconcilable, as Dr. Rollins suggests, by consideration of the variation of seasonal temperature changes along the extensive latitudinal range of *M. mercenaria*. Summer heat shock may exert a much greater effect upon growth of more southern populations of *M. mercenaria* than does winter cold shock. The timing of the main growth halt must be resolved before that species can be confidently used to infer season of harvesting of shells preserved in

St. Catherines Island archeological sites.

James H. Oliver, Jr., director of the Institute of Arthropology and Parasitology at Georgia Southern College, completed the fourth year of his research on determination of tick species on the island, seasonal variation in tick population densities and monthly surveys of the tick hosts for the presence of protozoan blood parasites transmitted by ticks.

Dr. Oliver and his crew have found at least six tick species on the Island. He has also concentrated on attempts to identify the piroplasm parasitizing white-tailed deer and the tick vector of this blood protozoan.

Another dimension of his work involves cooperative research with scientists of the Harvard School of Public Health and scientists of the Connecticut Agricultural Station. Projects with the former group involve *Babesia microti* (the positive agent of rodent and human babesiosis) and ecological studies of the tick, *I. scapularis*. Work with the Connecticut scientists involves surveying the island's wild mammals that are suspect tick vectors for the presence of Lyme Disease spirochetes.

Dr. Oliver discovered the first case of a chigger mite feeding on a larval tick. Chiggers almost always feed on mammals, birds or reptiles and have never been reported to parasitize ticks. A short manuscript on this discovery has been submitted to the Journal of Parasitology.

Eugene Lyon, a noted scholar in the field of 16th-17th century Spanish Florida history, completed historical research on Mission Santa Catalina de Guale. Dr. Lyon located documents regarding the founding, operation, configuration and final siege at Santa Catalina, and translated specific accounts of sailors and soldiers who served in that mission complex. He has provided David Hurst Thomas, curator in the Museum's Department of Anthropology and principal investigator of the archeological program on St. Catherines, with translations of valuable material about the expeditions to Santa Catalina and

the native American groupings there in the mid to late 17th century.

Great Gull Island During the 1985 season (April through September), 60 people participated in research on Great Gull Island, Long Island Sound, New York.

More than 5000 pairs of terns nested on the island this year. Some 7400 young Common Terns were banded for identification. Roughly 6400 of these survived to fledge, despite some mortality caused by rains.

Field workers were involved in several projects. Margaret Rubega studied the nesting habits of Roseate Terns. She established that some 700 pairs were breeding during the season. Jill Hamilton observed the various feeding techniques of Common Terns. Talvi Ansel documented the behavior of island species, including the Song Sparrow. Volunteer Parker Cane studied the interactions of adult Common Terns on one region of the island.

The "Birdathon," an annual bird-spotting fundraising event, involved 42 birders who secured monies from 5000 sponsors based on the number of birds they identified. More than \$17,000 was raised, including \$520 in matching gifts.

Archbold Biological Station

The Archbold Biological Station, located in south-central Florida, is an affiliate of the Museum. The station conducts a broad research program with emphasis in ecology, evolutionary biology and animal behavior. Forty-five research projects involving station staff and research associates were conducted during the year. Forty-one visiting investigators conducted studies at the station.

An experimental burn of 16 hectares was carried out in February as part of a project investigating the effects of fire in a mature sand pine scrub. Data were collected on physical characteristics of the fire, soils, nutrients, plants and animals. These will be evaluated in light of pretreatment data from the burn plot and data from adjacent control plots.

The study is a cooperative effort involving most of the station staff and coordinated by Ronald L. Myers, Assistant Research Biologist. Dr. Myers also worked on long-term studies of vegetation ecology, including scrub and sandhill succession, pine population dynamics and the dynamics of cabbage palm hammocks.

Postdoctoral Fellow Sam Vander Kloet of Acadia University conducted studies of flora of the station with emphasis on the biosystematics of *Vaccinium* and *Hypericum*.

James N. Layne, Senior Research Biologist and Museum Research Associate, has been involved in ecological studies of vertebrates of the station. In collaboration with Wayne C. Packer of the University of Western Australia, he began analysis of population data based on 17 years of intensive sampling of small mammals and conducted studies on comparative foraging strategies and acorn preferences of small rodents.

James L. Wolfe joined the station staff as Executive Director in August, and was appointed a Museum Research Associate in the Department of Mammalogy in November. He studied the behavior and ecology of rice rats (*Oryzomys palustris*), initiated a project with Postdoctoral Fellow C. Tan Summerlin on the effects of moonlight on activity patterns of small mammals, and began studies on the biology of fishes of Lake Annie.

Studies by Assistant Research Biologist Mark A. Deyrup on arthropods of the station included major projects on the biology of velvet ants and preparation of a guide to ants of Florida in collaboration with scientists from the University of Florida. Under Dr. Deyrup's curatorship, the arthropod reference collection grew by 6480 identified specimens to a total of 25,049.

Research Associates made major contributions to the station's research program. Warren G. Abrahamson conducted studies of plant ecology, especially as related to fire. The work of Glen Woolfenden and John Fitzpatrick on scrub jays at the station earned

them the Brewster Prize, the highest research award presented by the American Ornithologists' Union. Thomas Eisner worked on the defensive chemical secretions by insects, and was involved in the production of two films which won numerous awards.

Southwestern Research Station

Vincent D. Roth, Resident Director for 23 years, retired, and his replacement, Wade C. Sherbrooke took over the position on March 1. A new assistant to the director, Pamela Limberger, joined the staff.

The research station's primary role is to provide a support facility for field biological research of staff members of the American Museum, as well as professional colleagues from other museums, universities and colleges in the United States and around the world. The diversity of biota and ecological settings of the Chiricahua Mountains and surrounding areas continues to stimulate the curiosity of investigators from a broad spectrum of disciplines.

By providing these scientists with a facility where they can have ready access to diverse natural communities and carry out related laboratory investigations, the Museum is making a significant

A member of the Coyote Players, a group that performs traditional American Indian ceremonies, presents a "woman's shawl dance" during Native American Month which was held in conjunction with the special exhibition, "Lost and Found Traditions: Native American Art 1965-1985." The Department of Education presents programs on the world's cultures every weekend from October through June. The peoples of Japan, Latin America, Africa, China and the Middle East have been the focus of the free People Center programs which feature music and dance, and craft demonstrations.



contribution to natural history research. The results are seen in scientific publications and collection expansions.

The station also contributes toward the educational objectives of the Museum through visiting classes, the volunteer program, a seminar series, and the large numbers of people who visit if only to enjoy the beauty of the setting.

Mr. Roth published his spider identification guide through the American Arachnological Society. The book is titled, "Spider Genera of North America; With Keys to Families and Genera and a Guide to the Literature."

Mr. Sherbrooke has established a number of goals that have begun to be attained. One of the new aims is the development of a stronger volunteer program more tightly linked to the station's research and educational objectives.

The volunteer program was advertized nationally this year. Notices were carried in the newsletter of the Animal Behavior Society, the Ornithological Societies Newsletter, Herpetological Review and Environmental Opportunities Newsletter. In addition, the Museum's Office of the Deputy Director for Research sent flyers for posting to more than 200 biology departments in universities around the country.

The response was strong, drawing 30 high quality applicants to the station. Their enthusiasm for working with researchers has been good for the facility's ability to attract future researchers.

Expanding the maximum number of volunteers at the station at any given time from four to six, has enabled more flexible scheduling between station chores and research activities. This allows researchers to obtain the aid of well qualified field assistants on a part-time basis. In addition, volunteers gain experience that helps them grow in their field and evaluate their professional objectives in biology.

Department of Education

Although the best known function of the Department of Education is that of presenting programs to groups of school children, it is also engaged in many other activities. Music and dance programs, films, workshops, symposia and lecture series take place in the Charles A. Dana Education Wing and in the Main Auditorium. These activities attract visitors of all ages from the various ethnic communities within the region. Education staff members also lead field trips and study tours. With the renewal of a generous gift from the Samuel and May Rudin Foundation, a dozen college and high school students were able to work as interns in the department.

Programs for Children On any given school day the Museum may be visited by more than 100 school classes. Some 150,000 youngsters mainly from New York City schools were registered for visits through the department. More than 21,000 children received instruction through the "Single Visit" program. Taught by the department's staff members, the program features classes in anthropology and natural science. It includes instruction in exhibition halls and a classroom period in which children are brought into close contact with artifacts, animal or mineral specimens. New topics were added, including Chinese New Year, Blacks in Science, and a Whale Week.

During the celebration of Black History Month in February, 3500 school children attended special performances of music, dance and puppetry. These were made possible in part by a gift to the department from the Henry Nias Foundation.

More than 8000 pupils from classes visiting the Museum but not registered for programs received

instruction from 68 teaching volunteers who were trained by the department's staff.

An additional 3500 elementary and junior high school children attended assembly programs on ecology that were given at their own schools by a department staff member. Almost 250 junior high school students participated in microscope study, shark anatomy and animal behavior programs held in the Louis Calder Laboratory. This facility, which is supported by a grant from the Louis Calder Foundation, is the site of weekend workshops and courses for young people each semester. Reptiles, archeology, marine life and endangered species are among the topics featured. Needy children receive stipends for these programs.

Handicapped persons received specialized instruction from a staff member trained to work with such groups. This person's services were supported by a gift from the Surdna Foundation. Volunteers assisted with more than 150 such groups consisting of about 1300 children. In March more than 200 persons attended a mime and drama program designed for the hearing-impaired.

Programs for Adults Afternoon and evening lecture series drew 5500 registrants. Thirty-three lecture series and workshops were offered, including such diverse subjects as African mammals, geology, birds, civilizations in India, sex and gender, archeology of the British Isles, Islamic arts and sciences and ethnobotany of North American Indians.

Workshops were offered in Navajo weaving, travel photography and animal drawing. Among the lecturers were staff members from the Museum's education and scientific departments and from other institutions such as Columbia, Harvard and the University of Pennsylvania.

One hundred fifty people participated in weekend field trips in geology, botany, birding and whale-watching and more than 400 took part in morning bird walks in Central Park during the spring and fall migration periods.

The May/June programs instituted several years ago continued to be extremely successful. Registration increased from about 1000 a year ago to more than 1300 this year. In addition to the popular sunset geology cruises up the Hudson and in the New York Bay area, new offerings included a workshop in bird identification for beginners and a natural science walk at Pelham Bay in the Bronx.

The ninth annual Margaret Mead Film Festival, composed of 44 anthropological documentary films, was attended by more than 6000 people. A grant from the New York State Council on the Arts helped make this four-evening event possible.

Other special events included a symposium on acupuncture, performances of dances from Asia and the Pacific, a children's concert, and the annual Identification Day. On ID Day, the public is invited to bring in anything from rocks and fossils to anthropological artifacts to be identified by members of the scientific staff. These special activities were funded by gifts from the Helena Rubinstein Foundation and the Vincent Astor Foundation. They attracted more than 7000 people.

Almost 350 teachers from New York City schools registered for courses in the biological sciences and anthropology. These 15-session courses are accredited through the Graduate School of Education of the City College of New York and are taught at the Museum by department staff.

Community Programming A total of 52,500 visitors attended programs designed for, but not limited to, persons from African-American, Latin-American and Caribbean communities. These included workshops on African batik, beadwork and basketry, and Latin-American arts and crafts; a program on the life and achievements of Paul Robeson (taped at the Museum and later shown on WNET-Channel 13); a concert of classical music on steel drums; folktales from the Caribbean, the United States and West Africa, and a music and dance tribute to Martin Luther King, Jr.

Funds from the Henry Nias Foundation, the Samuel and May Rudin Foundation, the family of Frederick H. Leonhardt, the Evelyn Sharp Foundation, the Avon Products Foundation Inc., the Sidney, Milton and Leoma Simon Foundation and the Grumman Corporation made these special events possible.

Interpretive Facilities The Alexander M. White Natural Science Center, designed especially for children, stresses the ecology of New York City. It was the recipient of a gift from the Museum's Staff Wives organization, in memory of Mrs. Alexander (Posy) White. More than 53,000 people, most in family groups, visited the Natural Science Center during the afternoons and weekends when it is open to the public.

On weekends in the Frederick H. Leonhardt People Center Native American, Indian, Middle Eastern, Japanese, Latin-American, African-American and Chinese cultures were presented through music, dance, crafts and slide talks. These free programs were made possible by an endowment from his family in memory of Frederick H. Leonhardt.

The Discovery Room, which has hands-on materials for the very young and for the visually handicapped, is another education facility that is open on weekends. It served 3000 children and their parents. On school days this facility is used for teaching groups of the disabled.

A gift from the Sergei S. Zlinkoff Fund was used for purchasing and installing, in the Main Auditorium, special infrared equipment to assist the hearing-impaired.

Department of Exhibition and Graphics

This year the department mounted several special exhibitions; it continued working toward completion of the Hall of South American Peoples. Plans are also underway for new installations in the Hall of Evolution and Human Biology; maintenance projects were completed in the Hall of African Mammals, and new audiovisual exhibits were installed in the Guggenheim Hall of Minerals and the Hall of Earth History.

Special Exhibitions "Masterpieces of the American West" opened in November in Gallery 3 and drew a very appreciative and interested audience. The Anschutz Collection of Western Art was a departure from the normal run of exhibitions mounted in Gallery 3. Several artifacts from our collection helped to illustrate many of the elements in the paintings. "Wolves and Humans: Coexistence, Competition and Conflict," a special exhibition of the facts, myths and lore behind the wolf, designed and built by the Science Museum of Minnesota opened in June.

Gallery 1 was the location of two special exhibitions. The "Art of Cameroon," was circulated by the Smithsonian Institution Traveling Exhibition Service. "Lost and Found Traditions: Native American Art, 1965-1985," was organized by the American Federation of the Arts. It featured more than 300 contemporary objects crafted by Native Americans. The exhibition was mounted with support from the American Can Foundation.

Other special exhibitions included "Tiger, Tiger, Burning Bright: An Indian Wildlife Portfolio," photographs of wildlife from India, in Naturemax Gallery, and "Vijayanagara: Where Kings and Gods Meet," architectural drawings and archeological photographs of this ancient city, in the Akeley Gallery. These exhibitions



helped to celebrate Festival of India, 1985.

Exhibitions in the Arthur Ross Exhibit of the Month program included the "Origami Holiday Tree," the "Brazilian Princess," and "Aging," where labels were affixed to several mammal, fish and reptile exhibit cases showing the lifespan of each species. The exhibition, "Chinese Dinosaurs," featuring two huge replicas obtained on loan from the Peoples Republic of China, was on public view in Roosevelt Memorial Hall.

Audiovisual Exhibits State-of-the-art video projection equipment was installed in two areas of the Museum to present two new audiovisual shows. The first, entitled "Forever Gold," was placed in a newly designed theater in the Guggenheim Hall of Minerals. It tells the story of gold: its properties, discovery, mining, refining and uses. The second, "Earth's Wildfire: Evidence of a Dynamic Planet," is shown in a three-screen theater in the Hall of Earth History. It is an 11-minute video story of how plate tectonics cause much of the movement of the Earth's crust. This installation was partially supported by a grant from Conoco. Both of these permanent exhibits utilize advanced video technology including videodisc recordings and front projected images to produce shows that are virtually maintenance free.

A raven taking flight from a hungry wolf made one of the chillingly realistic details in the special exhibition, "Wolves and Humans: Coexistence, Competition and Conflict." Several innovative techniques were featured in the exhibition, which was organized by the Science Museum of Minnesota. People entering the gallery were greeted by the musky smell of a wolf den. A "howling booth" encouraged visitors to howl like a wolf in order to locate simulated packs of wolves hidden on a light board map.

Permanent Halls Work on permanent halls continued with several exhibits being installed in the Hall of South American Peoples. Completion of this hall is scheduled for late 1987 with a public opening in early 1988. Planning continues on new installations in the Hall of Evolution and Human Biology as well as on a redesign of the Osborn Hall of Late Mammals. "New Frontier of Life," formerly an Arthur Ross Exhibit of the Month, is now permanently installed in the Hall of Invertebrates.

Maintenance projects completed last year included refurbishing of five habitat groups in the Hall of North American Mammals (Beaver, Raccoon, Gray Fox and Opossum, Mountain Beaver, Fisher and Porcupine). Refurbishing of all the dioramas on the second and third floors in the Hall of African Mammals was completed.

The Graphics Section of the department produced a wide variety of printed pieces, posters, bulletins and other examples of graphic design including the Annual Report. A new phototypesetting facility was purchased and installed. It enables the staff to design and revise layout, set type photographically and produce camera-ready art in much less time than previously and at considerable cost savings.

Members of the department's replica studio spent about one year making molds of the Museum's *Tyrannosaurus rex* and casting replica bones in fiberglass. The first replica was sold to the Academy of Natural Sciences of Philadelphia; it is now a focal point in their new dinosaur hall. Under the direction of Martin Cassidy, technicians and volunteers are now making additional copies of *Tyrannosaurus rex* on order for several other museums.

Department of Library Services

The Museum's preeminent natural history library is a major resource for the Museum staff and the international scientific and scholarly community. Its reputation of excellence is maintained through the special care given to its rare book, film, manuscript and photographic collections. In many cases the curation of these collections has been made possible through generous grants.

The Special Film Collection

A two-year project to restore, conserve and catalog some 1500 reels (300 titles) of film is nearing completion. The project is being funded by the U.S. Department of Education Title II-C Program and Exxon. The resulting Special Film Collection documents the history of the Museum, expeditions, natural phenomena, extinct and endangered species, and societies that have irrevocably changed. The Collection constitutes a historical record of the development of natural history museums, scientific exploration and research, and the history of the use of motion pictures in the process of scientific documentation. The Collection includes films from the early 20th century, one of the earliest color films from 1919 and the CBS-AMNH "Adventure" series of the 1950s that is the precursor to today's sophisticated nature films.

Because the films had not been previously curated, labels and titles were missing and extensive research was needed to identify people, geographic locations, tribes, biota, expeditions, etc. Members of the Museum's Library and scientific staff contributed their time and expertise to provide sufficient clues to begin researching a film. The Library's collections were used to obtain detailed descriptions of each film. Cataloging information on the films is being input into the OCLC database, an international library network that will

provide access to this Collection on a worldwide basis. Each film has been cleaned, repaired, restored, viewed and edited. Copies for research purposes have been made. The original films are now in archivally sound boxes in an environmentally controlled area of the Library.

The Special Film Collection project is attracting considerable attention from the film profession and from scholars. Thanks to the support from Exxon and the Department of Education and to the cooperation of the Museum staff and the film profession, a significant documentary resource has been saved and made available to researchers.

Curating the Collections

The Library continued to curate special and general collections and to produce indices and catalogs to make access to the collections easier. Indices to two major photographic collections were completed: the Rodman Wanamaker Expedition and the Edward Curtis images. The color slides collection was reviewed; outdated images were withdrawn and more modern ones added. With the assistance of the Department of Mineral Sciences, the collection of color slides of minerals and gems was improved. Artifacts are being photographed before installing them in the new Hall of South American Peoples.

Grants A grant of \$9000 from the New York State Library was used to restore and copy a photographic album of the Jesup Expedition to Siberia in the 1890s. With a grant to The Associated Natural Science Institutions from the National Historical Publications and Records Commission (NHPRC) the Library hired a consultant to assess the archives and to recommend procedures and develop programs. A \$161,160 grant from the U.S. Department of Education Title II-C Program will be used to restore and microfilm the Museum's most important field notebooks, diaries and journals. With funding from the New York Metropolitan Reference and Research Library Agency the Library has under-

taken a two-year conversion of its 17,000-title serial collection into the OCLC database; thus far 4812 titles have been completed.

The Library's expertise in natural history was recognized by OCLC. It was authorized to "enhance" the OCLC monograph database. Only 43 libraries in the network of the 4000 have been invited to correct the cataloging of other libraries.

Exhibitions Three exhibits mounted this year were: "From the Museum's Attic" and "Carl Ethan Akeley, 1864-1926" in the Library Gallery and "Jewels of India" in the Library entrance. Seven sketches and oil paintings by Titian Ramsay Peale were loaned to the Smithsonian Institution for the exhibit, "The Magnificent Voyagers." Guy Dussaussois, a Fulbright scholar from the Bibliotheque Interuniversitaire de Bordeaux visited to learn the operations of a research library, and Pearl Holford, a graduate student at the Columbia University School of Library Service, served her internship in the Archives. The Library-sponsored round-the-world trip, "Rediscover the Great Expeditions II," took off in November. Participants were accompanied by Dr. Nicholson, Dr. Musser, Dr. Carneiro and Nina J. Root, Chairwoman of the Department of Library Services.

Services The Library served 8000 users, answered 11,000 reference questions, circulated 28,281 items to the scientific staff and photocopied 14,320 pages for the public. It received 1766 inter-library loan requests, borrowed 622 items from other libraries and performed three database searches. It processed 2433 photographic orders realizing an income of \$47,497 and granted gratis permissions worth \$16,335. A packet of 20 slides of Museum images was prepared and 450 sets have been sold. Monographs representing 1707 titles and journal issues representing 6176 titles were added to the collection. In addition, 20,789 cards were filed into the catalogs, 45,561 photographic images were processed, and 42,756 issues of Museum scientific

publications were distributed. Microforms of the *Proceedings and Transactions of the Zoological Society of London* were purchased and the Library's sets are being restored. *Recent Publications in Natural History* published four issues containing 2815 citations and 13 reviews, 2684 have been distributed.

Stephen A. Stone donated 25,000 color slides taken by his father S. Byron Stone, and Patricia Wynne donated 15 books she illustrated and more than 120 original drawings in memory of her agent Edward T. Riley. Numerous gifts of individual volumes were received from friends and staff.

Bryan R. Johnson, Acquisitions Librarian, was appointed American representative of the Printing History Society (London).

Publications:

AMNH Department of Library Services
1985. The collections of the Department of Library Services, American Museum of Natural History. 5 pp.

1985. Guide to the Library, American Museum of Natural History. 6 pp.

1985. A national program for natural history libraries. New York, iii+40+140+19 pp.

A visitor to the Department of Library Services' Photographic Collection examines slides of mineral specimens. Slides and black-and-white photographs can be purchased through the Photographic Collection, which holds some 400,000 images. An often requested item is a new packet of 20 slides that samples the Museum's outstanding exhibits.



- Johnson, Bryan R.
 1985. [Review of] Native American press in Wisconsin and the nation, ed. by James P. Danky, Maureen E. Hady and Richard Joseph Morris. The Papers of the Bibilog. Soc. of Amer., vol. 79, no. 4, pp. 611-612.
1986. [Review of] Science and civilisation in China. Volume 5: Chemistry and chemical technology. Part 1: Paper and printing, by Tsien Tsuen-hsui. Fine Print, vol. 12, no. 1, pp. 42-44.
1986. Where to find handmade papers. Small Press, vol. 3, no. 3, pp. 16-18.
1986. [Review of] Atlas of the North American Indian, by Carl Waldman. Choice, vol. 23, no. 7, p. 1044.
1986. The non-English editions of works by James Willard Schultz. The Piegan Storyteller, vol. 11, no. 2, pp. 1, 3-6.
1986. [Review of] An annotated bibliography of Northern Plains ethnohistory, by Katherine M. Weist and Susan R. Sharrock. Choice, vol. 23, no. 8, pp. 1198-1199.
- Johnson, Bryan R. (ed.)
 1985. Book Arts Rev., vol. 4, no. 3.
1985. Book Arts Rev., vol. 4, no. 4.
1985. Recent Publ. in Nat. Hist., vol. 3, no. 2.
1985. Recent Publ. in Nat. Hist., vol. 3, no. 3.
1985. Recent Publ. in Nat. Hist., vol. 3, no. 4.
1986. Book Arts Rev., vol. 5, no. 1.
1986. Book Arts Rev., vol. 5, no. 2.
1986. Recent Publ. in Nat. Hist., vol. 4, no. 1.
1986. Root, Nina J. and Bryan R. Johnson, Proceedings of the Zoological Society of London: an index to the artists, 1848-1900. N.Y., Garland Publishing, xxiii, 947 pp.
- Root, Nina J.
 1985. American Museum of Natural History Library. Sci. & Tech. Libraries, vol. 6, nos. 1/2, Fall 1985/Winter 1986, pp. 1-7.
1985. Decision-making for collection management. Coll. Management, vol. 7, no. 1, Spring 1985, pp. 93-101.
1985. Natural history collections and libraries. Encyclopedia of Library and Information Sci., vol. 39, suppl. 4, pp. 332-336.
1985. Preserving and maintaining museum library collections. In Museum Librarianship, John C. Larsen, ed. Hamden, Ct., Library Professional Publications, pp. 51-66.
1986. Nina J. Root and Bryan R. Johnson, Proceedings of the Zoological Society of London: an index to the artists, 1848-1900. N.Y., Garland Publishing, xxiii, 947 pp.

Collections Management

The conservation of artifacts and specimens, the most visible aspect of collections management at the American Museum, requires a wide range of technical knowledge and skill. Every effort is made to preserve the object for future study and/or exhibition. In each of the Museum's scientific departments, the collections are the responsibility of the curators and scientific assistants.

The Department of Anthropology began to transfer its ethnographic collections of African, Siberian and the Northwest Coast materials into the new two-level storage facility on the fourth floor. This facility will eventually house a major portion of the Museum's ethnographic collections. The new position of Associate Registrar was created and the person hired in it will oversee the transfer of these collections to the new facility.

On one level, the 20,000-square-foot environmentally controlled facility is equipped with mobile storage units for small artifacts. These units allow maximum utilization of floor space. The second level was designed to store very large artifacts that require specialized support systems designed by the conservation staff.

Because of their size and delicate nature, textiles have proved to be among the most difficult objects to store. Two new textile storage units designed by the conservation staff have provided a solution to the problem. The larger of the all-metal cabinets is six feet wide, eight feet high and 10 feet long. The smaller cabinet is four feet wide, eight feet high and seven feet long. In both units, the textiles are placed on screen supports, which are inserted into the cabinets. There is roughly an inch between each textile, allowing for greater circulation of air.

Previously, mounted textiles were stored individually in crates that measured about five feet, by eight feet, by seven inches. This method required considerably more storage space and limited accessibility to the textiles.

Another conservator has been appointed to assist in the conservation of objects for the Hall of South American Peoples, which is currently in preparation. An additional conservator will be brought in to assist with the project as work progresses. Over the coming year, additional conservators will be brought in as required to work on special exhibitions of ethnographic materials.

An internship program to expand graduate study in conservation has begun. Several graduate level student interns from the New York University Institute of Fine Arts have worked under the supervision of Museum staff members in the Conservation Laboratory. The Department of Anthropology plans to bring in additional student interns in conservation.

The Department of Ichthyology began transferring collections into its recently completed storage facility on the first floor. The facility provides 4500 square feet of space, more than doubling the storage space previously available. Thus far, through the use of compact shelving and mobile storage units, specimens that would previously have required 3000 square feet of storage space are now stored in a 1500-square-foot area of the new facility.

The Department of Library Services is completing a two-year project to restore, conserve and catalog its Special Film Collection (see the Department of Library Services section). The Library has also purchased microforms of two rare publications of the Zoological Society of London, the *Proceedings* and *Transactions*. These will be used for research by the public. The Library's original copies of the publications, which were printed from 1812 on, have been restored and placed in storage. The volumes included color plates by some of the outstanding natural history artists from the 19th century. The texts of the volumes were rebound and the color plates, printed on acid paper, were preserved separately in protective sleeves.

Interdepartmental Facilities

June marked the first full year of operation for the new VS85 computer which replaced the VS80. Five new database applications were created for various Museum departments to manage members' contributions, courses, films, grants and press lists. A telecommunications application was written to facilitate transfer of word processing documents from the VS85 to the Micropress phototypesetter. Existing applications were revised to take advantage of the greater speed and memory of the VS85. In addition, both the operating system and the word processing software were upgraded in May.

More than 260 Museum employees have sign-on access to the computer system. To meet the demand for terminals and printers, new peripheral hardware was added to the system. These included three additional printers, three workstations and seven Wang PC terminals. There is now a combined total of 40 terminals and printers on the system.

In order to meet current and projected demands for data access, another 288 megabyte disk drive was installed in May. This brings the total disk capacity of the VS85 to more than 700 megabytes.

The Scanning Electron Microscope (SEM) is used by Museum staff to examine and photograph materials as diverse as arthropods, bryozoans, shells, diatoms, foraminifera, ceramics, feathers, skulls, teeth and asbestos fibers. A video display shows the surface detail of a specimen magnified from four up to 30,000 times normal size.

A permanent photographic record of the image can be recorded on a micrograph. The micrographs are then analyzed to obtain information about the size and arrangement of surface structures. SEM micrographs are used in published papers and are kept as permanent records of specimens.

Grants and Fellowships

The Office of Grants and Fellowships, which administers the Museum's programs of fellowships and research grants available to the scholarly community, this year assumed the responsibility of centralizing and expanding the graduate training program into the Doctoral Training Program.

The Doctoral Training Program is a joint educational venture with universities which have a formal relationship with the Museum. It is dedicated to the training of Ph.D. candidates in the scientific disciplines represented in the Museum.

At present the joint programs are the Evolutionary Biology Program with the City University of New York, the Animal Behavior-Biopsychology Program also with C.U.N.Y., and the Paleontology Program with Columbia University. The Museum is also actively encouraging ties with other institutions.

The Doctoral Training Program, an important complement to the Postdoctoral Fellowship Program, reinforces the Museum's commitment to the education and training of scientists. The expansion of this program was made possible by a generous gift from the Exxon Foundation.

The Grants Program supported a total of 140 predoctoral candidates and postdoctoral investigators. The program awarded 62 Frank M. Chapman Memorial Grants (Ornithology); 35 Lerner-Gray Grants for Marine Research; 39 Theodore Roosevelt Memorial Grants (North American zoology and paleozoology), and four Lincoln Ellsworth Grants for research in the near arctic.

Collection Study Grants, which enable graduate students and recent postdoctoral investigators to visit the Museum to study the scientific collections, supported 10 researchers visiting the Departments of Entomology, Herpetology, Ichthyology, Mammalogy, Ornithology and Vertebrate Paleontology.

The Research and Museum

Fellowships Program provides support to recent postdoctoral investigators, established scientists and other scholars so they may carry out specific projects within a limited period of time at the Museum or its field stations.

This year seven Research Fellows were in residence. Joel Cracraft was appointed the Kalbfleisch Research Fellow in the Department of Invertebrates. He investigated a series of questions in evolutionary biology focusing on the analysis of those processes controlling patterns of biological diversification.

Marjorie Grene, a Boeschstein Research Fellow in the Department of Invertebrates, analyzed the nature of hierarchy theory and evolutionary biology.

Peter Meylan accepted a Carter Research Fellowship in the Department of Vertebrate Paleontology to conduct a revision of the fossil Trionychidae (family of soft-shelled turtles) of North America.

Kathleen Barlow, the Lounsbery Research Fellow in Anthropology, conducted research on the art, mythology and social organization in the Murik Culture of Papua New Guinea.

Robert Voss, the Thorne Research Fellow in Mammalogy, worked on a revision and phylogenetic study of *Zygodontomys*. Mice of this genus are small, morphologically distinctive muroid rodents that range from eastern Costa Rica through Panama, Colombia, Venezuela and the Guianas.

Mary McKittrick, a Chapman Research Fellow in Ornithology, examined the significance of individual variation in muscle flexor cruris lateralis (hindlimb muscle) in the family of flycatchers (Tyrannidae).

Nina Pierpont, a Chapman Research Fellow in Ornithology, studied the evolution of diversity in woodcreepers (Aves: Dendrocolaptidae).

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

a limited term appointment not to exceed five years. Michael Smith completed his first year as Kalbfleisch Assistant Curator (Fellow) in the Department of Ichthyology. He explored the relationship between ontogeny and systematics, as exemplified by fishes.

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

Publications, Membership and Marketing

Natural History Many of this year's articles reflected the intersection of science with current social concerns; others were new attempts to solve age-old evolutionary and anthropological conundrums. As in the past, virtually every feature article in *Natural History* described original work in evolutionary biology or anthropology, astronomy or geology. The authors were the scientists and scholars who did the research.

In "The Natural History of AIDS," Matthew A. Gonda, head of the Laboratory of Cell and Molecular Structure at the National Cancer Institute, reported the AIDS virus to be a relative of the slow-acting, neurotropic viruses that attack hoofed mammals. Dr. Gonda detailed the methods—DNA hybridization and DNA sequencing—that made the identification of the virus possible

and pointed to structural and genetic features that elucidate the virus's ancestry and seemingly sudden appearance.

"The Children's Fate," a 24-page supplement authored by Lester R. Brown and the staff of Worldwatch Institute, took a look at the global ecosystem that the next generation will inherit. Based on an analysis of the world's water supply, topsoil, forests, fisheries, grain supplies and disposition of nuclear wastes, Worldwatch warned that, by using the earth's resources at a greater than sustainable rate, the next generation is being left a legacy of economic and ecological deficits. The supplement was lavishly illustrated with four-color reproductions of children's paintings supplied by UNICEF and Studio in a School.

Evolutionary biologists focused on the compromises and contingencies that shape the course of evolution. Valerius Geist reconstructed the ecology of the extinct Irish elk and postulated that the male's famous hundred-pound antlers were paradoxically related to the species' need to produce fast and enduring runners.

The outcome of Frederick Gehlbach's 19-year study of screech owls substantiated a hypothesis that female birds of prey choose small mates to insure greater reproductive success. Canadian ornithologist John D. Reynolds explored the causes of sex-role reversals in red-necked phalaropes, a species of shore bird in which the females are polyandrous and males incubate the eggs. Charles Janson reported on capuchin monkeys and Scott Baker and Louis Herman reported on humpback whales. Both studies linked animal sociality with feeding patterns.

Several contributions came from researchers in the earth sciences and atmospheric studies. In an account of Idaho's 1983 Borah Peak earthquake, geologists Ross Stein and Robert Bucknam took some steps toward earthquake prediction, by suggesting that, in the Great Basin at

least, shocks are repeated in specific, identifiable places.

Meteorologist James W. Wilson, who investigated wind shear for the National Center for Atmospheric Research, wrote on the anatomy of "microbursts," the sudden downdrafts that imperil aircraft during takeoff and landing.

Features on anthropology and archeology ranged widely, both geographically and through time. Marvin Allison wrote of a prehistoric coastal Chilean tribe whose preserved dead predate the Egyptian mummies by at least 2000 years. Jack Kugelmass explored the contemporary subculture of computer fanatics, and George Gmelch reported on the tendency of emigrants from Barbados to eventually return to the island. A dig that yielded cartridge cases and bullets led archeologists Douglas Scott and Melissa Connor to conclude that Custer's men were outgunned by the Indians at the Battle of Little Big Horn.

Halley's comet came as close to earth as it will for another 75 years, and amateur astronomers were kept apprised of the approach by Dr. Nicholson's monthly columns, "Halley's Comeback." At various times during the year, Harvard Biologist Stephen Jay Gould, philosophy professor William Phipps, and British astronomer F. Richard Stephenson all took up the subject of Halley's comet, from historical perspectives.

For the 12th year, Dr. Gould turned out his immensely popular and provocative monthly columns on evolutionary biology. The columnists, Raymond Sokolov, Stephen Maran, and Robert H. Mohlenbrock each continued to inform on food, astronomy and botany, respectively.

Natural History also covered issues in contemporary wildlife conservation. Wyoming biologist Louise Richardson informed readers of the status of the world's last six black-footed ferrets; Jim Robbins reported on the return of the timber wolf to the American Northwest; and Lester

Short, chairman of the Museum's Department of Ornithology, chronicled his quest—eventually successful—to locate the supposedly extinct ivory-billed woodpecker.

Magazine advertising revenues reached almost \$5.2 million, as measured by the Publishers Information Bureau. This represents an increase of approximately 5.2 percent over the prior year, despite a small decline in advertising pages sold.

Average paid circulation for *Natural History* reached approximately 503,000, according to the Audit Bureau of Circulations.

The magazine continued to play an important role in communicating with Museum members and represents the main medium for advertising Discovery Tours, the Members Book Program, and other Museum activities.

Membership Despite a price increase made necessary by rising costs, the Participating and Donor Membership program continued to grow and to be an increasing source of revenue for the Museum.

In addition to providing regular and comprehensive information about Museum events, *Rotunda*, the members' newsletter, included feature articles on Charles Knight, research associate Horace Stunkard, Harry Shapiro's return to Polynesia, and a three-part series on work at the Museum's Southwestern Research Station.

Membership programs were extremely popular. Two capacity audiences heard Richard Leakey discuss his recent discoveries and views on human evolution. NASA astronomer Stephen Maran's talk on Halley's comet, the annual holiday concerts in the Planetarium, and a preview of the film, "Jews of Yemen," all drew capacity audiences.

Museum staff and scientists were actively involved in many of the programs. The Departments of Ornithology and Ichthyology conducted special behind-the-scenes tours. Dr. McKenna discussed the dinosaur extinction

controversy in an evening program. Members also enjoyed special opening premieres and programs in conjunction with the exhibitions "Masterpieces of the American West" and "Wolves and Humans." Family program highlights included "The All New Dinosaur Revue" (attended by 1800 people), "Eagles and Owls," and the annual "Ghost Stories from Around the World."

The Membership Office launched a members' birthday party program, which offers dinosaur birthday parties for children 5 to 10 years old. The parties, a source of additional revenue for the Museum, were an instant success, with bookings far exceeding projections. New themes are planned for the coming year.

Special Publications The Members' Book Program had a banner year. The program offers fine-quality books and calendars to the Museum's members and friends through an annual catalog, advertisements in *Natural History* and direct mail. The Members' Book Program Catalog, now in its third year, introduced a special section of nature- and science-oriented children's books and incorporated, for the first time, audio cassettes and video tapes.

In conjunction with Universe Book Publishers, Special Publications produced the 1987 calendar, "John Gould's Exotic Birds of Asia." The same spectacular bird images were used to create a set of eight notecards. "The Language and Music of the Wolves," a recording produced several years ago by *Natural History*, was released as an audio cassette. Narrated by actor and conservationist Robert Redford, it features authentic howls, growls and barks of wild wolves.

Faces: The Magazine About People, launched in October, 1984, grew in subscriptions and reputation. This children's magazine, published by Cobblestone Publishing, in cooperation with the American Museum, is aimed at children 8 to 14 and offers thematic issues focusing on anthropology, world cultures and

geography. A review in the May issue of *School Library Journal* described *Faces* as a "gem of a magazine."

The sale of Audubon portfolios, the new edition of six prints from Audubon's *Birds of America*, proceeded briskly throughout the year. The prints are produced from the original copper plates in the Museum's collections and are published by Editions Alecto, a British fine arts publisher. Royalties from this project will endow a research fund in the name of John James Audubon and will help the Museum carry on research in ornithology, mammalogy, and other areas in the natural sciences with which Audubon was so deeply concerned.

Two marketing agreements were entered into this year. MBI Inc. published a series of books, "Masterpieces of Science Fiction," that was promoted to the Museum's members in a letter from the chairman of the American Museum-Hayden Planetarium. Torstar Books Inc. published "All The World's Animals," a series promoted to the Museum's membership in a letter of recommendation from the Museum director. These marketing projects also generated royalties for the Museum.

Discovery Tours The travel program of the American Museum provided more than 760 participants with unique and in-depth study tours to 30 countries. Seven cruises and 11 land programs were completed. Thirty-four Museum lecturers from 13 departments and nine guest lecturers from universities and other museums served as tour leaders and provided formal lectures and informal discussions during each tour.

Many new educational adventures were offered, among them the Museum's first sailing program in the Caribbean during the winter holidays, a marine biology and geology tour through Hawaii, birding expeditions to the Amazon jungle, a cruise from Singapore to Athens via the Red

Sea, a study tour of the prehistoric caves of France, and a voyage along the Alaskan coast on a large, luxury cruise liner.

Of special note were programs designed to observe Halley's comet under optimum conditions with Museum scientists. The Discoverer's Club was formed for all past Museum travelers, and the Discoverer's Club *Newsletter* was created to provide members with news on interesting destinations, cultural and natural history highlights, and hints on travel gear. To afford members and inquirers greater service, toll-free telephone lines were installed in the Discovery Tours office.

Discovery Tours designs the itineraries to reflect specific study "themes," selects and coordinates the lecture teams and lecture series, and budgets and markets each trip through direct mailings to Museum members and test lists. It handles all written and telephone inquiries, books all reservations, and creates and produces comprehensive educational materials for each participant, including logistical information hints, guide information, glossaries, chronologies, checklists of wildlife and reading lists. Discovery Tours also oversees and monitors the operation of each program, and provides post tour reports on the experiences of participants.

Plans for 1986-87 include first-time Discovery Tours cruises to Antarctica, Japan, the Asmat region of Indonesia, the Seychelles Islands and Maldives Islands, and the first Discovery Tours program combining Peru, Easter Island and Tahiti.

Museum Shop This was an outstanding year for the Museum Shop. For the first time, annual sales were more than \$2 million.

New construction contributed to increased sales. A permanent shop on the fourth floor, "Museum Shop on Four," replaced the rolling cart. The emphasis in the shop is on the dinosaur, from plastic models and books to backpacks and clothing. The fourth floor shop is run as part of the very successful Volunteer Pro-

gram. A handsome renovation on the basement Junior Shop helped to increase business, particularly with parents and grandparents. An enlarged book section and a new range of educational material have been introduced.

The Gallery 3 Shop had three different themes and merchandise groups during the year to reflect exhibitions of "Maya: Treasures of an Ancient Civilization," "Masterpieces of the American West," and "Wolves and Humans." Native American crafts have always sold well in the main Museum Shop, but this category achieved even greater importance as a result of the exhibition, "Lost and Found Traditions, Native American Art 1965-1985."

New licensing agreements have been undertaken to broaden Museum exposure in three-dimensional objects and quality fabrics and wall coverings.

Sales are particularly strong in minerals, jewelry by Native American, Indonesian and African craftspeople and in reproductions and crafts from Mexico, China and Africa.

The two-year-old book balcony has increased visibility and continues to draw more potential customers into the shop. There, in addition to buying books in record numbers, patrons are buying globes, binoculars, bookends, records, posters, stationery and totes.

Micropaleontology Press

Micropaleontology Press serves academic and professional paleontologists in their studies of microscopic fossils from ancient oceans and lakes. To support its work, the Press received important gifts for the modernization of equipment and facilities from Amoco Production and Research Company, Shell Oil Company, and Exxon Corporation.

Seven issues of the world-standard *Ellis and Messina Catalogues of Micropaleontology* were delivered. These included three issues of the *Catalogue of Foraminifera*, with original type descriptions of 902 genera and species; two issues of the *Catalogue of Ostracoda*, with 499

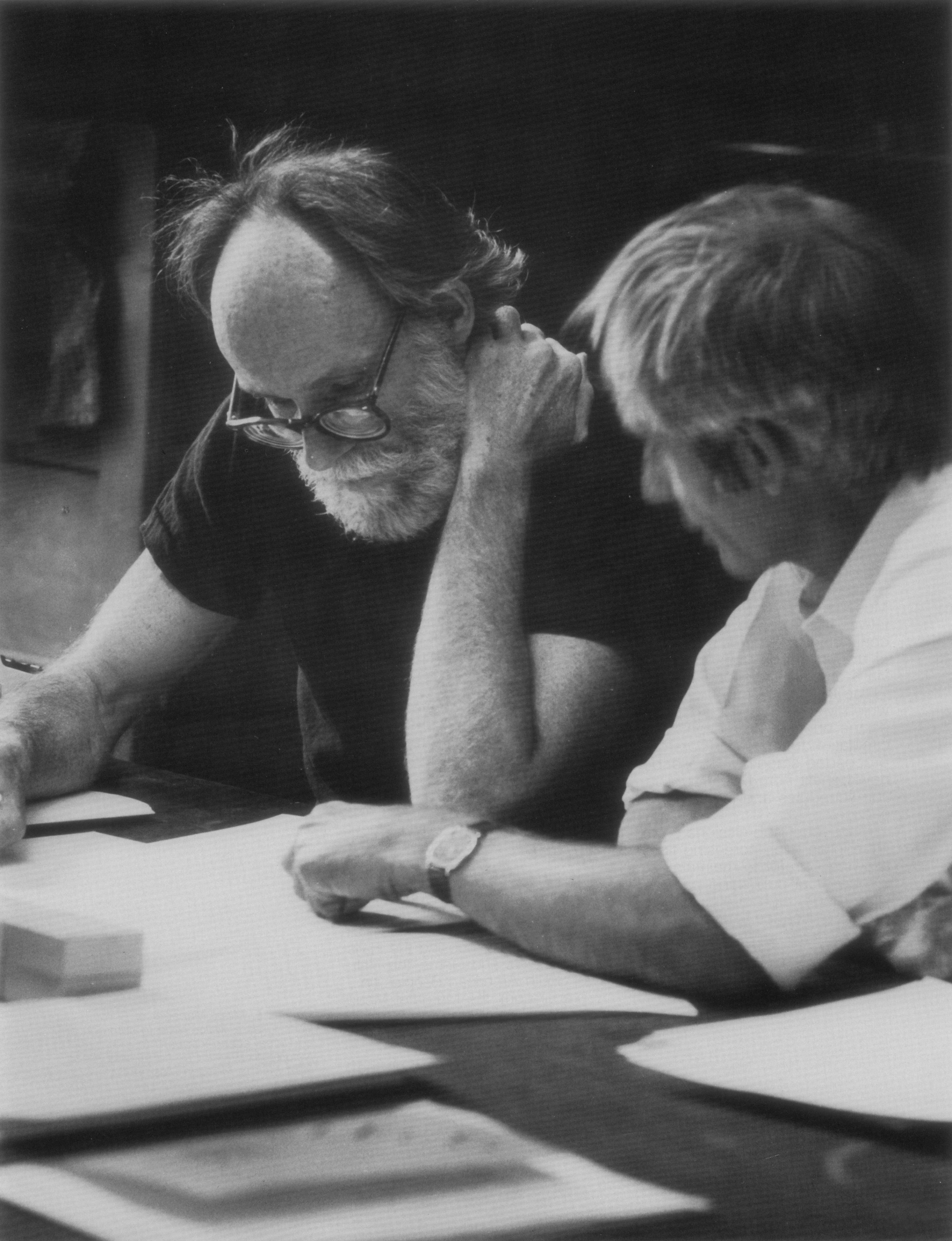
genera and species; and the initial two issues of the new *Catalogue of Diatoms*, with 710 genera and species. The initial microfiche edition of the *Catalogue of Foraminifera* was also delivered. The quarterly research journal *Micropaleontology* and the monthly information service *Bibliography and Index of Micropaleontology* were published in their 31st and 14th years, respectively.

In March, Micropaleontology Press moved to new quarters in the Education wing, gaining modern office space and improvements in storage and production facilities.

Scientific Publications The Museum's three scientific series, the *Bulletin*, *Novitates*, and *Anthropological Papers*, have been providing a forum for scientific discussion for more than a century. (The first *Bulletin* rolled off the press in 1881.) Scientists affiliated with the Museum can publish the results of their research by submitting papers to the chairperson of the appropriate scientific department.

Several long-term scientific projects were published this year. The *Anthropological Papers* presented a 300-page compilation of the late Junius Bird's excavation and life-

Before submitting the work for publication in Novitates, Guy G. Musser, Chairman and Curator in the Department of Mammalogy, left, reviews his manuscript on the tarsiers of Sulawesi with Lee Herman, Curator, in the Department of Entomology and a member of the Scientific Publications Committee. Novitates is one of the three Museum scientific publications that provide a forum for the results of research by scientists from the American Museum and other institutions. Novitates and the Bulletin focus on taxonomic analyses. Anthropological Papers presents findings on human culture and evolution.



long study of the Peruvian Indian archeological site known as Huaca Prieta. Appearing in the *Bulletin* was a catalog by Museum entomologist Lee H. Herman, in which he concluded a comprehensive classification of *Bledius*, a burrowing, water-loving beetle. In the field of invertebrates, the *Bulletin* published Research Associate Stephen Jay Gould's and David S. Woodruff's clarification of the taxonomy of *Cerion*, a much misunderstood Caribbean snail.

Australian spiders (Orsolobidae and Mygalomorphae), Australian frogs (Microhylidae), and North American Early Tertiary mammals known as leptictids were also among the taxa analyzed in the more than 2400 pages of the *Bulletin* and *Novitates* printed this year.

Curator Four issues with a total of more than 300 editorial pages were published during the year. The editor, Dr. Nicholson, appointed several new members to the editorial board. The new appointees include members of the Museum staff as well as representatives from outside institutions, continuing the journal's objective of drawing upon many resources via a diversified editorial board.

The transition period, during which Meckler Publishing assumed the printing, promotion, and circulation functions of *Curator*, proceeded smoothly. Subscribers now benefit from timely publication schedules and increased service.

Manuscript submissions continue in an ever increasing flow, allowing *Curator* to maintain its standards of publishing papers of wide range, high quality and great significance to the museum world.

Administration

Plant Operations, Construction, Maintenance and Building Services

Plant Operations consists of three departments—Construction, Maintenance and Building Services, which coordinate their efforts on projects throughout the Museum complex.

For example, for the year's 10 special exhibitions, the Building Services Department provided the personnel to transport the exhibition materials and cases to the galleries in which they were to be installed. Building Services also provided the security guards. The Construction Department provided carpentry, painting, electrical and sheet metal services for each exhibition to meet the specifications of each design. The Maintenance Department cleaned each gallery and also maintained the air conditioning, ventilation and lighting.

The three departments worked closely with architects, designers and engineers on projects funded by the City of New York through the Department of Cultural Affairs and the Department of General Services. The following projects are in various stages of design or completion:

- Exterior renovations are being carried out in three phases. Phase I includes the replacement of deteriorated flat roofs. (The City has listed this project for the coming year, and the contract will be awarded and work completed during 1986-1987). Replacement and repair of deteriorated windows, repointing of exterior walls and the replacement of damaged or missing roof slates, falls under Phase II. Phase III calls for construction of an enclosed fire stair for Building 8, housing the Halls of Minerals and Gems, the Hall of South American Peoples (in preparation), the Margaret Mead Hall of Pacific Peoples and the Anthropology Department's office and storage areas.

Restoration continued on the Museum's front plaza and steps, a project which began in April, 1985. Its purpose was to reinforce foundation supports and restore the appearance of the steps and

plaza, the New York State Memorial to Theodore Roosevelt. The project was to be completed in the fall of 1986.

- Installation of a multiplex computerized intrusion alarm system.
- Restoration of the Theodore Roosevelt Memorial Hall, the interior of the state's memorial to the 26th President, was planned for 1987. The work will include the installation of air conditioning, cleaning of the marble and the ceiling, construction of a new coat check facility, information desk and group seating, improved lighting and an electronic visitor counting system.

Plant Operation projects completed this year included renovation of the lower level subway entrance lobby and public restrooms, redesign and refurbishment of the Junior Museum Shop in the subway lobby, and new wall, ceiling and track lighting for the Akeley Gallery. In addition, renovation and reconfiguration work was carried out in the basement of the Education Building to relocate the Micropaleontology Press and to more efficiently organize the General Services Department. Walls were demolished and relocated, windows, doors, floors, ceilings, plumbing, lighting, and telephone and computer cables were installed.

Charles L. Miles, Manager of Building Services, uses a walkie-talkie to summon an additional attendant-guard to the Naturemax Theater as he takes a report from Martha Meegan, Assistant Manager of Building Services, on the size of the audience for the 1:30 p.m. performance. The Museum's 110 attendant-guards maintain constant contact with the central security office and with one another as they patrol the public and behind-the-scenes areas.



Air conditioning, heating and ventilation systems were designed and installed. Printing presses and mail handling equipment were relocated in the new General Services area. The work was carried out in such a way as to keep both departments operating with a minimum of inconvenience.

Renovations were also completed in the Halls of Minerals and Gems and the Hall of Earth History to enable them to accept new audio/visual projection equipment. Refurbishment work was carried out on the Klipspringer diorama in the Hall of African Mammals, the Gold of the Americas alcove area in the Hall of Mexico and Central America, the Korea diorama in the Hall of Asian Peoples and the New Frontier exhibit in the Hall of the Biology of Invertebrates.

Other projects begun this year and scheduled for completion in the coming year include installation of lunchrooms for school groups, an employee cafeteria, and new doors and a canopy for the Planetarium. The canopy will be fabricated to restore the look of the original Art Deco design used when the Planetarium was built 50 years ago.

Naturemax Theater The Naturemax Theater saw the highest attendance—355,061 visitors—since its opening in February, 1982. This represents a 64 percent increase over last year's attendance.

The rise can be attributed to the success of the highly acclaimed feature film, "The Dream Is Alive," which documents America's space shuttle program.

"The Dream Is Alive" was suspended for two days as the Museum paid tribute to the astronauts whose lives were lost in the tragic space shuttle accident in January. When "The Dream Is Alive" was returned to its regular schedule, a memorial statement was displayed on the screen.

Three new films were added to the Naturemax schedule. They are "On the Wing," "Skyward" and "Nomads of the Deep."

As a member of the Space Theater Consortium, the Museum is kept informed of film offerings in the IMAX format. They are previewed

by the Museum's staff in an effort to obtain the best possible films for future presentation in the Naturemax Theater.

Attendance Museum attendance for the 1985-1986 fiscal year totaled 2,618,667. This figure includes 2,020,141 visitors to the Museum and 598,526 to the Planetarium.

Development and Public Affairs

When Director Thomas D. Nicholson was asked by the American Association of Museums to serve as General Chairman of its annual meeting, the designation was regarded as a great honor to him and the American Museum of Natural History. Dr. Nicholson agreed to serve and the convention was held at the New York Hilton in June. Some 4000 delegates attended and participated in four intensive days of meetings. A series of evening events took delegates on special tours and to parties at museums in the Bronx, Staten Island, Brooklyn, Queens and various parts of Manhattan. Local arrangements were administered by this department.

Development That the Museum is a multifaceted institution is reflected in Development's efforts to find innovative methods of reaching new contributors while maintaining close relationships with longtime supporters. Individuals, foundations, corporations and government agencies respond to these efforts with interest and generous contributions.

The Friends, a group of supporters of the Museum, was invited to several evening events, including a preview of the "Brazilian Princess" topaz, the world's largest cut gem, before it was unveiled to the public. In April, Friends spent an evening with curators from Anthropology and Vertebrate Paleontology learning about South America. Friends and the Museum's other generous contributors were invited to a special showing of "Lost and Found Tradi-

tions: Native American Art 1965-1985." The exhibition was sponsored by the American Can Company.

A powerful force in the life of the Museum is its partnership with the business community. Spurred by the continuing efforts of Trustee Donald C. Platten, business support for the Museum grew. For the second year, that support has surpassed the \$1 million mark, led by generous contributions from Lawrence A. Wien, Chemical Bank and the Exxon Corporation.

This type of contribution keeps the Museum open and its facilities running; supports the maintenance, conservation and expansion of the collections; underwrites scientific research; and sustains the staff and structure that bring educational programs to adults and school children. Revenue from the Employee Free Admissions Program continues to grow as corporations strengthen the bond between themselves, their employees and the Museum. Corporations and their employees also provide support through matching gifts programs, a source that grew by 35 percent over last year.

The Museum is grateful to the Mobil Corporation for its continuing support of the Friday and Saturday evening free admissions program. The Exxon Corporation sponsored several projects, including the Graduate Training Program which enables students of the natural sciences to gain experience working with the Museum's curators and the collections. Under the auspices of the Exxon Public Service Loan Program, Walter J. Kenworthy, Vice President of the Exxon Education Foundation, joined the Museum for a term as Executive Assistant to the Director.

Foundations play a vital role in the growth and welfare of the Museum. The Howard Phipps Family Charitable Foundation and the LAW Fund of the Readers Digest continue to provide generous support for the planned renovation of the Theodore Roosevelt Memorial Hall. The Edward John Noble Foundation provided major funding for the Anthropology Department's archaeological project on St. Catherines Island.

The Ambrose Monell Foundation generously supported the Museum general fund. The Bodman Foundation contributed to the installation of an elevator in the Hall of Ocean Life and for conservation projects in the Anthropology Department. With valuable support from the Clark Foundation, the Museum is able to continue its program of computerizing many of its offices.

Benefit Events The fall season started with the annual Children's Halloween Party, which is enjoyed by adults as well as children and continues each year to be sold out.

On Dec. 5, Mrs. Philip F. Anschutz, Mrs. Henry Clay Frick and Mrs. Arthur Ross chaired the "Diamonds & Spurs Ball" to celebrate the opening of the special exhibition, "Masterpieces of the American West: Selections from the Anschutz Collection." Mrs. Charles A. Dana and Mrs. Robert G. Goelet, who had served as ball chairmen for the last three years, were honorary chairmen.

The ever imaginative committee of young people, cochaired by Mrs. Ottavio Serena and Mrs. Arnaud Brunel, sparked the winter season with a "Carnivale," complete with samba band and confetti. The "Carnivale" attracted more than 500 people to the Museum. The total ticket sales and contributions generated by all of these activities was \$270,000.

Public Affairs Contacts with local and national media were strengthened. Meetings were held with editors and producers at their editorial offices and at the Museum to disseminate information about exhibitions, programs and scientific projects. Print and broadcast publicity were generated for all major exhibitions. Special luncheon gatherings were scheduled to generate interest in the major exhibition, "Dark Caves, Bright Visions: Life in Ice Age Europe."

The office arranged events for major groups of media representatives. The New York Press Club, the National Association of Science Writers and the American Association of Travel Writers held luncheon or dinner meetings in various exhibition halls, enabling their

members to become more familiar with the Museum's programs.

Public Affairs opened and concluded the year with heavy promotions for the Naturemax Theater. The "Dream Is Alive" was the subject of publicity and advertising in July, 1985, and "On the Wing" was the focus of a major press preview when it opened a year later.

When the nearly extinct Ivory-billed Woodpecker was found in Cuba by a research team led by Dr. Short, Chairman of Ornithology, Public Affairs quickly brought this information to major segments of the scientific and general press. News of the discovery was carried on the first page of The New York Times, and in *People*, *Newsweek*, and *U.S. News and World Report*, as well as on television.

Public Affairs produces a nationally distributed radio series. Twenty-six brief science interviews between the Director and Museum researchers were produced and distributed to 600 radio stations. An additional 13-week series, featuring topics from *Natural History*, is planned.

The second annual "Legislators Night" was held in January to enable city and state legislators to become better acquainted with the Museum. Some 400 people—members of the City Council, the State Assembly and the State Senate, and their families—visited for an evening of dining, dancing and special programs.

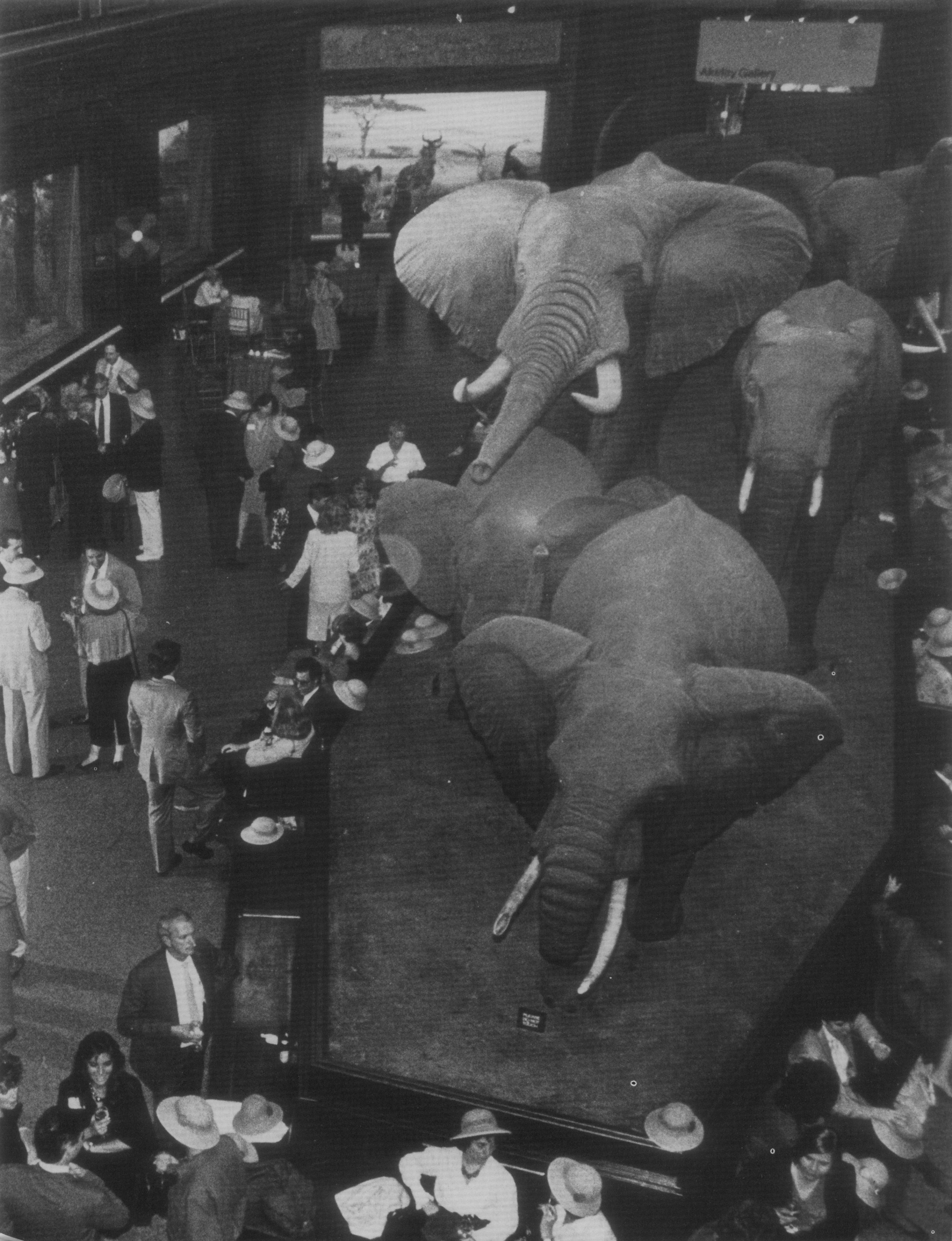
The Office also arranged for the appearance of notable Museum objects on the NBC network show, "Late Night with David Letterman." Meteorites, a reproduction of a Tyrannosaurus Rex skull, a reproduction of a Neanderthal skull, a termite queen, a sting ray, and the "Brazilian Princess" topaz were featured during six weeks on the TV show. "Late Night with David Letterman" is said to reach an audience of 10 million young, upwardly bound adults, a group the Museum seeks to reach.

The Museum's outreach was again extended to WNET Channel 13. Under an arrangement with *Natural History* magazine, the station agreed to air 134 30-second spots during the last half of 1986. Produced by Exploration, Inc., the

spots promoted *Natural History*, the Museum generically, and the new exhibition, "Dark Caves, Bright Visions."

The annual advertising campaigns executed by Ogilvy & Mather were closely linked to the Museum's exhibitions. Full-page ads focusing on special exhibitions and describing other programs were run quarterly in The New York Times. Ads also appeared semi-annually in *New York* magazine. There were quarterly radio campaigns on stations whose listeners represent a cross section of potential Museum visitors. Well-known voices heard on the ads were those of Lorne Greene of "Bonanza" for "Masterpieces of the American West," and Zsa Zsa Gabor for the "Brazilian Princess" topaz.

Guest Services Excellent meeting and conference facilities, and unique settings for social events attracted diversified audiences and provided significant support for the Museum and the Planetarium. Some of the events staged were for the ABC Television Network; Celanese Corporation; New York Fashion Council; University Glee Club; American Littoral Society; Young Presidents' Organization (Metro Chapter); Cravath, Swain & Moore; Salomon Brothers, Inc.; The Mt. Sinai Medical Center; American Institute of Science and Technology of the City of New York; U.S. Appliances Corporation; Paul Weiss, Riffkind, Wharton & Garrison; The New York Blood Center; Skadden, Arps, Slate, Meagher & Flom; International Business Machines; the Northeast Chapter Society of American Travel Writers; Rio Grande Railroad; The Johns Hopkins University Center for the Advancement of Academically Talented Youth; Johnson & Johnson; Citibank N.A.; Ogilvy & Mather Direct; Willkie Farr & Gallagher; National Audubon Society; New York Cotton Exchange; New York Urban Coalition, Inc.; Mobil Oil Corporation; The Graduate Faculties Alumni of Columbia University; BBDO International, Inc.; National Association of Science Writers; Wagner and Tomlin Theatricals; Grand Canyon Trust; The New York Racing Association; American Institute of Aeronautics and



Astronautics; Doubleday and Company, Inc.; Urban Parks Service; United Nations Hospitality Center; The New York Press Club; American Can Company.

In addition, internally sponsored social and press events, meetings, conferences, lectures, classes, performances and screenings were coordinated by Guest Services.

The Food Express served 758,962 visitors, and the American Museum Restaurant attracted 62,959. The Terrace Cafe reopened in front of the 77th Street entrance because of continuing renovation work on the Plaza and steps of the Central Park West entrance. Extensive renovation work began to increase the seating capacity of the school lunchrooms, and work progressed on a new cafeteria for employees, with support from the Charles Hayden Foundation.

Commerical filming and photography projects included a commerical for the TWIX candy bar, a photo essay for *Rolling Stone*, a segment for the CBS-TV special, "Dinosaur," as well as numerous educational filmings, tapings and interviews, and various advertisements. Scenes for the motion picture, "The Pick-Up Artist" were shot in and around the Museum and Planetarium.

The Office's responsibility for certain informational materials included the distribution of 794,525 floor plans and general information brochures in English and foreign languages; presentations on the closed circuit television system in the Museum; and material for the general information telephone recording. The latter reached 296,358 potential visitors.

Volunteer Office For 13 years the Origami Holiday Tree has delighted visitors between Thanksgiving and the New Year. This year the Mayor's Volunteer Service Awards cited the tree project "for providing enjoyment to hundreds of holiday visitors at the American Museum of Natural History, offering an alternative to the serious scientific study of natural history by blending science with a Far East art form." Over the year, 103 volunteers worked in the Origami program producing figures and teaching the art of paper folding to the public while the tree was on public view.

The Museum Highlights Tour program reaches a wide audience every day of the week, with its heaviest activity on weekends when Museum attendance is highest. Overall, 2605 tours were given this year compared with 2445 the year before. The number of weekend tours rose from 885 last year to 965 this year. The program of tours exclusively for Museum members began in 1978 with 36 tours. This year 77 Members' Tours were given to 1420 members.

The enlarged and refurbished "Museum Shop on 4", staffed by volunteers, increased its sales from \$73,200 to \$139,800.

A profile of volunteers indicates that most are college educated, more than a third are senior citizens (these working mostly on weekdays), and many have full-time jobs (these working mostly on weekends). On an average mid-week day, 86 volunteers are at work on Museum assignments either with the public (59 percent), or behind-the-scenes (41 percent). Most volunteers are attracted to the Museum's volunteer programs through prior knowledge and enjoyment of Museum programs and publications.

As nationwide interest in volunteerism increased over the year, Volunteer Manager Mitzi Bhavnani, became more active as a spokesperson for the American Museum's volunteer program and the volunteer field. Following her presentation on corporate volunteerism at a combined North Eastern Museums Association/Mid-Atlantic Association of Museums Convention, the United States Association of Museum Volunteers appointed Mrs. Bhavnani to its Board and asked her to develop topics and recruit speakers for three sessions on volunteerism at the American Association of Museum's Convention in New York City. She was appointed a preliminary judge on the New York City Task Force on Awards and Recognition of the Mayor's Voluntary Action Center. She also initiated the formation of a new group, Volunteer Program Administrators in New York City Cultural Institutions, to share information at the local level.

The Akeley Hall of African Mammals was an ideal setting for a "safari" attended by members of the advertising and publishing communities. The reception was sponsored by Natural History magazine in May to celebrate the 50th anniversary of the Akeley Hall.

OFFICERS

PRESIDENT

Robert G. Goelet

VICE PRESIDENTS

William T. Golden
Plato Malozemoff
Henry G. Walter, Jr.
Frederick A. Klingenstein

SECRETARY

Carroll L. Wainwright, Jr.

TREASURER

Charles H. Mott

BOARD OF TRUSTEES

ELECTIVE

Class of 1986

Philip F. Anschutz
William S. Beinecke
Howard L. Clark
Joseph F. Cullman, 3rd
Mrs. Hart Fessenden
Elbridge T. Gerry
Charles H. Mott
Albert C. Stewart

Class of 1987

Charles J. Hedlund
Lansing Lamont
Mrs. John Macomber
William F. May
Gerard Piel
Jack Rudin
Alfred R. Stern
Oscar S. Straus, II
Henry G. Walter, Jr.

Class of 1988

Frank T. Cary
William T. Golden
Arthur Gray, Jr.
Frederick A. Klingenstein
Mrs. Constantine Sidamon-Eristoff

Class of 1989

Robert R. Barker
Thomas D. Barrow
Robert G. Goelet
Earl G. Graves
Mrs. John E. Hutchinson, III
Frank Y. Larkin
Donald C. Platten
Arthur Ross
Carroll L. Wainwright, Jr.

Class of 1990

L.F. Boker Doyle
Henry Clay Frick, II
Caryl P. Haskins
Frank G. Lyon
Plato Malozemoff
Barnabas McHenry
Edwin H. Morgens
Fergus Reid, III
Frederick Seitz

EX OFFICIO

Edward I. Koch, Mayor of the City of New York
David N. Dinkins, President of the Borough of Manhattan
Harrison J. Goldin, Comptroller of the City of New York
Henry J. Stern, Commissioner, Department of Parks and Recreation
Bess Myerson, Commission, Department of Cultural Affairs
Nathan Quinones, Chancellor, Board of Education, City of New York

HONORARY

Malcolm P. Aldrich**
August Belmont
Robert E. Blum
Benjamin S. Clark
James S. Rockefeller
Edwin Thorne
Thomas J. Watson, Jr.

COUNSEL

Milbank, Tweed, Hadley & McCloy

COMMITTEES OF THE BOARD*

MANAGEMENT COMMITTEE

ELECTED MEMBERS

Robert R. Barker
Mrs. Hart Fessenden
Henry Clay Frick, II
Caryl P. Haskins
Mrs. John E. Hutchinson, III
Frank Y. Larkin
Frank G. Lyon
Mrs. John Macomber
Barnabas McHenry
Arthur Ross
Mrs. Constantine Sidamon-Eristoff
Alfred R. Stern
Oscar S. Straus, II

EX OFFICIO MEMBERS

Robert G. Goelet
William T. Golden
Plato Malozemoff
Henry G. Walter, Jr.
Frederick A. Klingenstein
Carroll L. Wainwright, Jr.
Charles H. Mott
Bess Myerson

AUDIT AND EXAMINING COMMITTEE

Frank Y. Larkin, Chairman
Frank T. Cary
Howard L. Clark
Arthur Gray, Jr.
Charles H. Mott
Arthur Ross

FINANCE COMMITTEE

Charles H. Mott, Chairman
Robert R. Barker
Elbridge T. Gerry
Frederick A. Klingenstein
Oscar S. Straus, II
Carroll L. Wainwright, Jr.
L. F. Boker Doyle, Alternate

NOMINATING COMMITTEE

Donald C. Platten, Chairman
Barnabas McHenry
Joseph F. Cullman, 3rd

COMMITTEES OF THE MUSEUM*

BUDGET COMMITTEE

Mrs. Hart Fessenden, Chairman
Charles H. Mott
Thomas D. Nicholson, Ex Officio
Pauline G. Meisler, Ex Officio
Frederick A. Klingenstein
Frank Y. Larkin
Frank G. Lyon
Carroll L. Wainwright, Jr.
Henry G. Walter, Jr.

SPECIAL ADVISORY COMMITTEES*

ANNUAL CORPORATE DRIVE COMMITTEE

Donald C. Platten, Chairman
Thomas D. Barrow
Howard L. Clark
Frank G. Lyon
William F. May
Jack Rudin
Albert C. Stewart

DEVELOPMENT COMMITTEE

Robert G. Goelet, Chairman
William T. Golden
Frederick A. Klingenstein
Frank Y. Larkin
Plato Malozemoff
Charles H. Mott
Donald C. Platten, Ex Officio
Jack Rudin
Mrs. Constantine Sidamon-Eristoff
Oscar S. Straus, II

EDUCATION POLICY COMMITTEE

Mrs. John Macomber, Chairman
Malcolm J. Arth
Mrs. William Chappell
Mrs. Hart Fessenden
Earl G. Graves
William A. Gutsch, Jr.
Mrs. John E. Hutchinson, III
Lansing Lamont
Neil H. Landman
William F. May
Edwin H. Morgens
Thomas D. Nicholson
Norman I. Platnick
Demetrius Pohl
Arthur Ross
Randall T. Schuh
Ian M. Tattersall
Ethel Tobach

EXHIBITION POLICY COMMITTEE

Frank Y. Larkin, Chairman
Malcolm J. Arth
William S. Beinecke
Norene L. Brooks
Howard L. Clark
Joseph F. Cullman, 3rd
R. Niles Eldredge
George S. Gardner
George E. Harlow
Laurel Kendall
Frank G. Lyon
Mrs. John Macomber
Ann Breen Metcalfe
Thomas D. Nicholson
Michael Novacek
Arthur Ross
Jerome G. Rozen, Jr.
Joseph M. Sedacca
Randall T. Schuh
Alfred R. Stern
Albert C. Stewart
Bal Raj Vohra
Mrs. Halsted W. Wheeler

PLANETARIUM POLICY COMMITTEE

Oscar S. Straus, II, Chairman
Malcolm J. Arth
Ned W. Bandler, Jr.
William S. Beinecke
Mrs. Hart Fessenden
Mrs. Maurice Goodgold
William A. Gutsch, Jr.
Charles J. Hedlund
Dorritt Hoffleit
Lansing Lamont
Mrs. James Magid
William A. May
Thomas D. Nicholson
Richard T. Perkin
Thomas D. Nicholson
Daniel W. Seitz
Randall T. Schuh
Benjamin S. P. Shen
Henry G. Walter, Jr.
Mrs. Jacqueline Bograd Weld

SCIENCE POLICY COMMITTEE

Caryl P. Haskins, Chairman
Frank T. Cary
R. Niles Eldredge
Mrs. Hart Fessenden
Henry Clay Frick, II
William T. Golden
Jerome L. Greene
Plato Malozemoff
Guy G. Musser
Charles W. Myers
Gareth Nelson
Thomas D. Nicholson
Michael Novacek
Gerard Piel
Donald C. Platten
Norman I. Platnick
Martin Prinz
Jerome G. Rozen, Jr.
Randall T. Schuh
Frederick Seitz
Mrs. Constantine Sidamon-Eristoff
David Hurst Thomas
Francois Vuilleumier
Henry G. Walter, Jr.

SPECIAL ADVISORY BOARDS*

FRANK M. CHAPMAN MEMORIAL COMMITTEE

Lester L. Short, Chairman
Dean Amadon
George F. Barrowclough
A. H. Brush
James C. Greenway, Jr.
Wesley E. Lanyon
Frank Y. Larkin
Thomas D. Nicholson
Jerome G. Rozen, Jr.
François Vuilleumier
Richard G. Zweifel

LERNER-GRAY FUND ADVISORY COMMITTEE

Arthur Gray, Jr., Chairman
Arland L. Carsten
William K. Emerson
Nixon Griffis
Thomas D. Nicholson
Jerome G. Rozen, Jr.
Jack Rudin
Frederick Seitz
Mrs. Constantine Sidamon-Eristoff
C. Lavett Smith
Ethel Tobach

SANFORD COMMITTEE

Lester L. Short, Chairman
Edward C. Childs
Thomas D. Nicholson
William F. Sanford

THEODORE ROOSEVELT MEMORIAL COMMITTEE

Arthur Ross, Chairman
Charles J. Cole
John Gable
Lee H. Herman
William D. Johnston
Mrs. John Macomber
Guy G. Musser
Gareth Nelson
Thomas D. Nicholson
Anna C. Roosevelt
Elizabeth Roosevelt
Jerome G. Rozen, Jr.
Frederick Seitz
Mrs. Constantine Sidamon-Eristoff
Richard H. Tedford

*The President is an Ex Officio member of all committees.
**Deceased

THE STAFF July 1, 1986

Thomas D. Nicholson, Ph.D., Director
Charles A. Weaver, Jr., B.A.
Deputy Director for Administration
and Assistant Treasurer
Jerome G. Rozen, Jr., Ph.D.
Deputy Director for Research
Pauline G. Meisler, M.B.A.
Assistant Director for
Financial Operations
L. Thomas Kelly, M.B.A.
Assistant Director and Publisher
Albert E. Parr, Sc.D.
Director Emeritus

SCIENCE, EDUCATION AND EXHIBITION DEPARTMENTS

ANTHROPOLOGY

Craig Morris, Ph.D., Chairman and Curator
Robert L. Carneiro, Ph.D., Curator
Stanley A. Freed, Ph.D., Curator
Enid Schildkrout, Ph.D., Curator
Ian M. Tattersall, Ph.D., Curator
David Hurst Thomas, Ph.D., Curator
Laurel Kendall, Ph.D., Assistant Curator
Gordon F. Ekholm, Ph.D., Curator Emeritus
Harry L. Shapiro, Ph.D., Curator Emeritus
Bella Weitzner, Curator Emerita
Priscilla Ward, B.S., Senior Scientific
Assistant
Phillip C. Gifford, Jr., Ph.D., Senior
Scientific Assistant Emeritus
Robert L. Bettinger, Ph.D., Research
Associate
Gertrude E. Dole, Ph.D., Research
Associate
Ruth S. Freed, Ph.D., Research Associate
Donald K. Grayson, Ph.D., Research
Associate
Paula Brown Glick, Ph.D., Research
Associate
Richard A. Gould, Ph.D., Research
Associate
Aldona C. Jonaitis, Ph.D., Research
Associate
Grant D. Jones, Ph.D., Research Associate
Shepard Krech, III, Ph.D., Research
Associate
Frederica de Laguna, Ph.D., Research
Associate
Clark Spencer Larsen, Ph.D., Research
Associate
J. Alan May, Ph.D., Research Associate
Rhoda Metraux, Ph.D., Research Associate
Anna Roosevelt, Ph.D., Research Associate
Jeffrey H. Schwartz, Ph.D., Research
Associate
Colin M. Turnbull, M.A. (Oxon.), D.Phil.,
Research Associate
Donald S. McClain, M.S., Field Associate
Carin Burrows, Associate
Helen E. Fisher, Ph.D., Associate

ASTRONOMY AND THE AMERICAN MUSEUM-HAYDEN PLANETARIUM

William A. Gutsch, Jr., Ph.D., Chairman
and Associate Astronomer
Franklyn M. Branley, Ed.D., Astronomer
Emeritus
Kenneth L. Franklin, Ph.D., Astronomer
Emeritus
David S. Roth, Planetarium Shop Manager
Rocco Bellino, Assistant Manager
Joseph Maddi, Chief Technician
Helmut K. Wimmer, Art Supervisor
Lynne B. Azarchi, M.B.A., Public Affairs
Coordinator
Clarence A. Brown, B.S., Producer
Brian P.M. Sullivan, B.S., Production
Designer

ENTOMOLOGY

Randall T. Schuh, Ph.D., Chairman and
Curator
Lee H. Herman, Ph.D., Curator
Norman I. Platnick, Ph.D., Curator
Frederick H. Rindge, Ph.D., Curator
Jerome G. Rozen, Jr., Ph.D., Curator
Mont A. Cazier, Ph.D., Curator Emeritus
Willis J. Gertsch, Ph.D., Curator Emeritus
Sarfaz Lodhi, M.Sc., Senior Scientific
Assistant
Mohammad Umar Shadab, Ph.D., Senior
Scientific Assistant

Louis N. Sorkin, M.S., Senior Scientific
Assistant
Gail L. Motkya, M.S., Scientific Assistant
Marjorie Statham Favreau, Scientific
Assistant Emerita
Alice Gray, M.S., Scientific Assistant
Emerita
Sixto Coscaron, D.Nat.Sc., Research
Associate
Frederick Coyle, Ph.D., Research Associate
James S. Farris, Ph.D., Research Associate
Raymond R. Forster, Ph.D., Research
Associate
Richard L. Hoffman, Ph.D., Research
Associate
Kurt Johnson, Ph.D., Research Associate
Kumar Krishna, Ph.D., Research Associate
Charles D. Michener, Ph.D., Research
Associate
Mary F. Mickevich, Ph.D., Research
Associate
A. F. Millidge, Ph.D., Research Associate
Alfred F. Newton, Jr., Ph.D., Research
Associate
Philip D. Perkins, Ph.D., Research
Associate
William A. Shear, Ph.D., Research
Associate
James A. Slater, Ph.D., Research Associate
Gary M. Stonedahl, Ph.D., Research
Associate
Howard T. Topoff, Ph.D., Research
Associate
Quentin D. Wheeler, Ph.D., Research
Associate
Raymond Mendez, Field Associate
James Reddell, B.A., Field Associate
R. T. Allen, Ph.D., Associate
Robert C. Dalgleish, Ph.D., Associate
Noel L.H. Krauss, Ph.D., Associate
Bryant Mather, D.Sc., Associate
Charles Mitter, Ph.D., Associate
John A. Murphy, M.Sc., Associate
John T. Polhemus, Ph.D., Associate
Walter C. Sedgwick, B.A., Associate
John Stamatov, D.D.S., Associate

HERPETOLOGY

Charles W. Myers, Ph.D., Chairman and
Curator
Charles J. Cole, Ph.D., Curator
Richard G. Zweifel, Ph.D., Curator
Charles M. Bogert, A.M., LL.D., Curator
Emeritus
Michael W. Klemens, M.S., Senior Scientific
Assistant
Carol R. Townsend, B.A., Senior Scientific
Assistant
Archie F. Carr, Jr., Ph.D., Research
Associate
Roger Conant, Sc.D., Research Associate
Martha L. Crump, Ph.D., Research
Associate
John W. Daly, Ph.D., Research Associate
Herbert C. Dessauer, Ph.D., Research
Associate
Carl Gans, Ph.D., Research Associate
Linda R. Maxson, Ph.D., Research
Associate
John A. Moore, Ph.D., Research Associate
Janis A. Roze, Ph.D., Research Associate
Carol Ann Simon, Ph.D., Research
Associate
Paulo E. Vanzolini, Ph.D., Research
Associate
Victor Martinez C., Lic., Field Associate
Alfredo Paolillo O., Lic., Field Associate
Itzchak Gilboa, B.A., Associate
Anne B. Meylan, Ph.D., Associate

ICHTHYOLOGY

Gareth Nelson, Ph.D., Chairman and Curator
Donn E. Rosen, Ph.D., Curator
C. Lavett Smith, Ph.D., Curator
Lester Aronson, Ph.D., Curator Emeritus
James W. Atz, Ph.D., Curator Emeritus
Michael L. Smith, Ph.D., Kalbfleisch Assistant Curator (Fellow)
M. Norma Feinberg, A.B., Senior Scientific Assistant
Barbara Brown, Ph.D., Scientific Assistant
Reeve M. Bailey, Ph.D., Research Associate
Madeline L. Cooper, M.S., Research Associate
P. Humphrey Greenwood, D.Sc., Research Associate
Klaus D. Kallman, Ph.D., Research Associate
Francisco Mago-Leccia, Ph.D., Research Associate
Richard Lund, Ph.D., Research Associate
Peter Moller, Ph.D., Research Associate
Lynne R. Parenti, Ph.D., Research Associate
Colin Patterson, Ph.D., Research Associate
Joseph W. Rachlin, Ph.D., Research Associate
James C. Tyler, Ph.D., Research Associate
Richard P. Vari, Ph.D., Research Associate
P.J.P. Whitehead, Ph.D., Research Associate
R. L. Shipp, Ph.D., Field Associate
James Van Tassell, Field Associate
Norman Macbeth, Ph.D., Associate
Jacques Serrier, Ph.D., Associate

INVERTEBRATES

Niles Eldredge, Ph.D., Chairman and Curator
Roger Lyman Batten, Ph.D., Curator
William K. Emerson, Ph.D., Curator
Ernst Kirsteuer, Ph.D., Curator
Judith E. Winston, Ph.D., Associate Curator
Neil H. Landman, Ph.D., Assistant Curator
Dorothy E. Bliss, Ph.D., Sc.D., Curator Emerita
Norman D. Newell, Ph.D., Curator Emeritus
Harold S. Feinberg, B.A., Senior Scientific Assistant
Sidney S. Horenstein, A.B., Senior Scientific Assistant
Walter E. Sage, III, B.S., Scientific Assistant
William A. Berggren, Ph.D., Research Associate
Donald W. Boyd, Ph.D., Research Associate
J. Kirk Cochran, Ph.D., Research Associate
Howard R. Feldman, Ph.D., Research Associate
Stephen Jay Gould, Ph.D., Research Associate
James D. Hays, Ph.D., Research Associate
Jeremy Jackson, Ph.D., Research Associate
John J. Lee, Ph.D., Research Associate
Linda Habas Mantel, Ph.D., Research Associate
Leslie F. Marcus, Ph.D., Research Associate
Harold B. Rollins, Ph.D., Research Associate
John D. Soule, Ph.D., Research Associate
Horace W. Stunkard, Ph.D., Sc.D., Research Associate
Elisabeth S. Vrba, Ph.D., Research Associate
Joel Cracraft, Ph.D., Kalbfleisch Research Fellow

Marjorie Grene, Ph.D., Boechenstein Research Fellow

MICROPALAEONTOLOGY PRESS

John A. Van Couvering, Ph.D., Editor
Norman S. Hillman, M.S., Production Editor
Susan E. Carroll, M.S., Assistant Editor

MAMMALOLOGY

Guy G. Musser, Ph.D., Chairman and Curator
Sydney Anderson, Ph.D., Curator
Ethel Tobach, Ph.D., D.Sc., Curator
Richard G. Van Gelder, Ph.D., Curator
Robert S. Voss, Ph.D., Assistant Curator
Karl Koopman, Ph.D., Curator Emeritus
Marie A. Lawrence, M.S., Senior Scientific Assistant
Michael D. Carleton, Ph.D., Research Associate
Louise Emmons, Ph.D., Research Associate
Robert Goodwin, Ph.D., Research Associate
Thomas A. Griffiths, Ph.D., Research Associate
John Buettner-Janusch, Ph.D., Research Associate
Stuart O. Landry, Jr., Ph.D., Research Associate
James N. Layne, Ph.D., Research Associate
M. Raymond Lee, Ph.D., Research Associate
James L. Patton, Ph.D., Research Associate
George B. Schaller, Ph.D., Research Associate
Kathleen M. Scott, Ph.D., Research Associate
James L. Wolfe, Ph.D., Research Associate
Terry L. Yates, Ph.D., Research Associate
Thomas L. Blakemore, Field Associate
Timothy J. McCarthy, Associate
Jose Ramirez-Pulido, Ph.D., Associate
Esteban E. Sarmiento, Ph.D., Associate

MINERAL SCIENCES

Martin Prinz, Ph.D., Chairman and Curator
George E. Harlow, Ph.D., Associate Curator
Demetrius C. Pohl, Ph.D., Assistant Curator
Silvester Sterbal, M.Sc., Technical Specialist
Joseph J. Peters, M.S., Senior Scientific Assistant
Ruth Lindsley, M.S., Scientific Assistant
Michael R. Weisberg, M.S., Scientific Assistant
Robert T. Dodd, Ph.D., Research Associate
Klaus Keil, Ph.D., Research Associate
Arthur M. Langer, Ph.D., Research Associate
C. E. Nehru, Ph.D., Research Associate
J. V. Smith, Ph.D., Research Associate
Jeremy S. Delaney, Ph.D., Research Fellow
Thomas A. Peters, M.S., Associate
Anna S. Sofianides, M.S., Associate
Julius Weber, Hon. D.Sc., Associate

ORNITHOLOGY

Lester L. Short, Ph.D., Chairman and Curator
Wesley E. Lanyon, Ph.D., Lamont Curator of Birds
Francois Vuilleumier, Ph.D., Curator
George F. Barrowclough, Ph.D., Assistant Curator
Dean Amadon, Ph.D., Sc.D., Lamont Curator Emeritus of Birds
Ernst Mayr, Ph.D., Curator Emeritus

Charles E. O'Brien, Curator Emeritus
Mary LeCroy, B.S., Senior Scientific Assistant
Allison Andors, M.A., M.Phil., Scientific Assistant
Helen Hays, B.A., Chairwoman, Great Gull Island Committee
Robert Bleiweiss, Ph.D., Research Associate
Walter J. Bock, Ph.D., Research Associate
Jared Diamond, Ph.D., Research Associate
Robert W. Dickerman, Ph.D., Research Associate
Crawford H. Greenewalt, Sc.D., Research Associate
James C. Greenway, Jr., A.B., Research Associate
Cheryl F. Harding, Ph.D., Research Associate
G. Stuart Keith, M.A. (Oxon.), Research Associate
William H. Phelps, Jr., B.Sc., Research Associate
Robert F. Rockwell, Ph.D., Research Associate
Mary McKittrich, Ph.D., Chapman Research Fellow
Nina Pierpont, Ph.D., Chapman Research Fellow
John Bull, Field Associate
John Eleuthere du Pont, Sc.D., Field Associate
Ruth Trimble Chapin, M.S., Associate
Sadie L. Coats, Ph.D., Associate
Ruth DeLynn, Associate
Lowrie S. Flagg, Associate
Lois H. Heilbrun, A.B., Associate
Richard Sloss, Associate

VERTEBRATE PALEONTOLOGY

Michael Novacek, Ph.D., Chairman and Associate Curator
Eugene S. Gaffney, Ph.D., Curator
Malcolm C. McKenna, Ph.D., Frick Curator
Richard H. Tedford, Ph.D., Curator
John G. Maisey, Ph.D., Associate Curator
Edwin H. Colbert, Ph.D., Sc.D., Curator Emeritus
Bobb Schaeffer, Ph.D., Curator Emeritus
Morris F. Skinner, Sc.D., Frick Curator Emeritus
Beryl E. Taylor, Frick Curator Emeritus
Susan Koelle Bell, A.B., Senior Scientific Assistant
Charlotte P. Holton, B.A., Senior Scientific Assistant
John P. Alexander, B.A., Scientific Assistant
Donald Baird, Ph.D., Research Associate
Eric Delson, Ph.D., Research Associate
Robert Emry, Ph.D., Research Associate
John J. Flynn, Ph.D., Research Associate
Lance Grande, Ph.D., Research Associate
Max K. Hecht, Ph.D., Research Associate
Robert M. Hunt, Jr., Ph.D., Research Associate
Bruce J. MacFadden, Ph.D., Research Associate
Paul E. Olsen, Ph.D., Research Associate
John H. Ostrom, Ph.D., Research Associate
John H. Wahlert, Ph.D., Research Associate
Peter Meylan, Ph.D., Carter Research Fellow
Peter Lewis, Field Associate

COUNCIL OF THE SCIENTIFIC STAFF

Gareth Nelson, Ph.D., Dean
Niles Eldredge, Ph.D., Assistant Dean
George E. Harlow, Ph.D., Secretary
The Chairmen of the Scientific and
Educational Departments and Six Elected
Members at Large

SOUTHWESTERN RESEARCH STATION

Wade C. Sherbrooke, M.S., Resident
Director

EDUCATION

Malcolm J. Arth, Ph.D., Chairman and
Curator
Kenneth A. Chambers, M.S., Assistant
Chairman
Marcia White-Wise, B.A., Manager of
Teaching Programs
Gloria Davis, B.A., Education Registrar
Ismael Calderon, M.A., Coordinator of
Community Programming
Nathaniel Johnson, Jr., M.A., Special
Programs Coordinator
Keith M. Brown, B.A., Assistant to
Community Programming Coordinator
Marjorie M. Ransom, M.A., Supervising
Museum Instructor
Paul J. Sanfacon, M.A., Senior Museum
Instructor
Helmut W. Schiller, B.S., Senior Museum
Instructor
Frances C. Smith, B.S., Museum Instructor
Jenny C. Breining, B.A., Museum Instructor
Lisa Breslof, B.S., Museum Instructor
Janice B. Durant, B.A., Museum Instructor
Alison Loerke, B.S., Museum Instructor
Andrea M. Thaler, B.S., Museum Instructor
Farida A. Wiley, Honorary Associate in
Natural Science Education
Elizabeth A. Guthrie, B.A., Associate in
Nature Education
Robin Lehman, Associate in Photography

EXHIBITION AND GRAPHICS

George S. Gardner, B.I.D., B.F.A.,
Chairman

Exhibition

Ralph J.T. Bauer, B.F.A., Manager
Eugene B. Bergmann, B.I.D., Senior
Exhibit Designer
Victor M. Matos, B.F.A., Assistant Designer

Graphics

Joseph M. Sedacca, B.A., Manager

Audio-Visual

Larry Van Praag, Chief Projectionist

LIBRARY SERVICES

Nina J. Root, M.S.L.S., Chairwoman
Linda L. Reichert, M.S.L.S., Assistant
Librarian for Reference Services
Miriam Tam, M.S.L.S., Assistant
Librarian for Technical Services
Diana Shih, M.S.L.S., Senior Cataloging
Librarian
Nanette LoDolce, M.L.S., Cataloging
Librarian
Carol W. Tucher, M.L.S., Senior
Reference Librarian
Russel Rak, M.A., Administrative
Assistant
Mary Genett, M.L.S., Library Associate

PUBLICATIONS

Curator

Thomas D. Nicholson, Ph.D., Editor-in-Chief

Scientific Publications

Jerome G. Rozen, Jr., Ph.D., Managing
Editor
Joseph M. Sedacca, B.A., Manager
Brenda E. Jones, B.A., Editor

DEVELOPMENT AND PUBLIC AFFAIRS

Ann Breen Metcalfe, B.A., Chairwoman
Marilyn Badaracco, Manager for Guest
Services
Marjorie Bhavnani, B.A., Manager for
Volunteers and Information Desk
Services
Herbert Kurz, B.A., Manager for Public
Affairs
Thomas A. Lesser, M.A., Manager for
Development
Marcia Schaeffer, B.A., Manager for Benefit
Events
Sheila Greenberg, M.S., Assistant Volunteer
Manager
Christine Spencer, Assistant Volunteer
Manager
Joseph Antonacci, B.A., Public Affairs
Associate
Melvin Elberger, M.A., Public Affairs
Associate
Gary R. Forman, B.S., Development
Associate
Renee Perry, B.A., Development
Associate
Susan Pollak, M.P.A., Development
Associate
Amy Rudnick, B.A., Guest Services
Associate
Lorraine Airall, Contributors' Assistant
Daryl L. Cox, B.A., Guest Services
Assistant
Connie Puswald, B.A., Public Affairs
Assistant

NATURAL HISTORY MAGAZINE

L. Thomas Kelly, M.B.A., Publisher
Alan Ternes, M.Ph., Editor
Ruth D. McCrea, Jr., M.B.A., General
Manager
Cary Castle, B.B.A., Circulation
Manager
Ellen M. Goldensohn, M.A., Managing
Editor
Mark Abraham, B.A., Production
Manager
Thomas Page, Designer
Florence Edelstein, Copy Chief
Rebecca Finnell, B.A., Senior Editor
Sally Lindsay, M.F.A., Senior Editor
Bruce D. Stutz, B.A., Senior Editor
Vittorio Maestro, B.A., Associate Editor
Ernestine Weindorf, Assistant to the
Publisher
Ramon Alvarez, B.A., Promotion
Manager
Colleen Mehegan, B.A., Manager of
Special Publications
Terrence Frimmet, B.B.A., Assistant
Circulation Manager
Lawrence E. Hoffer, B.S., Assistant
Fulfillment Manager
Lisa Polk, M.P.A., Assistant Business
Manager

DISCOVERY TOURS

R. Todd Nielsen, B.A., Manager for
Discovery Tours
Richard Houghton, M.S., Discovery Tours
Associate

MEMBERSHIP

Henry Schulson, B.A., Manager of
Membership Services
Susan W. Pelzer, B.A. Membership
Associate

MUSEUM SHOP

Martin Tekulsky, A.B., Marketing Manager
Maren Ryan, Senior Assistant Manager
Charles L. Hopkins, B.S., Assistant
Manager
Charles Kanarick, B.A., Assistant Manager
Barbara J. Voss, B.F.A., Assistant Manager

ADMINISTRATIVE AND SCIENTIFIC RESEARCH SERVICES

Pearlie Tillman, B.P.S., Assistant to the
President
Robert M. Acker, B.S., Assistant to
Deputy Director for Administration
Janet L. Shipley, Administrative
Secretary and Assistant Executive
Secretary
Barbara M. Conklin, B.A., Collections
Registrar
Paul F. Beelitz, M.A., Associate Collections
Registrar
Valerie Hrebicek, Assistant to the Director
Diane M. Menditto, B.A., Assistant
Administrator for Grants and Fellowships
Joan Whelan, M.A., Interdepartmental
Facilities Coordinator
Lauren Duffy, B.A., Scientific Assistant
Belinda Kaye, B.A., Assistant Registrar
for Loans
William B. Weinstein, B.A., Assistant
Registrar for Data Management

GENERAL SERVICES

Richard P. Sheridan, B.A., Manager
Olivia Bauer, B.A., Assistant Manager

OFFICE OF THE ASSISTANT DIRECTOR FOR FINANCIAL OPERATIONS AND CONTROLLER

Pauline G. Meisler, M.B.A., Assistant
Director for Financial Operations
Frances M. Dunleavy, B.S., Controller
Jason S. Lau, M.B.A., Assistant Controller
Donald R. Kossar, B.S., Chief Budget
Accountant and Senior Grants
Accountant
Fred R. Quijano, B.S., Computer Auditor
and Accountant
Ellen L. Enke, B.S., Assistant to the
Controller
Rose B. Hopkins, B.S., Assistant to the
Controller
Charles Urban, Manager, General
Accounting
Ugo E. Marini, Assistant Manager,
General Accounting
Maria A. Luna, B.S., Accounts Payable
Supervisor
Audrey Yuille, Computer Coordinator
Robert Applebaum, Payroll Manager
Jeffrey Maer, B.A., Purchasing Manager
David E. Csuray, Purchasing Associate
Jerome Williams, M.A., Admissions
Control Manager
Paula Buncom, B.A., Senior Assistant
Manager, Admissions Control
Barbara Armond, Assistant Manager,
Admissions Control
Richard D. Ross, B.A., Assistant Manager,
Admissions Control
Bernice Salik, B.A., Assistant Manager,
Admissions Control

PERSONNEL

Geraldine M. Smith, B.A., Personnel
Manager
Lewis Vilensky, M.Ed., Senior Personnel
Assistant
Susan L. Kroll, Personnel Assistant

PLANT OPERATIONS

Norene L. Brooks, B.B.A., Plant Manager

Construction

Richard Slawski, B.S., Construction Manager

Julio A. Correa, B.A., Assistant Manager
Albert Grenzig, B.E.E., Assistant Manager
Carl Hilgers, Assistant Manager
Klaus A. Wolters, Assistant Manager
William A. Graham, Assistant to the Manager

Maintenance

Bal Raj Vohra, B.E.E., M.B.A., Maintenance Manager

Andrzej M. Witek, M.S., Assistant Manager
Mary Dillon, Cleaning Supervisor
Edwin Garcia, Cleaning Supervisor

Building Services

Charles L. Miles, Manager
Sankar Gokool, Associate Manager
Per E. Larsson, B.B.A., Senior Assistant Manager
Robert B. Hill, Assistant Manager
Frank P. Masavage, Assistant Manager
Martha A. Meegan, B.A., Assistant Manager
Juan DeJesus, Assistant Manager
Erin J. O'Reilly, B.A., Assistant Manager
Joyce Wallach, Assistant to the Manager
Trenton Chapman, Supervising Museum Attendant-Guard
Albert Pontecorvo, Supervising Museum Attendant-Guard

MEMBERS ELECTED BY THE BOARD OF TRUSTEES TO HIGHER CATEGORIES OF MEMBERSHIP

ENDOWMENT

Mrs. Gardner D. Stout

BENEFACTOR

Mr. and Mrs. James C. Greenway
Mrs. Clarence L. Hay
Karl F. Koopman
Malcolm C. McKenna
Lillian Schloss
Lawrence A. Wien

ASSOCIATE FOUNDER

Mr. and Mrs. Herbert L. Abrons
Herbert R. Axelrod
Mr. and Mrs. Rolland D. Nelson

ASSOCIATE BENEFACTOR

Peter L. Bastien
Mrs. Helen Watson Buckner

PATRON

Dr. and Mrs. Sydney Anderson
Mrs. John Baker
Alice Denison Barlow
Sylvain R. Jakabovics, Esq.
Mabel Lamb

ASSOCIATE PATRON

Brent R. Bowden
Mr. and Mrs. Wilbur H. Friedman
Maurice B. Hexter
Mr. and Mrs. Stephen King
Barbara Stoler Miller
Louis Slavitz
Kay C. Vaught

HONORARY LIFE MEMBERS

Sydney Anderson
Bea Brewster
Michael Cigliano
Florence Edelstein
Melvin Hinckley
Sidney Horenstein
Angelo Mangano
Donn E. Rosen
Jerome G. Rozen, Jr.
Gerald Thurmann
Ernestine Weindorf

CORRESPONDING MEMBERS

David Attenborough, 5 Park Road, Richmond, Surrey, England
Ronald M. Bernier, Professor of Art History, University of Colorado, Boulder, Colorado
William G. Conway, General Director, New York Zoological Society, New York, New York
G. A. Cooper, Department of Paleobiology, National Museum of Natural History, Smithsonian Institution, Washington, D.C.
Frank K. Edmondson, Astronomy Department, Indiana University, Bloomington, Indiana
Clifford Frondel, Department of Geological Sciences, Harvard University, Cambridge, Massachusetts
Caryl P. Haskins, former President, Carnegie Institute of Washington, 2100 M Street, N.W., Washington, D.C.
Claude Levi-Strauss, 2 Rue de Marronniers, Paris, France
Benjamin S.P. Shen, Professor of Astronomy, University of Pennsylvania, Philadelphia
Ethelwynn Trewavas, British Museum (Natural History), London, England

CONTRIBUTORS

July 1, 1985-June 30, 1986

UNRESTRICTED GIFTS

INDIVIDUALS, FOUNDATIONS, AND CORPORATIONS

\$50,000 and over

Chemical Bank
I.B.M. Corporation
The Ambrose Monell Foundation
Mr. and Mrs. Rolland D. Nelson
Lawrence A. Wien

\$25,000 and over

American Broadcasting Companies, Inc.
Bristol-Myers Company
The Chase Manhattan Bank, N.A.
Citicorp/Citibank
Exxon Corporation
Enid A. Haupt
Joseph Klingenstein Charitable Trust
The G. Unger Vetlesen Foundation
Thomas J. Watson, Jr.

\$10,000 and over

AT&T Foundation
Mr. and Mrs. Herbert L. Abrons
American Express Foundation
Amerada Hess Corporation
The Anschutz Foundation
BBDO International, Inc.
The Bank of New York
Bankers Trust Company
J.M.R. Barker Foundation
Helen W. Buckner
CBS Inc.
The James W. and Margaret W. Carter Fund
Carter-Wallace, Inc.
Celanese Corporation
CIBA-GEIGY Corporation
Consolidated Edison Company of New York, Inc.
Cravath, Swaine & Moore
Du Pont
Engelhard Hanovia, Inc.
General Foods Corporation
Sibyl and William T. Golden Foundation
Gladys and Roland Harriman Foundation
International Paper Company Foundation
Johnson & Higgins
F. M. Kirby Foundation, Inc.
L.B.S. Communications, Inc.
Mr. and Mrs. Frank G. Lyon
MacAndrews & Forbes Group Incorporated
McGraw-Hill Inc.
Merrill Lynch & Company, Inc.
Metropolitan Life Insurance Company
Morgan Guaranty Trust Company of New York
William T. Morris Foundation
New York Cotton Exchange
The New York Racing Association
New York Telephone Company
The New York Times Company Foundation, Inc.
Paul, Weiss, Rifkind, Wharton & Garrison
The Pfizer Foundation, Inc.
Philip Morris Incorporated
Sarah I. Schieffelin Residuary Trust
Skadden, Arps, Slate, Meagher & Flom
The Starr Foundation
Time Inc.
Willkie Farr & Gallagher
Young Presidents Organization

\$5,000 and over

Allied-Signal Inc.
 American Can Company Foundation
 American Institute of Aeronautics & Astronautics and The New York Society of Security Analysts, Inc.
 American-Standard Foundation
 Mr. and Mrs. William C. Bowden
 The Chubb Corporation Charitable Trust
 Colgate-Palmolive Company
 Coopers & Lybrand
 Joseph F. Cullman 3rd
 Mrs. Hart Fessenden
 GTE Corporation
 Daniel M. Galbreath
 Grace Foundation, Inc.
 Mary W. Harriman Foundation
 Dr. and Mrs. Caryl P. Haskins
 Dr. and Mrs. John E. Hutchinson, III
 Johnson and Johnson
 Lansing Lamont
 Manufacturers Hanover Trust Company
 Marsh & McLennan Companies, Inc.
 Mercedes-Benz of North America, Inc.
 Edward S. Moore Foundation, Inc.
 Morgan Stanley Foundation
 The N.C.R. Foundation
 New York Fashion Council, Inc.
 New York Life Foundation
 Newsweek
 Ogden American Corporation
 The Ogilvy Group
 The Procter and Gamble Fund
 RCA Corporation
 Rockefeller Group Inc.
 Salomon Inc.
 The Seth Sprague Educational and Charitable Foundation
 Sterling Drug Inc.
 Mrs. Gardner D. Stout
 Dr. Judith P. Sulzberger
 Swiss Bank Corporation
 Texaco Philanthropic Foundation Inc.
 TIGER
 Union Carbide Corporation
 Union Pacific Foundation
 Lawrence A. Wien Foundation, Inc.
 John Wiley & Sons Inc.

\$2,500 and over

Associated Dry Goods Corporation
 BP North America, Inc.
 The Theodore H. Barth Foundation
 The Howard Bayne Fund
 Bunge Corporation
 Capital Cities Foundation, Inc.
 Mr. and Mrs. Hamilton M. Chase
 Chesebrough-Pond's Inc.
 The Coach Dairy Goat Farm
 The Coca-Cola Bottling Company of New York
 Dextra Baldwin McGonagle Foundation, Inc.
 Cleveland H. Dodge Foundation
 Doubleday & Company, Inc.
 Allan H. Fine
 Forbes Foundation
 Grand Canyon Trust
 Gulf + Western Foundation
 H. J. Heinz II Charitable and Family Trust
 Mr. and Mrs. Henry B. Guthrie
 Irving One Wall Street Foundation, Inc.
 Mrs. B. Brewster Jennings
 The Henry J. Kaiser Family Foundation
 Kimberly-Clark Foundation, Inc.
 Thomas J. Lipton Foundation, Inc.
 Leon Lowenstein Foundation
 R.H. Macy & Company, Inc.
 Mobil Foundation, Inc.
 Charles H. Mott

Nabisco Brands Inc.
 National Westminster Bank USA
 North American Philips Corporation
 Owens-Corning Fiberglas Corporation
 Price Waterhouse
 Restaurant Associates Industries
 James S. Rockefeller
 S. H. and Helen R. Scheuer Family Foundation, Inc.
 Melvin and Phyllis Schneider
 Squibb Corporation
 Thanksgiving Foundation
 Transway International Foundation
 Unilever United States, Inc.
 United States Trust Company of New York
 Westvaco Foundation
 The Widder Foundation, Inc.
 The H. W. Wilson Foundation
 The Xerox Foundation

\$1,000 and over

AMAX Foundation, Inc.
 AMF Foundation
 Allied Stores Foundation, Inc.
 Mr. and Mrs. Arthur G. Altschul
 American Diversified Enterprises Inc.
 American Re-Insurance Company
 Amstar Corporation
 Arthur Andersen & Co.
 Hon. Walter H. Annenberg
 Mr. and Mrs. Douglas Auchincloss
 Mabel Bess Austin
 Automatic Data Processing
 Avnet, Inc.
 BASF Corporation
 Mr. and Mrs. Robert Bach
 Emma Elizabeth Barnsley
 Mr. and Mrs. Thomas D. Barrow
 Basix Corporation
 The Morris S. and Florence H. Bender Foundation, Inc.
 Ruth Melville Berlin
 Mr. and Mrs. John C. Bierwirth
 Mrs. Harry Payne Bingham
 Elmer Bloch
 Block Drug Company Inc.
 Robert E. Blum
 Boston Properties
 Bowne and Co. Inc.
 Joseph G. Bradley
 Mr. and Mrs. Alfred Brittain, III
 Alfred P. Brooks
 Joan Bull
 Mr. and Mrs. Shirley C. Burden
 Burlington Industries Foundation
 Mr. and Mrs. Thomas P. Caine
 Chicago Pneumatic Tool Company
 Chiquita Brands, Inc.
 Clabir Corporation Foundation
 Mr. and Mrs. Howard L. Clark
 Collins & Aikman Corporation
 Colt Industries, Inc.
 Constans Culver Foundation
 The Cowles Charitable Trust
 Crum & Forster Corporation
 DFS Dorland Worldwide
 Daily News Foundation
 Dan River Foundation
 Deloitte Haskins & Sells
 Irene Diamond
 Hon. and Mrs. C. Douglas Dillon
 Dr. and Mrs. Strachan Donnelley
 R. R. Donnelley & Sons Company
 Mr. and Mrs. L.F. Boker Doyle
 Drexel Burnham Lambert Inc.
 Dun & Bradstreet Corporation Foundation
 Mr. and Mrs. Royal H. Durst
 The Dyson-Kissner-Moran Corporation
 Emery Worldwide
 The Equitable

Ernst & Whinney
 Essex Chemical Corporation
 Ethan Allen Inc.
 Damaris D. W. Ethridge
 Marsha Feinhandler
 Laurence D. Fink
 The First Boston Corporation
 Ford Motor Company Fund
 Fribourg Foundation, Inc.
 Mr. and Mrs. Richard L. Gelb
 General Host Corporation
 Mr. and Mrs. Elbridge T. Gerry
 The Goldman Sachs Fund
 Grow Tunneling Corporation
 Elizabeth Gurmendi
 Mr. and Mrs. Ralph E. Hansmann
 Hanson Industries
 Harcourt Brace Jovanovich, Inc.
 Hartz Mountain Corporation
 Mr. and Mrs. John C. Head, III
 Mr. and Mrs. Laurin Hall Healy
 Mr. and Mrs. Charles J. Hedlund
 Mr. and Mrs. Robert H. Heilbrunn
 Mr. and Mrs. R. Allen Hermes
 Margaret Brodrick Hicklin
 George C. Hixon
 Hoffman-LaRoche, Inc.
 Home Life Insurance Company
 The IFF Foundation Inc.
 Helen Imperatore
 Mr. and Mrs. Peter Iselin
 J. P. Stevens & Co., Inc. Foundation
 William K. Jacobs, Jr.
 Jaros, Baum & Bolles
 The Johnson's Wax Fund Inc.
 Kane Lodge Foundation, Inc.
 Mr. and Mrs. Mark N. Kaplan
 The Knapp Foundation, Inc.
 Daniel C. Kaye
 Robert W. Kean, Jr.
 Mr. and Mrs. Stephen M. Kellen
 Helen L. Kimmelman
 Frank Y. Larkin
 Mr. and Mrs. Alexander M. Laughlin
 Lazard Frères & Co.
 Mrs. Thomas LeBoutillier
 Leberthal & Company, Inc.
 Mr. and Mrs. M. William Levy
 William and Deborah Lipner
 Scott Little
 Mr. and Mrs. John L. Loeb
 Loehmann's Inc.
 Laurence Dow Lovett
 Mr. and Mrs. Dan W. Lufkin
 Mr. and Mrs. John D. Macomber
 Mr. and Mrs. James I. Magid
 George W. Maker
 Mr. and Mrs. Plato Malozemoff
 Mrs. Adams Mandeville
 The Manhattan Life Insurance Co.
 Mr. and Mrs. William McChesney Martin, Jr.
 Michael T. Martin
 Mrs. Edward J. Mathews
 McCann-Erickson Worldwide
 Robert Earl McConnell Foundation
 Mark B. McCormick
 Melville Corporation
 Mr. and Mrs. Henry H. Meyer, Jr.
 Mitsubishi International Corporation
 The Leo Model Foundation
 Moët-Hennessy U.S. Corporation
 Benjamin Moore & Co.
 Mr. and Mrs. Thomas Bruce Morgan
 Mrs. Henry L. Moses
 The NL Industries Foundation Inc.
 Mr. and Mrs. John C. Nelson
 Neuberger & Berman
 Newsday Inc.
 North American Reinsurance Corporation
 Mrs. Donald M. Oenslager

The Palisades Educational Foundation, Inc.
 Mr. and Mrs. Edward S. Pantzer
 I. M. Pei & Partners
 Mr. and Mrs. Alexander M. Power
 Mr. and Mrs. Robert W. Purcell
 Judith S. Randal
 Maurice A. Reichman
 Revlon
 R. J. Reynolds Industries, Inc.
 Richardson-Vicks Inc.
 Mrs. William C. Ridgway, Jr.
 Avery Rockefeller
 Mr. and Mrs. David Rockefeller
 Mrs. John D. Rockefeller 3rd
 Mrs. Laurance S. Rockefeller
 Mrs. Richard Rodgers
 Peter B. Roll
 Mr. and Mrs. Frederick P. Rose
 Mrs. Axel G. Rosin
 John Richard Royall
 Mr. and Mrs. Peter A. Salm
 Sasco Foundation
 Dorothy Schiff
 The William P. & Gertrude Schweitzer Foundation, Inc.
 Scudder, Stevens & Clark
 Sears, Roebuck and Co.
 Mr. and Mrs. Norman M. Segal
 Kira Sergievsky and Joseph Mische
 Mr. and Mrs. Alexander B. Slater
 Mr. and Mrs. Richard A. Sloss
 The Smith, Barney Foundation
 Sony Corporation of America Foundation, Inc.
 Dr. and Mrs. Walter F. Stafford, Jr.
 Mrs. Foye E. Staniford, Jr.
 Mr. and Mrs. Alfred R. Stern
 Oscar S. Straus, II
 Mrs. Arthur Hays Sulzberger
 Mr. and Mrs. Arthur Ochs Sulzberger
 Syms
 Tambrands Inc.
 Teachers Insurance and Annuity Association
 Thomas & Betts Charitable Trust
 The Oakleigh L. Thorne Foundation
 Joseph G. Tompkins
 Mr. and Mrs. Eugene Tuck
 USLIFE Corporation
 United Airlines Foundation
 United Industrial Corporation
 United Way of New York City
 Universal Leaf Tobacco Co.
 Uris Brothers Foundation, Inc.
 Mr. and Mrs. Carroll L. Wainwright, Jr.
 The Weiler-Arnoff Family
 J. Fred Weintz, Jr.
 Mr. and Mrs. Stephen K. West
 Mrs. John Campbell White
 James H. and Ann R. Wiborg
 Mr. and Mrs. Ramsay Wilson
 The Witco Foundation
 Ann Eden Woodward Foundation

\$500 and over

Mr. and Mrs. Walter R. Abbott, Jr.
 Mrs. Lester S. Abelson
 Mr.* and Mrs. Malcolm P. Aldrich
 Alexander's
 Ethan Allen
 Mr. and Mrs. Howard Alper
 American Home Products Corporation
 Ametek Foundation, Inc.
 William H. Anderson Foundation, Inc.
 Apple Bank for Savings
 Dr. and Mrs. Isaac Asimov
 Isabel H. Ault
 Ned W. Bandler, Jr.
 J. Paul Barringer
 William R. Berkley

Mrs. William R. Biggs
 Mr. and Mrs. H. P. Bingham, Jr.
 The Albert C. Bostwick Foundation
 Mr. and Mrs. Robert L. Bridges
 Hazel W. Bunce
 Donald K. Clifford, Jr.
 Russell S. Codman, Jr.
 Columbia Foundation
 Mr. and Mrs. Henry G. Corey
 Corning Glass Works Foundation
 Mrs. Cornelius Crane
 Catherine G. Curran
 Mr. and Mrs. Jean Paul Delmas
 A. Whitney Ellsworth
 Epstein Philanthropies
 The Eugene and Estelle Ferkauf Foundation
 Elias and Bertha Fife Foundation, Inc.
 Andrea Finkelstein
 Alan Freedman Family Fund
 Edward H. Gerry
 Benjamin D. Gilbert
 Goldfarb & Fleece
 James Graham & Sons, Inc.
 William C. Graustein
 Grolier Incorporated
 The Guardian Life Trust
 Mr. and Mrs. John Hudson Hall, Jr.
 Handy & Harman Foundation
 Hans P. Huber
 Mabel S. Ingalls
 Israel Discount Bank of New York
 Henry J. Jacoby
 Mr. and Mrs. Edward H. Judson
 Max Kade Foundation, Inc.
 Dr. and Mrs. Walter J. Kenworthy
 Jane P. and Charles D. Klein Foundation
 Mr. and Mrs. Edwin L. Knetzger, Jr.
 M. H. Lamston Inc.
 Ruddick C. Lawrence
 Lenox Incorporated
 Mr. and Mrs. William M. Lese
 Susan E. Linder
 Mr. and Mrs. Troland S. Link
 Lord & Taylor
 Mr. and Mrs. William F. May
 Mitsui & Co. (U.S.A.), Inc.
 William Morrow & Co., Inc.
 Nestlé Foods Corporation
 Norman Foundation, Inc.
 Overseas Shipholding Group, Inc.
 Mr. and Mrs. Walter H. Page
 Mr. and Mrs. Gordon B. Pattee
 Mrs. George W. Perkins
 Harold K. Raisler Foundation
 Robert K. Raisler Foundation
 Mr. and Mrs. Willis L. M. Reese
 William W. Reese
 Mr. and Mrs. Dudley Roberts
 Rollins Burdick Hunter of New York, Inc.
 Mr. and Mrs. Milton F. Rosenthal
 Mr. and Mrs. Jack A. Russell
 Mr. and Mrs. Walter J. Schloss
 Scholastic Inc. (A.K. Oliver—Scholastic Charitable Trust)
 Mrs. Charles M. Scott
 Scovill Foundation, Inc.
 Mr. and Mrs. George J. Shapiro
 Frank C. Shattuck
 The Signal Companies, Inc.
 Marilyn and James Simons
 Mrs. Sydney Snyder
 Mr. and Mrs. Dixon Stanton
 Mr. and Mrs. Ernest Stein
 Alice E. Stein
 Sidney Stern Memorial Trust
 John W. Straus
 Sugar Foods Corporation
 Mr. and Mrs. C. Harold Taylor
 Thyssen Bornemisza Foundation

Roy V. Titus
 Travel Interests, Inc.
 The Travelers Companies Foundation, Inc.
 Union Bank of Switzerland
 Clarence E. Unterberg
 Mr. and Mrs. Jephtha H. Wade
 Mr. and Mrs. Edward R. Wardwell
 Waring & LaRosa, Inc.
 Mrs. Harry Weinstock
 Mr. and Mrs. Halsted W. Wheeler
 Mrs. Taggart Whipple
 Mr. and Mrs. Joe W. Williams
 Young & Rubicam Inc.
 Carl Zeiss, Inc.
 William Zinsser & Co. Inc.

*(Mr. Aldrich deceased)

RESTRICTED GIFTS
Donor

Project

\$250,000 and over

Annie Laurie Aitken Charitable Trust
Endowment Fund for Akeley Hall
Mr. and Mrs. Robert G. Goelet
Building Development Fund
Great Gull Island Fund
Howard Phipps Foundation
Roosevelt Memorial Restoration Fund

\$100,000 and over

L.A.W. Fund, Inc.
Roosevelt Memorial Restoration Fund
Edward John Noble Foundation, Inc.
St. Catherines Island Archeology
Research

\$50,000 and over

The Bodman Foundation
Handicapped Improvement Fund
Collection Management
Exxon Education Foundation
Undergraduate and Graduate
Training Program
High Winds Fund, Inc.
Roosevelt Memorial Restoration Fund
Mobil Corporation
Free Evening Admission Program
Arthur Ross
Exhibit of the Month Program
Roosevelt Memorial Restoration Fund

\$25,000 and over

The Clark Foundation
Automatic Data Processing Program
The Tinker Foundation, Inc.
Research in the Chincha Area
of Peru

\$10,000 and over

The Achelis Foundation
Handicapped Improvement Fund
Amoco Production Company
Micropaleontology Press Modernization
Exxon Corporation
Exxon Executive Fund
Vertebrate Paleontology Research
Mr. and Mrs. Gordon P. Getty
"Dark Caves, Bright Visions"
Catalog
The Greenwall Foundation
Undergraduate-Graduate Research
Program
Karl F. Koopman
Taxonomic Mammalogy Research
Richard Lounsbery Foundation, Inc.
"Dark Caves, Bright Visions"
Catalog
Samuel Rubin Foundation, Inc.
American Museum-Hayden
Planetarium "Celestial Objects"
Installation
Samuel and May Rudin Foundation, Inc.
Education Community Outreach
Programs and Internship Program
The Sidney, Milton and Leoma Simon
Foundation
American Museum-Hayden Planetarium
Satellite Transmission Fund
Education Community Outreach
Programs
American Museum-Hayden Planetarium
The Ruth and Vernon Taylor Foundation
Monitor Valley Archeological Project

U.S. Appliances Corporation
American Museum-Hayden Planetarium

\$5,000 and over

American Institute of Aeronautics
and Astronautics and the
New York Society of Security Analysts, Inc.
American Museum-Hayden Planetarium
Art Deco Society of New York
American Museum-Hayden Planetarium
Art Deco Fund
The Vincent Astor Foundation
Education Community Outreach
Programs
Dr. and Mrs. Henry Clay Frick, II
Osborn Research
Mrs. Clarence L. Hay
Pre-Columbian Purchase Fund
The Henry Nias Foundation, Inc.
Education Community Outreach
Programs
The Ogilvy Group
American Museum-Hayden Planetarium
Phelps Dodge Foundation
Economic Mineralogy Research
Helena Rubinstein Foundation, Inc.
Education Community Outreach
Program
Salomon Inc.
American Museum-Hayden Planetarium
William F. Sanford
Ornithology Research Projects
Shell Companies Foundation, Inc.
Micropaleontology Press Modernization
Sergei S. Zlinkoff Fund
for Medical Research and Education, Inc.
Hearing-Impaired Enhancement
System

\$1,000 and over

AMAX Foundation, Inc.
Economic Mineralogy Research
George and Frances Armour Foundation
Materials for Department of Education
Teaching Collection
Astra Läkemedel AB
Poison-Dart Frog Research
Avon Products Foundation, Inc.
Education Community Outreach
Programs
Winfield Baird Foundation
Arthur Ross Hall of Meteorites
Margaret Bird
Junius B. Bird Expedition
Mrs. William B. Chappel, Jr.
Nature Room
Lillian Butler Davey
Margaret Mead Fund for the
Advancement of Anthropology
Margarita Victoria Delacorte Foundation
Textile Conservation
George T. Delacorte
Textile Conservation
Exxon Company, U.S.A.
Exxon Special Fund
The Griffis Foundation, Inc.
Research of Dr. C. Lavett Smith
Mr. and Mrs. Jay V. Grimm
Great Gull Island
Grumman Corporation
Education Community Outreach
Programs
F. Walker Johnson
Endowment Fund for the Osborn
Library and Archives
David L. Klein, Jr., Memorial
Foundation, Inc.
Middle American Archeology Research

Mr. and Mrs. Frederick E. Landmann
Junius B. Bird Expedition Project
Mrs. Alfred Lee Loomis, Jr.
Library
Mr. and Mrs. Frank G. Lyon
Anonymous Bird Fund
James A. Macdonald Foundation
Mrs. Alexander M. White Memorial
Fund
Mrs. Hayward F. Manice
Great Gull Island
Margot W. Marsh
Mammalogy Research
Bryant Mather
Lepidoptera Research
National Geographic Society
Herpetology Research
Mr. and Mrs. Howard A. Newman
Sibyl Golden Fund
Isabel Ireland O'Brien
Great Gull Island
Pechiney Corporation
Economic Mineralogy Research
William H. Phelps, Jr.
Ornithology Research
Frederick H. Rindge
Entomology Research
Elizabeth E. Roosevelt
Theodore Roosevelt Memorial
Fund
The Evelyn Sharp Foundation
Education Community Outreach
Programs
Lester L. Short
Africa Ornithology Research
Frank B. Smithe
Anonymous Bird Fund
Tenneco Oil Company
Micropaleontology Press Modernization
Time-Life Books
Library Photographic Collection
Unilever United States, Inc.
American Museum-Hayden Planetarium

\$500 and over

Harold A. Dundee
Herpetology Research
The Ferdinand Eberstadt Foundation
Anonymous Bird Fund
William W. Goodman
St. Catherines Island Archeology
Research
Erna Hansen
Great Gull Island
Mrs. Eugene B. Hotchkiss
Ichthyology Research
Mary K. LeCroy
Great Gull Island
McGraw-Hill Foundation, Inc.
Volunteer Office Equipment
Beatrice B. Miller
Discovery Room
Moriches Bay Audubon Society
Great Gull Island
Ruth N. Oliver
Herpetology Research
Theodore Roosevelt Association
Theodore Roosevelt Memorial Fund
Joseph W. Taylor
Great Gull Island
Texaco USA
Micropaleontology Press Modernization
Carl Zeiss, Inc.
American Museum-Hayden Planetarium

DIAMONDS & SPURS BALL

Benefactors

Mr. and Mrs. Philip F. Anschutz
Joseph F. Cullman 3rd
Mr. and Mrs. Hart Fessenden

Dr. and Mrs. Henry Clay Frick II
Mr. and Mrs. Patrick Gerschel
Mr. and Mrs. Robert G. Goelet
William T. Golden
Mr. and Mrs. Arthur Gray, Jr.
Dr. and Mrs. John E. Hutchinson III
Mr. and Mrs. Plato Malozemoff
Mr. and Mrs. Milton Petrie
Mr. and Mrs. Lewis T. Preston
Mr. and Mrs. Arthur Ross
Mr. and Mrs. Constantine Sidamon-Eristoff
Mr. and Mrs. Henry G. Walter, Jr.
Mr. and Mrs. John Zuccotti
Mr. and Mrs. Donald Zucker

Sponsors

Mr. and Mrs. Rand V. Araskog
Guy Cary
Mr. and Mrs. Charles A. Dana, Jr.
Mr. and Mrs. Thomas M. Evans
Fiduciary Trust of New York
Waldo Hutchins, Jr.
Mr. and Mrs. John Macomber
Mr. and Mrs. Plato Malozemoff
Mr. and Mrs. Hayward F. Manice
Mr. and Mrs. Richard L. Parish, Jr.

Patrons

William N. Banks
H.J. Behrman and Co.
Mr. and Mrs. William S. Beinecke
Mrs. John C. Bierwirth
Elizabeth de Cuevas
Dreyer and Traub
Mr. and Mrs. William T. Ethridge
Lazard Freres and Company
Mr. and Mrs. George J. Gillespie III
Mr. and Mrs. James W. Glanville
Arthur H. Goodman
Mr. and Mrs. Edwin Jay Gould
Congressman & Mrs. Bill Green
Mr. and Mrs. John H. Gutfreund
Mr. and Mrs. Melville Hall
Enid A. Haupt
Mr. and Mrs. Henry J. Heinz III
Helen Imperatore
Mr. and Mrs. John N. Irwin III
Mr. and Mrs. Gilbert Kaplan
Mr. and Mrs. Henry Kaufman
Mr. and Mrs. Frederick A. Klingenstein
Mr. and Mrs. Peter Lawson-Johnston
Leonard Litwin
Mr. and Mrs. Alfred L. Loomis
Mr. and Mrs. Henry Luce III
Mr. and Mrs. Paul E. Manheim
Mr. and Mrs. Donald B. Marron
Mr. and Mrs. Douglas Mercer
Mr. and Mrs. John Merow
Mr. and Mrs. Richard Metz
Mr. and Mrs. Anthony K. Moulton
Francis X. Morrissey, Jr.
Mrs. John Olin
Mr. and Mrs. Victor Palmieri
Lionel I. Pincus
Mr. and Mrs. Donald C. Platten
Mr. and Mrs. Howard Ross
Mr. and Mrs. Daniel Rose
Mr. and Mrs. Joseph Slifka
Mr. and Mrs. John Scrymgeour
Mr. and Mrs. Paul E. Taylor, Jr.
Hon. and Mrs. Robert F. Wagner
Mr. and Mrs. Gerrit P. Van de Bovenkamp

Contributors

Raymond A. Braga
Mr. and Mrs. John L. Carroll
Anne Cox Chambers
Joan Ganz Cooney
Catherine S. Curran
Mr. and Mrs. Thomas L. Higginson
John S. Hilson

Mr. and Mrs. Donald Lamont
Mr. and Mrs. W. Loeber Landau
Mr. and Mrs. Leonard A. Lauder
Mr. and Mrs. Mortimer Levitt
Paul A. Nussbaum
Mrs. James Rorimer
Mr. and Mrs. Winthrop Rutherford
Alvin Schwartz
Mrs. John C. Schwartz
Mr. and Mrs. Marvin Schwartz
Mr. and Mrs. Arthur Ochs Sulzberger
Mr. and Mrs. Carl H. Tiedman
George H. Waterman
Harold M. Wit
Mr. and Mrs. Dukes Wooters

Special Gifts

Pandick, Inc.
Parfums Yves Saint Laurent

GOVERNMENT GRANTS AND SUPPORT

Source

Amount/Purpose

City of New York
\$8,318,813/General Operating Support
plus payments for energy and
pension costs.
Institute of Museum Services
\$75,000/General Operating Support
\$22,400/Conservation of Andean Textiles
National Aeronautics and Space
Administration
\$87,000/Petrologic Studies of
Meteorites
National Endowment for the Arts
\$20,000/Conservation Laboratory
Microscope Equipment
National Endowment for the Humanities
\$34,458/Planning Grant for Mangbetu
Exhibition
National Science Foundation
\$29,470/Unisexual Species of Reptiles
\$74,000/Phylogeny and Ontogeny of the
Goodeid Fishes
\$33,000/Automation Upgrading of X-ray
Diffraction Systems
\$80,000/Percomorph Interrelationships
and Teleost Classification
\$40,564/Ecology of Caribbean Cryptic
Coral Reef Communities
\$30,000/Systematics and Biogeography
of Chilean Spiders
Natural Heritage Trust
\$25,000/Anthropology Collection
Storage Program
New York State Council on the Arts
\$585,000/General Operating Support
\$6,000/Margaret Mead Film Festival
United States Department of Education
\$161,160/Resources II—Library

BEQUESTS

Estate of Clara S. Peck
Estate of Richard T. Shields
Estate of Acosta Nichols
Estate of Abraham Deutsch
Estate of Emanuel M. Weil
Estate of William Sheffield Cowles
Estate of Fred Faulstich
Estate of Hertha Furth
Estate of Evelyn Combes
Estate of Anna L. Ellsworth
Estate of Manuel Fernandez

GIFTS-IN-KIND

Department of Anthropology

Twelve Ethnographic Artifacts; including seven baskets, two stools, manioc squeezer, hammock, and carved wood armadillo; Yekuana (Makiritare), Warao, and Yanomamo Peoples; Venezuela; 20th Century; 59589
Charles Richter and Helen F. Richter in memory of Rivolio Apotheker Richter

Frog Figure, gold; Pendant depicting a frog holding a double-headed serpent in its mouth; Panama; A.D. 850-1100; 59620
Lillian Schloss

Funerary Miniature Grain Mill, terra-cotta; in two components: bedstone and receiving bowl; China; Han Dynasty; c. 206 B.C.-A.D. 220; 59621
Mr. and Mrs. Ezekiel Schloss

Ceramic Vessel and a Rim Fragment; Namibia, Africa; 17th Century; 59588
Mark Gordon

Polychrome Cylinder Vase, ceramic; figure seated in a water-lily blossom; Late Classic Maya; Guatemala; A.D. 600-900; 59705
Sylvain R. Jakabovics

Ballcourt Ring, stone; Aztec; Mexico; A.D. 1200 to 1520; 59715
Estate of Lila Acheson Wallace

Twenty-two Yangju P'yo! Sandae Nori Masks and the materials used in their manufacture, gourd, hair, cloth, paper; Korea; 20th Century; 59716
Cynthia Wilder

Sixty-nine Pre-Columbian Artifacts; including five ceramic vessels, seven tri-cornered stones, two metates, three ceramic stamps, three ceramic earplugs, 16 shell beads, 33 stone tools; Taino Culture; Dominican Republic; A.D. 1000-1500; 59753
Mr. and Mrs. Vincent Fay

Twenty-four Ethnographic Artifacts; including five figures in brass or bronze, seven paintings, one figure in rosewood, one papier mache mask, two textiles, three shadow puppets, one pair wood sandals, one rosary (India); one polychrome wood mask (Bhutan); one lute, one polychrome wood mask (Indonesia); 59763
Barbara Stoler Miller

Nose Ornament, silver; Moche Culture; Peru; 500 B.C. to A.D. 700; 59840
Louis Slavitz

Department of Entomology

Collection of 128 fly specimens (Apiceratidae); 59626
Frank F. Hasbrouck and Mont A. Cazier

Collection of 3543 spider and related arthropods; 59688
Norman I. Platnick

Collection of 351 miscellaneous water beetles; 59701
Frank N. Young

Collection of 11,030 insects, primarily beetles; 59710
Lee H. Herman

Collection of 13,557 Staphylinidae
(Coleoptera), Rove beetles; 59809
Alfred F. Newton, Jr. and Margaret Thayer

Collection of 11,724 plant bug specimens;
59852
Randall T. Schuh, Michael D. Schwartz and
Gary Stonedahl

Collection of 12,523 brush-footed butterfly
specimens and slides; 59861
Paul Grey

Collection of 8433 terrestrial arthropods
especially Hymenoptera and Lepidoptera
and spiders; from Chile; 59862
Luis E. Peña

Department of Exhibition and Graphics
Two JVC VCR machines and three electric
typewriters
Roberto Tamayo

Department of Herpetology
Collection of 1200 amphibian and reptile
specimens; 59813
Michael W. Klemens

Collection of 716 herpetological reprints;
59511
Kenneth Gosner

Collection of 3913 assorted amphibian and
reptile specimens; 59546
Virginia Polytechnic Institute

Department of Invertebrates
Collection of marine gastropods; 164 lots
Cymatiacae; 10 lots Columbariinae; 59575
Collection of 1109 marine mollusk specimens
in 527 lots, (Cypraeidae); 59694
Kay C. Vaught

One specimen Teramachia; Western
Australia; 59562
Constance K. Duprey

Collection of 535 mollusk specimens;
Panama Bay; 59720
Helen Du Shane

Collection of 9251 marine mollusk specimens
in 3891 lots; 59782
Alice Denison Barlow

Collection of 1297 marine mollusk specimens
in 290 lots (worldwide); 59821
Leon Juster and Mrs. Ruth L. Juster.

Department of Mineral Sciences
Lazurite (Lapis lazuli) Cross; Siberia,
U.S.S.R.; 59556
Florence E. Wall

Candle Snuffer found in Martinique after the
eruption of Mt. Pelee in 1902; 59623
James C. Gruener

Four faceted Elbaïtes; Mozambique; 59581
Mr. and Mrs. Harold Savinar

Four faceted Elbaïtes (tourmalines); Mozam-
bique; 59579
Mr. and Mrs. Hyman Savinar

Four faceted Elbaïtes; Mozambique; 59580
Mr. and Mrs. Lewis Savinar

Various minerals and gems including tour-
maline, azurite rose and topaz; California,
Brazil and China; 59773
Mabel Lamb

One topaz; 21,005 carats; (pale-blue) known
as the "Brazilian Princess" from the region near
Teofilo Otoni, Minas Gerais, Brazil; 59775
Anonymous Donor

One opal; 644 carats; partially polished;
South America; 59774
Mr. and Mrs. Stephen King

Seventeen mineral specimens including
copper-silver, gold on/with quartz, various
amethyst crystals, an azurite rose, etc.;
(worldwide); 59776
Pierre L. Bastien

Jadeite boulder; 45.5 pounds; (notched);
Jade Mines area (Moguang), Burma; 59856
Maurice B. Hexter

Department of Vertebrate Paleontology
Collection of 20,600 fossil nodule specimens;
mostly fish from Brazil; 59464, 59505,
59611, 59612
Herbert R. Axelrod

Hayden Planetarium
"QUASAR," work of art by Aldo Sessa.
Aldo Sessa

BEQUESTS AND CHARITABLE TRUSTS

You may establish a gift that will perpetuate your memory and help assure that the fruits of the American Museum's research, education and exhibition programs are handed down to future generations.

If you wish to support the American Museum, you may make a grant through a charitable trust or through a bequest in your will.

To discuss opportunities for support of the Museum and its programs, contact Robert G. Goelet, President; or the Manager for Development, American Museum of Natural History, Central Park West at 79th Street, New York, New York 10024-5192. Telephone: (212) 769-5151.

COVER: Sealed in amber 26 million years ago during the Upper Oligocene-Lower Miocene, this fossil termite provided researchers in the American Museum's Department of Entomology with a perfectly preserved specimen of a previously unknown species, *Cryptotermes yamini* Krishna and Bacchus. Today, living species of this highly destructive genus are often inadvertently transported by man in wooden structures to new localities where the termites become notorious pests. This fossil of a winged reproductive, which is from the Dominican Republic, was discovered in a Manhattan jewelry store and bought by Michael Yamin, a research associate at Rockefeller University. He donated the specimen to the American Museum several years ago. The amber measures 28 millimeters (one inch) long, by 14 millimeters (one-half inch) wide. The termite is eight millimeters (five-sixteenths of an inch) long. Gifts of this type expand the Museum's collections. Notable gifts from the past year ranged from the world's largest cut gem, the "Brazilian Princess" topaz, which was donated anonymously, to a collection of 3913 assorted reptile and amphibian specimens donated by Virginia Polytechnic Institute.

