



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

The American Museum of Natural History was founded 116 years ago. Its purpose is to study and interpret the origin and development of the earth and the animals (including man) that inhabit it.

The basic materials of the Museum are its 35 million specimens and artifacts. These have been acquired over the years through collections in the field, exchange, donations from private individuals and scientists, and purchase. Today the Museum's collecting is highly specific and aimed at filling gaps in existing inventories. The collections are arranged in vast storage areas, the most modern of which provide controlled climates and reflect all technological developments in conservation and collection management.

The American Museum, the largest natural history museum in the world, is located on the upper west side of Manhattan on four square blocks opposite Central Park. There are 22 interconnected buildings with many specialized spaces including 39 exhibition halls, five theaters, classrooms, lecture facilities, laboratories, collection storage areas, service shops and food service facilities.

There are some 200 staff researchers — scientists and their assistants — conducting investigations in the natural sciences both at the Museum and in the field. Using the collections as their major source materials, these investigators address significant problems in the fields of evolutionary biology, anthropology and geology. The findings from these efforts are shared with colleagues at other institutions through symposia, published papers and books, and cooperative studies. These data are frequently incorporated into further applied research in such broad areas as agriculture, the health sciences and technology-related industries. But more than that, the research leads to new thinking about how the earth was formed and changes, and how its populations of animals develop and respond to their environment. Mankind's thoughts

about the evolution of life and the interrelationship of all living things stem from the work done at research centers like this Museum.

The American Museum's constituents are many: 2½ million visitors per year, 490,000 members around the United States, scientist colleagues in research centers throughout the world, adults and children alike taking courses and attending performances, and the millions of future visitors and students of science for whom the collections are held in trust.

The Museum receives support for its facilities and programs from several major sources including the City of New York, which provides budgetary funds and owns the 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. Visitor contributions and membership fees also are significant sources of revenue. These people and organizations assure the Museum's growth as a center of culture and study.

HIGHLIGHTS

1984/July

- East met West with performances of traditional Japanese music, dance and theater during "Japan Month" in the Leonhardt People Center of the Charles A. Dana Education Center.
- The Department of Education presented a sold-out program of cruises and seminars dealing with the history, ecology and geology of the Hudson River.

September

- The exhibition, "Ancestors: Four Million Years of Humanity," ended its historic appearance at the Museum. Scientists came from around the world to pack their precious fossils and bring them home.
- Twenty-four ethnographic films made their New York premieres at the Margaret Mead Film Festival, a series the *Village Voice* described as "the most important documentary event in New York."

October

- Otumfuo Opoku Ware II, King of the Asante people, arrived in New York to open the special exhibition, "Asante: Kingdom of Gold."
- Thousands of New Yorkers, including Mayor Edward I. Koch, greeted the Asantehene in a procession up Central Park West to the Museum. Talking drums announced the Asantehene's arrival.
- *Faces*, a monthly anthropology magazine for children 8 to 14, was launched as a joint venture of the American Museum and Cobblestone Publishing, Inc.

November

- The special exhibition, "Ban Chiang: Discovery of a Lost Bronze Age," brought to Gallery 1 the findings of an archeological dig in Thailand.
- The National Endowment for the Humanities awarded \$350,000 to support the Hall of South American Peoples.

December

- "Bach by Starlight," a live, sold-out electronic concert of works by Bach and Pachelbel synchronized with laser lights, the movement of constellations and the appearance of moonscapes, was performed for the first time in the American Museum-Hayden Planetarium.
- The Margaret Mead Hall of Pacific Peoples, based on the life work of the most widely known anthropologist of the 20th century, opened as a new permanent exhibition.

January

- Some 300 New York State and New York City legislators and their families were introduced to the Museum through an evening of special programs and events at the first annual Legislators Night.
- For the fourth year, a grant from Mobil enabled the Museum to remain open free of charge on Friday and Saturday evenings.

February

- "Mountain of the Mist," a photographic essay depicting the work of staff scientists on an international expedition to a remote region in southern Venezuela, opened as an Arthur Ross Exhibit of the Month.
- One hundred and ten Museum members and friends visited Borneo and the Spice Islands on the Museum's first Discovery Tour there.

March

- Donald C. Johanson lectured on human origins to a sold-out auditorium as part of the Department of Education's Spring Lecture Series.
- "Captured Motion: Skeletal Studies by S. Harmsted Chubb," a special exhibition of the work of the world renowned osteologist who was at the Museum during the first half of this century, opened in Gallery 1.
- The Gyuto Tantric Monks, a Tibetan Buddhist order, gave their North American premiere performances of sacred chants in a special Membership program in the Main Auditorium and the Hall of Ocean Life.

April

- "Maya: Treasures of an Ancient Civilization," a special exhibition tracing 3500 years of Maya civilization, premiered in Gallery 3.
- The annual benefit, a fiesta held in connection with the "Maya" exhibition, netted nearly \$200,000 in support of Museum programs and services.
- The Museum celebrated the 200th anniversary of the birth of John James Audubon with two events: the special exhibition, "John J. Audubon: Science into Art," sponsored by Johnson and Higgins; and publication of a limited, hand-colored edition of six "Birds of America" prints struck from the original plates.
- *Natural History* magazine marked its 85th anniversary with a special issue featuring the "State of the Earth."
- Restoration began on the plaza and steps of the Theodore Roosevelt Memorial, New York State's official monument to the 26th President of the United States. The project was funded by the New York City Department of Cultural Affairs.
- Nobel Laureate Gerald M. Edelman delivered the Mack H. Lipkin Man and Nature Lectures.

May

- Governor Mario Cuomo spoke at the Annual Awards Dinner of the New York Press Club. The event was held in the Hall of Ocean Life.

June

- "The Dream Is Alive," a large-format IMAX film shot in space by NASA's shuttle astronauts, opened in the Naturemax Theater.
- Museum scientists identified some 400 artifacts and specimens for the general public at "ID Day."

116th ANNUAL REPORT 1984/85 AMERICAN MUSEUM OF NATURAL HISTORY

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One hundred and sixteenth 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

One of the most significant actions taken by the Board of Trustees in recent years was its unanimous acceptance at the Nov. 13, 1984, special meeting of the Report of the Long-Range Planning Committee which I appointed in 1983, under the Chairmanship of Anne Sidamon-Eristoff.

The report urged that the Board embark on a major capital fund drive in order to meet present and future needs of the Museum. It made recommendations concerning the leadership of the Board of Trustees and the role of a salaried President. It remains to implement these recommendations, and this is the first priority of the year to come.

Disappointing however, was a marked lack of progress in bringing about the hoped for merger of our New World cultural materials with those of the Museum of the American Indian.

As of July, 1984, a proposal to combine the New World anthropology resources of the M.A.I. with those of our Museum was still, as far as we knew, under consideration by the Trustees of the M.A.I. The proposal, developed in March and April by a negotiating committee comprised of five trustees from each institution, was acceptable to our Board and needed only approval in principle from the Board of the M.A.I. to be activated. We were in the process of selecting members for a joint committee of trustees and staff that would face the task of deciding the many architectural and other details required by the joint venture, but unfortunately, things did not work out as we had hoped.

There was a change in the Presidency of the M.A.I. and subsequent meetings of the two Presidents and groups of their Trustees revealed dis-

agreements over details in the Memorandum of Understanding. It became known in February, 1985, that representatives of the M.A.I. had for several months been seriously discussing a proposal to move the museum and its collection to Dallas. The President of the M.A.I. Board gave formal notice in May, 1985, that our April, 1984, proposal had been rejected.

Mayor Edward I. Koch and Governor Mario Cuomo pledged their support in keeping the M.A.I. and its collection in New York through a commitment of \$13 million each from the City and the State. This Museum applauded the efforts of the Mayor and the Governor in a public statement, and confirmed the financial commitment our Trustees had already made toward the venture. The Department of Cultural Affairs of New York City and the State Board of Regents gave their support to efforts that would keep the M.A.I. in New York.

As the year came to a close, the M.A.I. President announced that negotiations to move the museum to Dallas had been broken off. At the same time, we were preparing a revision of our Memorandum of Understanding that would express more clearly and in much more detail the support we could offer. While there is still no assurance that the plan will be accepted, we retain our confidence in its merits and its value to both institutions and the public they serve.

The 1984/85 fiscal year was an excellent period for the Museum, one in which its vitality as a center of inquiry, a citadel of learning and an exhibition showplace was indeed demonstrated.

Two major exhibitions filled the Museum's largest special gallery with an abundance of royal regalia and ancient mystery. "Asante: Kingdom of Gold" was a collection of some 800 artifacts from the Asante people of Ghana; "Maya: Treasures of an Ancient Civilization" displayed 300 items from Mexico, Guatemala and Belize.

"Asante: Kingdom of Gold" came here from the ethnography department of the British Museum (Museum of Mankind) for an exclusive North American appearance. We were honored to have Otumfuo Opoku Ware II, the King of the Asante people, preside

at the opening ceremonies of the exhibition in October. Known in Ghana as the Asantehene, he accepted an invitation from the Museum and from Mayor Koch to visit New York City on his first official trip to the United States. The Asantehene and we exchanged gifts appropriate for the occasion. The Museum awarded him our Silver Medal in recognition of his efforts to bring greater understanding of Asante culture to the New World.

The Museum is particularly grateful to its new elected Trustee Mrs. John E. Hutchinson III, who turned over her house in Chappaqua to the Asantehene, his family and his entourage for the length of their stay. In doing so, she provided a special kind of personal hospitality which an institution could not match.

"Asante: Kingdom of Gold," and the symposium held in connection with it, were supported by the National Endowment for the Humanities, the Federal Council on the Arts and Humanities, and the Wenner-Gren Foundation. Some 350,000 persons visited the exhibition between Oct. 18 and March 17.

"Maya: Treasures of an Ancient Civilization" premiered at the American Museum in April. Organized by the Maxwell Museum, Albuquerque, its artifacts represent some 3500 years of Maya history. Many of the objects had never before been seen outside their countries of origin. In July, "Maya" left for a two-year tour throughout the United States.

The gala "Fiesta" benefit held in celebration of the Maya exhibit opening raised nearly \$200,000.

The Museum's extensive collection of John James Audubon material includes this portrait of two raccoons, one of some 150 paintings in Audubon's work, The Viviparous Quadrupeds of North America. The artist patterned these mammal drawings on his first successful project, The Birds of North America. Audubon was one of the first persons to paint animals, especially birds, life size, posed in their native habitats. To celebrate the 200th anniversary of his birth, the American Museum mounted the special exhibition, "John James Audubon: Science into Art," with paintings and memorabilia drawn exclusively from its collection. The exhibition is being circulated to other Museums around the country through 1986 by the Smithsonian Institution Traveling Exhibition Service.



We are grateful to the committee co-chaired by Mrs. Charles A. Dana, Mrs. Arthur Ross and Mrs. Goelet. Other benefits held during the year included the annual children's Halloween Party and the Junior Benefit, with the theme "Splash Down to the Bottom of the Sea." The time and energy that committee members devote to these events have a direct, positive effect on improving and expanding Museum educational programs, research activities and general services.

"John James Audubon: Science Into Art," was presented in the Naturemax Gallery to celebrate the 200th anniversary of Audubon's birth on April 25. The exhibition featured original paintings, prints, documents and memorabilia from the Museum's collections, and it included six prints being produced in a limited edition for the Museum from the original copper plates of Audubon's *Birds of America*. The exhibition, produced with the support of a generous grant from Johnson and Higgins, will be circulated to museums throughout North America over the next several years under the auspices of the Smithsonian Institution Traveling Exhibition Service.

The restoration of six original *Birds of America* copper plates owned by the Museum will make it possible to endow a curatorial chair named in honor of John James Audubon through the sale of the limited print edition. The new print edition includes the very popular "Wild Turkey, Male," "Wild Turkey Hen and Chicks," "Snowy Owl," "Canada Goose," "Mallard," and "Great White Heron." The production and sale of the prints are under the direction of Alecto Historical Editions of London.

Several other curatorial positions benefited from endowed funding during the year. The gifts made by Mrs. James Walter Carter were allocated by the Trustees to fund two curatorial positions, one in Vertebrate Paleontology and one in Mammalogy, known as James Walter Carter curatorships. Demetrius C. Pohl joined the Department of Mineral Sciences as a new curator specializing in economic geology, a position established through the vigorous efforts of Trustee Plato Malozemoff and with contribu-

tions from the non-ferrous mining industry.

"Mountain of the Mist," a photographic display in the Akeley Gallery, documented the research efforts of Museum scientists and collaborators from other institutions in the United States and Venezuela who participated in the international expedition to Cerro de la Neblina, a remote region in southern Venezuela. The Museum's expenses in the expedition were funded by the William H. Phelps Foundation and the National Science Foundation; the exhibition was an Arthur Ross Exhibit of the Month.

"Captured Motion: Skeletal Studies by S. Harmsted Chubb," displayed a number of scientifically illuminating and esthetically breathtaking large animal skeletons, part of a unique anatomical collection prepared by Chubb, an osteologist who worked here during the first half of this century. The exhibit will be shown at other museums nationally.

The Museum introduced a new, fuller and more shapely artificial tree to bear the 3000 paper models and mobiles of 150 different animals for our Origami Holiday Tree, an exhibit that is also supported by Arthur Ross.

Other Arthur Ross Exhibits of the Month were "Collector's Choice: Sea Shells of Nathan L. Halpern" and "Moving a Museum: The Rothschild Collection of Birds."

Several grants were received in support of the forthcoming new Hall of South American Peoples. A major one came from the National Endowment for the Humanities, which awarded \$350,000 to support conservation of collections and preparation of exhibits for the new hall. Funds from the Endowment included \$100,000 in outright support and the balance on a one-to-one ratio. Assurances for the required matching funds were virtually completed during the year.

Natural History magazine celebrated its 85th anniversary in April with an expanded edition that included a special section on the "State of the Earth," proving itself a consistent and vigorous performer in what are difficult times for magazines.

The U.S. Department of Education granted the Museum's Department of Library Services \$83,943 to catalog and preserve its film collection. The

U.S. Department of Education is to be commended for recognizing the importance of this resource.

Many contemporary scientists and writers contributed to the Museum's education programs in lectures and readings offered by the Education Department and the Membership office. They included the anthropologists Ashley Montague, Catherine Bateson and Donald Johanson, and Nobel Laureate Gerald M. Edelman, who delivered the 1985 Mack H. Lipkin Man and Nature Lecture Series.

Programs on Asian, African, Caribbean, South American and Middle Eastern dance, crafts, music and drama were presented in the Kaufmann and Linder Theaters and the Frederick H. Leonhardt People Center of the Charles A. Dana Education Center. These community events have been supported in part by the Astor Foundation, the Samuel and May Rudin Foundation and Evelyn Sharp. Their contributions make it possible for the Museum to create programs emphasizing the rich ethnic heritages in New York City.

The New York State Council on the Arts awarded a grant to the Museum's Department of Education for organization of the annual Margaret Mead Film Festival. More than 350 films, including some 100 New York City premieres, have been screened during the festival's eight-year history.

The support of local, state and federal administrators and legislators is important to the development and implementation of our facilities and resources. The Museum continually seeks to inform these officials about our services and needs, and to call upon them for assistance where relevant. More than 70 legislators and their families attended Legislators Night in January.

The Museum is grateful to the City of New York and its elected and appointed officials for their continuing and increased support. The restoration and reconstruction of the Theodore Roosevelt Memorial Plaza and steps, begun this year, are being made possible through the City's capital budget.

An architectural evaluation of the interior of Roosevelt Memorial Hall is also under way, as is a study of the

77th Street facade. Both areas are also scheduled for complete restoration in coming years. Further improvements are planned for the American Museum-Hayden Planetarium, which celebrates its 50th anniversary in the fall of 1985.

Gifts made to the Museum in memory of our late President Gardner D. Stout, for whom the Hall of Asian Peoples is named, were allocated toward the restoration and preservation of the Museum's collection of scientific art and illustration, most especially in the Department of Ornithology. The Gardner D. Stout Hall of Asian Peoples will benefit from a gift of 50 ethnographic artifacts from the Korean Cultural Service. The gift will be used in a case depicting a traditional Korean home.

The corporate community gave strong financial support to the Museum this year. One-third of the 269 contributing companies increased their gifts to the General Fund. Through the leadership of Trustee Donald C. Platten, who served as its chairman, our annual campaign reached a record level, exceeding \$1 million for the first time.

With the adoption of the Long-Range Plan, the Museum can look forward to a period of growth, challenge and considerable positive change during the years ahead.



Robert G. Goelet,
President

Director's Message

A splendid event occurred in London in February, 1981, in celebration of the Centenary of the British Museum (Natural History). The Museum of Mankind, a division of the British Museum, presented an outstanding exhibition of its celebrated material from the Asante Kingdom of West Africa. The exhibition opening featured a parade and a formal entry by the King of the Asante and an impressive court that drew a lively and loving crowd. Enid Schildkrout, curator of the African collections at our Museum, and I attended, and we were greatly impressed. The event led to a chain of circumstances that culminated with the presentation of "Asante: Kingdom of Gold" at the American Museum of Natural History this year.

Our good relationship with Malcolm McLeod, keeper of the African collections at the Museum of Mankind, encouraged us to plan for an event that had never previously occurred: a loan of the British Museum's Asante material to a foreign museum. The first step in this direction was an exhibition of incomparable African textiles from the Museum of Mankind. The Trustees of the British Museum are generally unwilling to have their collections travel abroad; they *never* lend to traveling exhibits, and their stipulations for handling objects and specimens are very strict. We felt that if we could pass the test with the African textiles, we would stand a good chance to receive the Asante material as well. After careful planning and close cooperation, a highly successful exhibition of African textiles was presented here in 1982.

Another critical element was the attitude of the Asante king and people. The collection, while in the possession of the Museum of Mankind, included many objects from the royal household of the past century, of great significance to the king and his Council of Chiefs. It would be unthinkable to borrow such a collection without the approval of the Asantehene, the King of the Asante. Malcolm McLeod introduced us to the Asantehene, who graciously expressed his personal, if unofficial, endorsement of

the idea. He indicated warmly that he might participate in the exhibition opening in New York. From what we had seen in London, we were delighted with such a prospect.

Negotiations for the loan of the Asante collections then began in earnest. It was clear from the beginning that the collection could be shown only at the American Museum of Natural History and could not travel anywhere else in the United States. Although this stipulation had an adverse affect on our ability to obtain funding from government and private agencies (both of which prefer exhibitions that will travel to several locations), we accepted these terms. Then began planning of the complex details that go with a large exhibition. These cover reconstruction of the gallery area, installation of special cases, design of the exhibition, security, advertising, press relations, social events, crowd control, educational activities, tours for the general public, dissemination of information to members and other special constituents, shipping and security in transit for the collection, transportation for the accompanying British Museum staff, and the countless details of the schedule and events associated with the opening. Our experiences with many other exhibitions and the skill and training of our employees prepared us for much of this. Nevertheless, such planning was essential to achieve the goals and quality of the exhibition and to ensure the maximum benefit and enjoyment to the large number of visitors we hoped to attract.

The possibility that the Asantehene, Otumfuo Opoku Ware II, might come to New York and officially open the exhibition was a tantalizing prospect. Having him attend in person would be the crowning touch for this royal exhibition.

Therefore, through correspondence and the personal intervention of Malcolm McLeod, and Robert Fritts, ambassador from the United States to Ghana, we began negotiations with representatives of the Asantehene to arrange his visit. These took place over a long period of time and were extremely complicated. The Asantehene travels with a large retinue, members of his family, his principal

chiefs and other official escorts required by the dignity of his office and role. Because we were asking him to be present in his official and royal capacity, the presence was required not only of his regular staff, but also of persons with specific ceremonial duties.

The questions that arose formed the basis for our planning. What kind of accommodations could we provide for the Asantehene? How would transportation be arranged? What about local transportation? What security should be provided? What diet and menus were necessary? What was to be the protocol for seating and ceremonial events? How were his regalia to be transported? Communications during this period were difficult because the Asantehene lives in Kumasi, the traditional Asante capital, which is somewhat remote from Accra, the capital of Ghana.

Early on, the very warm support of New York's Mayor Edward I. Koch was offered and became essential. The mayor readily extended an official invitation to the Asantehene to visit New York for the purpose of opening the exhibition and Mr. Koch agreed to attend the opening personally. That helped enormously in making the visit possible.

As the arrangements were made and the days began to go by more quickly, we prepared with mounting excitement for the exhibition and the arrival of the Asantehene. It was during this period that His Excellency James Victor Gbeho, ambassador from Ghana to the United Nations, played a crucial role. At the same time,

Robert G. Goellet, President of the American Museum, welcomes Otumfuo Opoku Ware II, King of the Asante people of Ghana, during the opening of the special exhibition "Asante: Kingdom of Gold." Approximately 5000 spectators lined Central Park West to catch a glimpse of the King as he led a procession of Asante chiefs, and African and African-American musicians and dancers to the Museum's Theodore Roosevelt Memorial for the opening ceremony. Some 350,000 persons visited the "Asante" exhibition during the five months it was on view.



representatives of the Asante community in the New York area stepped forward with offers of help, and—extremely important from our point of view—many African-Americans became involved in the planning. While the presence of so many different parties made planning more complicated, it most importantly assured us the commitment of people whose support was absolutely essential, and it brought us much sound advice. In particular, the involvement of African-American communities in New York ensured that the exhibition would do what it was intended to do, that is, call to the attention of all Americans the history, rich culture and great traditions of the important African kingdom of the Asante.

It was very gratifying to have a number of other New York organizations cooperate with us in organizing the Asantehene's visit and enriching his time in our city. At the Studio Museum of Harlem and the Schomburg Center for Research in Black Culture, the professional staff very generously produced programs to please and honor the Asantehene. In both cases, it was evident that the pleasure was mutual; the Asantehene and his entourage were gratified to visit these important cultural centers. At the City College of New York, officials and students of the Black Studies Program, with the cooperation of community groups, created a Durbar—a traditional community festival—on the campus as an expression of welcome to the Asantehene and the Asante and Ghanaian people.

It cannot be imagined with what enthusiasm and warmth the King was greeted everywhere he went. His personal safety was never in doubt, except from the press of people, young and old, African and American, Black and White, who wished to be near him, to touch him, to exchange a word with him.

Because of the times we live in, concern for security must be felt whenever a celebrated figure participates in crowded public ceremonies. In arranging for that security, we had invaluable and generous advice and help from the office of Mayor Koch.

Sensing this enthusiasm and the emotions it implied, the Asantehene's police escorts carried out their duties with exceptional sensitivity, always

protecting him from excessive crowding when required, guiding him gently, but never interfering with the pleasure and excitement of those around him. It was truly remarkable to observe the skill and effectiveness with which this responsibility was carried out by the Port Authority Police, the officers and police of our own nearby 20th Precinct, the Intelligence Division of the New York Police Department, the Guardians, a special group of Black police, and the Museum's own Building Services Department. From the moment the Asantehene stepped off the aircraft at Kennedy Airport and crowds of colorfully dressed Asantes rushed forward to greet him, we knew that this great man attracted attention by his strong personal presence, and we were glad we had arranged so carefully with police authorities to give him the help he needed.

Nothing, however, prepared us for October 14th, the Sunday when thousands of people surged onto Central Park West and became part of the procession that we planned so carefully. It was a joyous, exciting, and yes, an awesome experience to see the masses of people focus on the leader of the day, the King of the Asante. While some New Yorkers may have tried to stay on the sidewalks, most found themselves swept up in the excitement and color and, responding to the throbbing of the drums, danced their way up Central Park West along with the Asante entourage. In the midst of the excitement, Mayor Koch—who was to have greeted the Asantehene on the Museum steps—found his automobile completely immobilized by the press of the parade and stepped out, greeted the Asantehene warmly and walked with him up Central Park West along with everyone else.

A moving ceremony followed, and after that the Asantehene was feted at a reception for a large number of Asante who came from near and far to honor their King. We had sent several thousand invitations to the Asante and Ghanaian community to visit "Asante: Kingdom of Gold" with the Asantehene at a private preview and reception reserved for them. A public opening and a separate reception were reserved for another day, to

which distinguished members of the Asante and Ghanaian community were also invited, along with others. But, the Sunday, Oct. 14, event was one which families and working parents and visitors from distant towns could attend.

The response was overwhelming. Following a symbolic visit to the exhibition by the entourage, the King and his chiefs took their places at a "court" arranged in our vast Hall of Ocean Life, and the doors of the Museum were thrown open for all. It was a Sunday, and the Museum was scheduled to close at six. Seeing the crowds, sensing the enthusiasm, swept up in the emotion and dignity, I quickly gave instructions that the Museum was to remain open that night, with all "on duty" employees remaining, until every visitor had seen the King, been served with refreshments, and attended the exhibition. The last of our thousands of guests left after 11 p.m.!

It was on that day, perhaps more than any other, that the full implications of showing such a splendid collection were made clear to the Museum and its members. Having the collection in all its glory, the descendants of the people who created the artifacts, and their leader all together at one time was an exhilarating experience.

It was revealing to see the Museum—an interpreter of the world's culture—displaying its own culture and interacting with that of the Asante during those moments. I am glad to report that there were very few cases of "culture shock," but many instances of mutual friendship, respect and understanding. For our part, we learned the truth of Malcolm McLeod's statement in his fine book, about the subtlety, wit and sophistication that pervaded the Asante culture.

No one did more and gave more than Mrs. John E. Hutchinson III. This gracious woman presented her estate in Westchester County to accommodate the royal party. For two weeks the Asantehene, his wife and a large entourage occupied the Hutchinson home. The significance of this gift is evident when one understands that the Asante are accustomed to cooking and serving food and running the royal household in their own

manner. A hotel—however grand—would not have been suitable. Mrs. Hutchinson brought the virtue of hospitality to new heights; the Museum and the Asantehene benefited equally from her kindness.

Mrs. Hutchinson was later invited by the Asantehene and his wife to visit Kumasi for the 50th anniversary of the return of the royal family to that city. Mrs. Hutchinson, who was elected a trustee of this Museum in December, 1984, was persuaded by her visit that the vital link between our two cultures will be of long standing.

The exhibition was a magnificent presentation of the common and royal life of the Asante people; it gave the visiting public a clear picture of traditional life in a highly complex African culture. All visitors were impressed by the glorious collection of gold—jewelry, weights, needles, swords, hats and many other objects. Indeed, the exhibition made the geographic area, formerly known to Europeans as the Gold Coast, come alive in all its former splendor and present day subtlety.

While there were elements of surprise and spontaneity all along the way, the high quality of the exhibition installation was no surprise at all. The standards achieved by the Department of Exhibition and Graphics and all the support departments were those we have come to expect. The personal efforts of Dr. Schildkrout, who shepherded the exhibition from beginning to end, made all the events possible. And the scholarly symposium she arranged on the subject of the Asante kingdom was of the highest academic standards. An excellent interpretive program was devised and executed by our Education Department. Lectures, films and performances relating to the Asante culture were presented throughout the run of the exhibition.

I must also personally credit two Asante chiefs for their guidance and help. One is Bafour Akoto, a distinguished elder principal chief and close confidant to the Asantehene, who visited us twice to help prepare the way for his King; his wisdom and experience were invaluable. The second is our own Edward Adjei, a Senior Attendant Guard, and an Asante chief by descent. Mr. Adjei was assigned to help the royal party overcome the complexities of New

York and served as liaison between the King's entourage and the Museum's personnel. His patient understanding avoided many potential problems.

"Asante: Kingdom of Gold" was a very rewarding experience for the Museum. Of immediate benefit was the large number of visitors who saw the exhibition, most especially those who were Black. In this way it was an important asset in attracting members of New York's Black community to the opportunities offered by the Museum for enriching their lives, the goal of the African-American Studies Program directed by our Department of Education.

Apart from that, many Black citizens of the New York area, including influential politicians, business and social leaders, told us that the experience of "Asante: Kingdom of Gold" showed them the relationships that could be developed between themselves and a traditional culture functioning in Africa.

Surely a museum can perform no greater service in exhibiting ethnographic collections than to convey a sense of kinship between visitors and the society of people that produced and use the material displayed. Such feelings did result from "Asante: Kingdom of Gold." Like its hallmark predecessor, "Ancestors: Four Million Years of Humanity," the Asante exhibition showed all who saw it the great common bond of humanity that unites all people.



Thomas D. Nicholson,
Director

Department of Anthropology

The Department of Anthropology pursued a wide range of programs in its three major areas of activity: research, curation and conservation. Conservators have begun to establish new standards for the preservation of the department's collection of eight million anthropological artifacts. A new storage facility is near completion. Anthropological and archeological work was conducted on cultures from regions as far from the Museum as India and Peru and as near as Georgia and Nevada. Important accessions were made for the African, Korean and Pacific collections. Among the important gifts for the new Hall of South American Peoples was a collection of 56 pre-Columbian artifacts from Peru valued at more than \$100,000 donated by Frederick Landmann.

Increased emphasis on conservation of the Department's vast collection of archeological and ethnological artifacts was the focus of great activity during the year. Judith Levinson was appointed to the new position of Conservator. She will assume general responsibility for all conservation matters. A team of five conservators, including specialists in textiles and metals, is engaged in major work on the South American collections in preparation for the opening of the new Hall of South American Peoples.

The Chincha Kingdom Craig Morris, Chairman and Associate Curator, devoted three months to archeological research in the Chincha Valley in south central Peru. He is studying the Chincha kingdom, which, by the time of the arrival of the Spanish in 1532, controlled a long distance trading network. Research being carried out in collaboration with several Peruvian and U.S. scholars determined that the region was already the scene of rapid urban

growth by A.D. 500. Some 80 archeological sites were surveyed, and excavations were conducted in two. One of these excavations uncovered an area used for the manufacturing of textiles during the Inca period.

The Hall of South American Peoples has been the focus of Dr. Morris' work at the Museum. Planning and script preparation for displays on the cultures of the Nasca, Tiwanaku, Wari and Chancay Indians were completed, and the installation of materials began in March.

Origins of the State Robert L. Carneiro, Curator, worked on the elaboration of a circumscription theory of the origin of the state. According to Dr. Carneiro, force and not enlightened self-interest is the means by which political evolution has led from autonomous villages to the formation of the state. He also expanded on the role of resource concentration and how an area's favorable environmental conditions lead to a rise in the population of that area.

Dr. Carneiro also completed work on a manuscript about the "Kawarup," an intertribal feast of the dead in the upper Xingu region of central Brazil.

Shanti Nagar The chief activity of Stanley A. Freed, Curator, in collaboration with Research Associate Ruth S. Freed, was the analysis of field data collected in 1958-59, 1977-78 and 1983 concerning life in the rural region of the Union Territory of Delhi, north India. Two projects received most of the Freed's attention during the year. One concerned the effects of India's family planning program, emphasizing sterilization, on population growth in Shanti Nagar from the 1950s to 1983. The second project consisted of a psychomedical case history of a 35-year-old woman who suffered from possessions and fits. These alternate mental states occur throughout India as well as in many other parts of the world. This case history describes the cultural curing techniques for obtaining remissions for such states. More significantly, the study delves into the biological, psychological and cultural stresses causing them.

Both studies were published in the *Anthropological Papers* in June, 1985. The two volumes are the latest

in a series of seven monographs published in the *Anthropological Papers* on rural life in north India.

Asante: Kingdom of Gold Enid Schildkrout, Curator, was responsible for organizing the special exhibition "Asante: Kingdom of Gold." This included making preparations for the visit of Opoku Ware II, the King of the Asante people, and his entourage of 17 people.

Dr. Schildkrout's duties included organizing an international symposium of 31 scholars on Asante culture. The symposium, entitled "Asante and its Neighbors: Relations with the Exterior," was supported by grants from the National Endowment for the Humanities (with Dr. Schildkrout as principal investigator) and the Wenner-Gren Foundation for Anthropological Research. The papers from the symposium are being edited for publication by Dr. Schildkrout. She received a separate grant from the NEH for the publication of the Asante papers.

Dr. Schildkrout carried forward research on the economic roles of children in Africa, and is working on a book about child labor in Africa. She was also involved in research on the Lang/Chapin ethnological collection from northeastern Zaire, and a planning grant was submitted for an exhibition and catalog on the Mangbetu people of Zaire.

A sculpture of a youthful maize god is characterized by the extended Maya nose and receding chin. The piece was one of 350 artifacts in the special exhibition "Maya: Treasures of an Ancient Civilization," which began its tour of North America at the American Museum in April. The exhibition, organized by The Albuquerque Museum, covered 3500 years of Maya history through rare artworks never before seen in the United States. National treasures were contributed from cultural institutions in Mexico, Guatemala and Belize. Special exhibitions enable the Museum to present ethnographic and anthropological information to the public in entertaining and interesting ways.



Dr. Schildkrout served as curator for the exhibition "The Art of Cameroon," and is beginning work on an exhibition of the Gypsy photographs of Jan Yoores.

Long-tailed Macaques During the summer of 1984 Ian Tattersall, Curator, pursued his collaborative field researches on the long-tailed macaques (*Macaca fascicularis*) of the island of Mauritius. With R. W. Sussman, of Washington University, he initiated an ecological study of a population of these primates living in medium-altitude autochthonous forests. Preliminary results of this study justify the characterization of *M. fascicularis* as a "weed species" that has flourished in the altered environments that result from human activity. In addition, the use of radiotracking techniques permitted the observation of the first instance of "homing" behavior reported in a primate.

Archeology of Monitor Valley

David Hurst Thomas, Curator, spent the summer of 1984 in Nevada, completing fieldwork on the Monitor Valley archeological project. Since 1973, the American Museum has pursued a detailed exploration of the prehistoric archeological record of Monitor Valley in central Nevada: 10 field seasons have been completed, and the first two volumes have appeared in *The Archeology of Monitor Valley* series.

The first volume (April, 1983) established the framework within which the archeological fieldwork was conducted, presenting five strategic models that anticipate the archeological record of Monitor Valley.

The second volume in the series detailed the results of American Museum excavations at Gatecliff Shelter. Discovered by Dr. Thomas in 1970, Gatecliff Shelter contained 11 meters of sediments deposited in a remarkably well-defined stratigraphic column spanning the last 7000 years. Full-scale excavations were conducted there for seven field seasons; approximately 5000 person-days were invested in the excavations, and roughly 600 cubic meters of deposits were removed. Costs of excavation, laboratory analysis and manuscript preparations were largely defrayed by the National Geographic Society, Voss

Fund for Anthropology, and the Richard Lounsbery Fund for Research in Anthropology.

Dr. Thomas also spent three months excavating on St. Catherines Island. Since 1979, these efforts have been directed at the successful discovery and excavation of *Santa Catalina de Guale*, a 16th / 17th century mission complex that functioned for a century as Spain's northern-most frontier on the eastern seaboard. To date, archeological teams have conducted excavations in the mission church, the dwelling of Franciscan friars, the communal kitchen and the associated Guale Indian village.

The field research on St. Catherines Island has been generously supported by funds from the St. Catherines Island and Edward John Noble Foundations. Conservation of the Santa Catalina artifacts has been partially underwritten by a grant from the Richard Lounsbery Foundation.

Korean Marriage Customs

Laurel Kendall, Assistant Curator, pursued research on contemporary Korean marriage customs. The first phase of this project emphasized changes in the form and content of Korean wedding rituals; the second is concerned with substantive exchanges of ritual goods between the family of the bride and the family of the groom. An analysis of data collected in the summer of 1983 suggests that for peasant brides, these exchanges have become more elaborate in the space of a single generation. This is due, in part, to the fact that contemporary brides work for wages.

With Homer Williams, Volunteer, she completed a study of women and suicide in Korea. Comparative data collected by the Japanese Colonial administrations of Korea and Taiwan and qualitative ethnographic data on domestic life was used in their research. Their findings support the argument that similarities in women's suicide profiles and differences in their suicide rates can be attributed to similarities and differences in the structure and dynamics of Chinese and Korean families.

Dr. Kendall was the local curator for the exhibition, "Ban Chiang: Discovery of a Lost Bronze Age." She is currently working on a new permanent Korean display for the Hall of

Asian Peoples and is involved in the planning phase of a new permanent Jewish display.

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1984. Origin myths. Evolution Brochure No. 2, Amer. Anthropol. Assoc., Washington, D.C., 7 pp.
1985. Comments on David Rindos, Darwinian selection, symbolic variation, and evolution of culture. *Current Anthropol.*, vol. 26, pp. 77-78.
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1984. Wives, lesser wives, and ghosts: supernatural conflict in a Korean village. *Asian Folklore Studies*, vol. 43, no. 4, pp. 215-225.
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- Masuda, Shozo, Izumi Shimada and Craig Morris, eds.
1985. Andean ecology and civilization: interdisciplinary perspectives on Andean ecological complementarity, Univ. of Tokyo Press, Tokyo, 550 pp.
- Morris, Craig
1985. From principles of ecological complementarity to the organization and administration of Tawantinsuyu. In Shozo Masuda, Izumi Shimada and Craig Morris, eds., *Andean ecology and civilization*, Univ. of Tokyo Press, Tokyo, pp. 477-490.
1985. Junius Bouton Bird (1907-1982). *Amer. Anthropol.*, vol. 87, pp. 120-122.
- Schwartz, Jeffrey H., and Ian Tattersall
1985. Evolutionary relationships of living lemurs and lorises (Mammalia, Primates) and their potential affinities with European Eocene Adapidae. *Anthro. Papers of The Amer. Mus. of Nat. Hist.*, vol. 60, pt. 1, pp. 1-100.

Notes:

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

Tattersall, Ian

1984. The treeshrew, *Tupaia*: a "living model" of the ancestral primate? In Living fossils, Niles Eldredge and S. M. Stanley, eds., Springer, New York, pp. 32-37.

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1985. Island primates of the western Indian Ocean. Natl. Geogr. Res. Repts., vol. 17, pp. 855-862.

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1984. The archaeology of Gatecliff Shelter, Nevada: 1970-1978. Natl. Geogr. Res. Repts., pp. 663-674.

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1985. The archaeology of Hidden Cave, Nevada. Anthro. Papers of the Amer. Mus. of Nat. Hist., vol. 61, pt. 1, pp. 1-430.

Abstracts and Popular Publications:

Freed, Stanley A.

1984. [Review of] Ninistints: Haida world heritage site, by George F. MacDonald. Curator, vol. 27, no. 4, pp. 308-309.

Freed, Stanley A. and Ruth A. Freed.

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1985. The authors reply. Nat. Hist., vol. 94, no. 3, p. 2.

Kendall, Laurel

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1985. In charge of change. Review article based on Martha Alter Chen: A quiet revolution: women in transition in rural Bangladesh; and Carol Laderman: Wives and midwives: childbirth and nutrition in rural Malaysia. The Women's Rev. of Books, vol. 11, no. 7, pp. 8-9.

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1985. The Asante of West Africa, Faces, January, 1985, pp. 4-8.

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Astronomy and the American Museum-Hayden Planetarium

On Oct. 3, 1935, the American Museum-Hayden Planetarium opened to the public. Since that day, more than 25 million people, from school children to astronauts, have entered its doors and sat beneath its starry dome. This year the Planetarium's attendance continued upward, with overall attendance at 577,748, the highest in seven years. As the Planetarium nears the date of its Golden Anniversary, special shows, events and restoration work are in progress. In June, the Sky Show, "Hayden: The Golden Years" opened. Containing nostalgic photos from the Planetarium's early days, it reviews some of the most important developments in astronomy during the past five decades and looks ahead toward the next century.

Celebrities Narrate Sky Shows

From summer through mid-November, the Planetarium presented "STAR-QUEST," which was narrated by "Star Trek's" Leonard Nimoy. The program traced the history of humankind's fascination with the skies from ancient times through the age of space. It then looked beyond the year 2000 to anticipated developments such as space stations, lunar colonies and interstellar travel.

During the holiday season, the Planetarium presented "The Star of Christmas," a traditional offering which combines thoughts from such diverse fields as astronomy, theology, history and linguistics to ponder possible explanations for the Star of Bethlehem.

In January, the Planetarium unveiled a new show, "The Violent Universe," narrated by veteran film actor Vincent Price. It contrasted the dramatic differences between the illusion of a quiet starry night as seen from earth, and the true nature of the turbulent and even explosive universe

—from the fiery birth and death of stars and planets to mysterious eruptions which destroy entire galaxies.

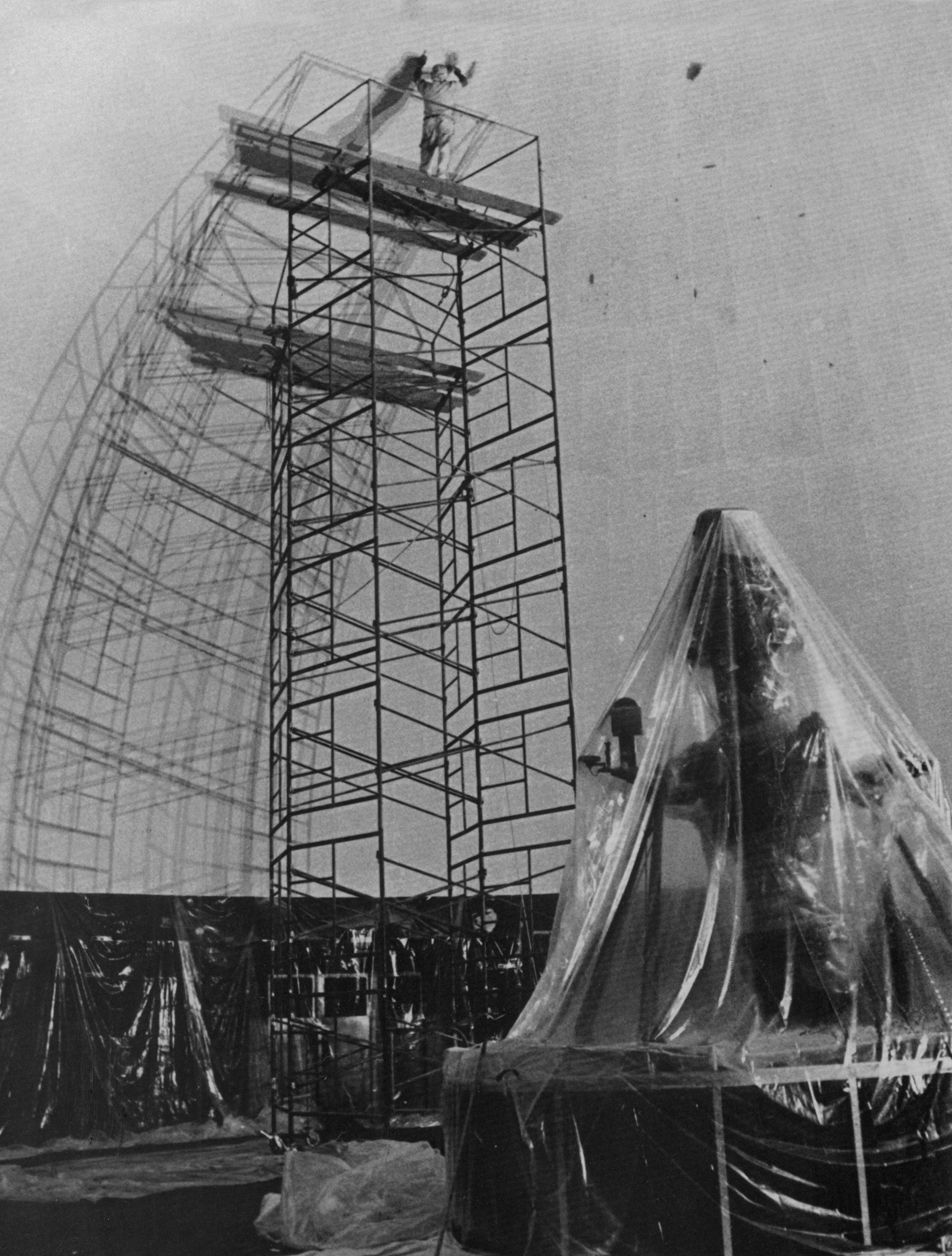
In late June, there began a celebration of two very special events with a Sky Show double feature. "Hayden: The Golden Years," written by Chairman William A. Gutsch and narrated by Charlton Heston, marked the Planetarium's 50th Anniversary. The program is a visual retrospective on how humankind's vision and understanding of the universe has changed since the Planetarium first opened its doors in 1935. Preceding all showings of "Hayden: The Golden Years," was the short feature, "Halley's Comet: Once in a Lifetime," in which "Star Trek" actor William Shatner explained the nature of comets, discussed their scientific study, and illustrated where and when to look for the most famous comet of all time. Halley's Comet will return late this year, after its customary 75½-year-hiatus. This program was made possible by contributions in memory of Georgette Wagner-Saveth.

In addition, on the first Saturday of each month at 10 a.m., the Planetarium introduced for weekend audiences its very popular weekday program for preschoolers, "Wonderful Sky" featuring the "Sesame Street" Muppets.* The show enjoyed the same reaction it has received in its weekday periods and consistently sold out in advance.

Also on weekdays during July and August, the Planetarium presented a live Sky Show, "The Skies of Summer." Designed for children and adults alike, the show focused on stars, constellations, planets and meteor showers to enjoy on a warm summer night. During the year 397,192 visitors attended public Sky Show performances.

Courses and Programs for Young and Old

The Planetarium offered a full spectrum of live and recorded programs for young people from nursery school toddlers to college students. These shows included "Wonderful Sky" for preschoolers, and "What's Up?," "Max's Flying Saucer" (about UFOs and extraterrestrial life), "Neighbor Worlds" (a trip through the solar system), "Skies of the Season," and "Earth, Sun, and Moon" for elementary schoolers.



In addition, "Slim Goodbody's Voyage to the Stars," a live theater production, returned for a limited engagement, and the Planetarium's public Sky Shows were integrated into the school schedule for grades five and up. Special topical lectures were also presented to high school and college audiences by request. Total school and preschool attendance at the Planetarium for the year was 105,555, the highest figure since 1978.

During the three academic terms of the year, the Planetarium again offered courses in such areas as astronomy, meteorology, and aviation for a combined enrollment of 830.

Lasers and Flying Saucers For the third year in a row the Planetarium held more special events than ever before and, in so doing, earned record revenues.

A wide variety of special events were created. Invaluable production assistance for many of these presentations was provided by Meeting Makers, Inc., of New York.

The Planetarium also hosted several members' programs, including a film and slide presentation by shuttle astronaut Jon McBride, a sold-out performance of "The Violent Universe" followed by an artwork and special effects "behind-the-scenes" tour, two special Saturday presentations of "Max's Flying Saucer," two sold-out concerts of "Bach by Star-

light," featuring works by J. S. Bach as performed by Music for Occasions, and two performances of "Celestial Rhythms," a concert of classical and modern electronic music performed by Planetarium composers Jonn Serrie, Mark Petersen and Barry Hayes.

On Friday and Saturday evenings, laser programs featuring the music of popular groups were presented in the Sky Theater. Attendance was strong, totaling 145,604 for the year.

Special Meetings In May, the Planetarium hosted two important professional conferences, the annual meetings of the Middle Atlantic Planetarium Society and the Major Planetarium Executives Conference. Both events were well attended by delegates from the United States, Ireland, France and Germany. Many of the Hayden staff gave papers or led workshops. The annual MAPS banquet was held in the Guggenheim Space Theater with the Margaret Noble address given by author Isaac Asimov. Financial assistance in hosting these conferences was provided by Minolta, the Wagner-Saveth Fund, Zeiss, Sky-Skan, Inc., Audio Visual Imagineering, Inc., Evans and Sutherland and Audio Visual Associates, Inc.

New Releases Based on a growing number of requests from other planetariums, the Planetarium has begun to formally market a selection of its astronomical artwork and spacecraft models in slide format through the creation of an Artwork Catalog. In addition, complete kits of materials, including original scripts, artwork and soundtracks of "STAR-QUEST" and "The Violent Universe" were also made available. Within this first year of formal offerings, sales totaling more than \$17,000 were made to planetariums in 11 states as well as England, Ireland, Germany and Greece.

Newly produced shows and artwork will be made available in catalog and show kit supplements as they are developed.

Renovations and Restorations In preparation for the Planetarium's 50th Anniversary, major renovation and restoration work has been undertaken both inside and outside the Planet-

arium. Among projects seeing completion have been a repainting of the domed Sky Theater and a refurbishment of the orrery in the Guggenheim Space Theater. Projects currently underway include replacing the Planetarium's marquee and front doors to reflect their original art deco motif and replacing all audiovisual equipment in the Guggenheim Space Theater with state-of-the-art technology. Much of this work is being financed through earnings from the Planetarium's laser programs.

Exhibitions The Artwall opposite the Perkin Library featured exhibits of original drawings and photographs from the collection of Harry Lange, production designer for such major motion pictures as "Star Wars" and "2001: A Space Odyssey"; paintings by California space artist Pamela Lee; and a special display of early Planetarium photographs from the archives in celebration of the Planetarium's 50th Anniversary.

The Richard S. Perkin Library Through the continued generous support of the Perkin family, the Richard S. Perkin Library again served as an invaluable resource to hundreds of people in the tri-state area. Some \$2000-worth of research materials were added to the Library, as well as a number of important journals from Kenneth L. Franklin. Dr. Franklin has retired after 29 years as an Astronomer at the Planetarium. The Board of Trustees has conferred upon him the title of Astronomer Emeritus.

In addition to providing reference material for staff, students and members of the public, the Library also served as an aid in research for such diverse projects as a television movie, a theatrical musical, and numerous articles and books published in and around New York.

Abstracts and Popular Publications:

Gutsch, William A., Jr.
1984. New Programs and Activities at the Hayden Planetarium. Proceedings of the International Planetarium Directors Conference. Stuttgart-Berlin-Hamburg.

Branley, Franklyn M.
1985. Comets, Let's Read and Find out Art Book. T. Y. Crowell. 32 pp.

1985. Volcanoes, Let's Read and Find Out Art Book. T. Y. Crowell. 32 pp.

Atop a 40-foot scaffold, a worker applies the last of five coats of paint to the dome of the American Museum-Hayden Planetarium. The painting project, part of the Planetarium's preparation for its 50th anniversary, required that the facility be closed the first two weeks of September. The theater's 650 seats were removed, repaired and rebolted to the floor and general maintenance was carried out on the Zeiss VI Planetarium projector, pictured at right, which was covered with plastic during the painting job. Since the Planetarium opened in 1935, more than 25 million people have passed through its doors.

1985. Hurricane Watch, Let's Read and Find Out Art Book. T. Y. Crowell. 32 pp.
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1985. Mysteries of Outer Space. E. P. Dutton. 92 pp.

Department of Entomology

Insects and spiders are remarkably diverse in their behavior, structure and in the clues they hold to evolutionary history. The Department of Entomology's collection of more than 16 million specimens is continually enriched through exchanges, gifts and fieldwork around the world. Whether collecting beetles in Costa Rica, observing bees in Pakistan or capturing spiders in Chile, the department's entomologists attempt to answer questions about the phylogenetic and biogeographic interrelationships of those groups to which their research efforts are dedicated.

Plant Bugs Randall T. Schuh, Curator and Chairman, and Michael D. Schwartz, Curatorial Assistant (supported by the National Science Foundation), completed and published their revision of the New World plant bug genus *Rhinacloa*.

Dr. Schuh spent six weeks in Europe working on his catalog of the Leptopodomorpha, shore bugs, prepared in cooperation with Curatorial Assistant Bella Galil and Associate John T. Polhemus. On that trip, as the first American heteropterist to visit Leningrad in more than two decades, he met with I. M. Kerzhner, specialist on Russian Heteroptera. Dr. Schuh was able not only to discuss important aspects of his research on Heteroptera, but also to arrange for an exchange of specimens of Miridae

between the American Museum and the Zoological Institute in Leningrad. This exchange will provide the first opportunity to compare in detail portions of the faunas of the two continents, and should improve greatly the knowledge of faunal interconnections between temperate North America and Asia.

In the last year of his National Science Foundation project on the phyllophagous mirid fauna of the western United States and Mexico, Dr. Schuh collected specimens and gathered information on plant hosts in the two countries.

Kalbfleisch Research Fellow Gary M. Stonedahl began a phylogenetic study and reclassification of the plant bug tribe Eccritotarsini, including an investigation of area relationships of its southern hemisphere faunas. He also collaborated with M. D. Schwartz on a revision of the North American orthotyline genus *Pseudopsallus* and related groups.

Bledius Beetles Lee H. Herman, Curator, submitted the fourth part of his monograph on the rove beetle genus *Bledius* for publication in the *Bulletin of the American Museum of Natural History*. The whole year was devoted to completing the manuscript of more than 700 pages and illustrations. Included are a summary of the natural history, distribution, an infrageneric classification, a phylogeny, and a catalog.

The monograph proposes a new classification of 34 species groups for the 438 extant species. This is based on examination of all except eight species. This classification of species groups is contrasted with a classification used by Europeans that includes eight subgenera. Descriptions, a list of the species, a summary of the distribution, anatomical illustrations, and maps are provided for each species group. Hypotheses of the phylogenetic relationships among the species groups are presented.

Among the topics included in the chapter on the natural history of *Bledius* are distribution on islands and near salt lakes, factors that determine and limit habitat selection, the construction, architecture and function of the burrow, feeding, reproduction, life cycle, subsocial behavior, surface activity, flightlessness, predators, par-

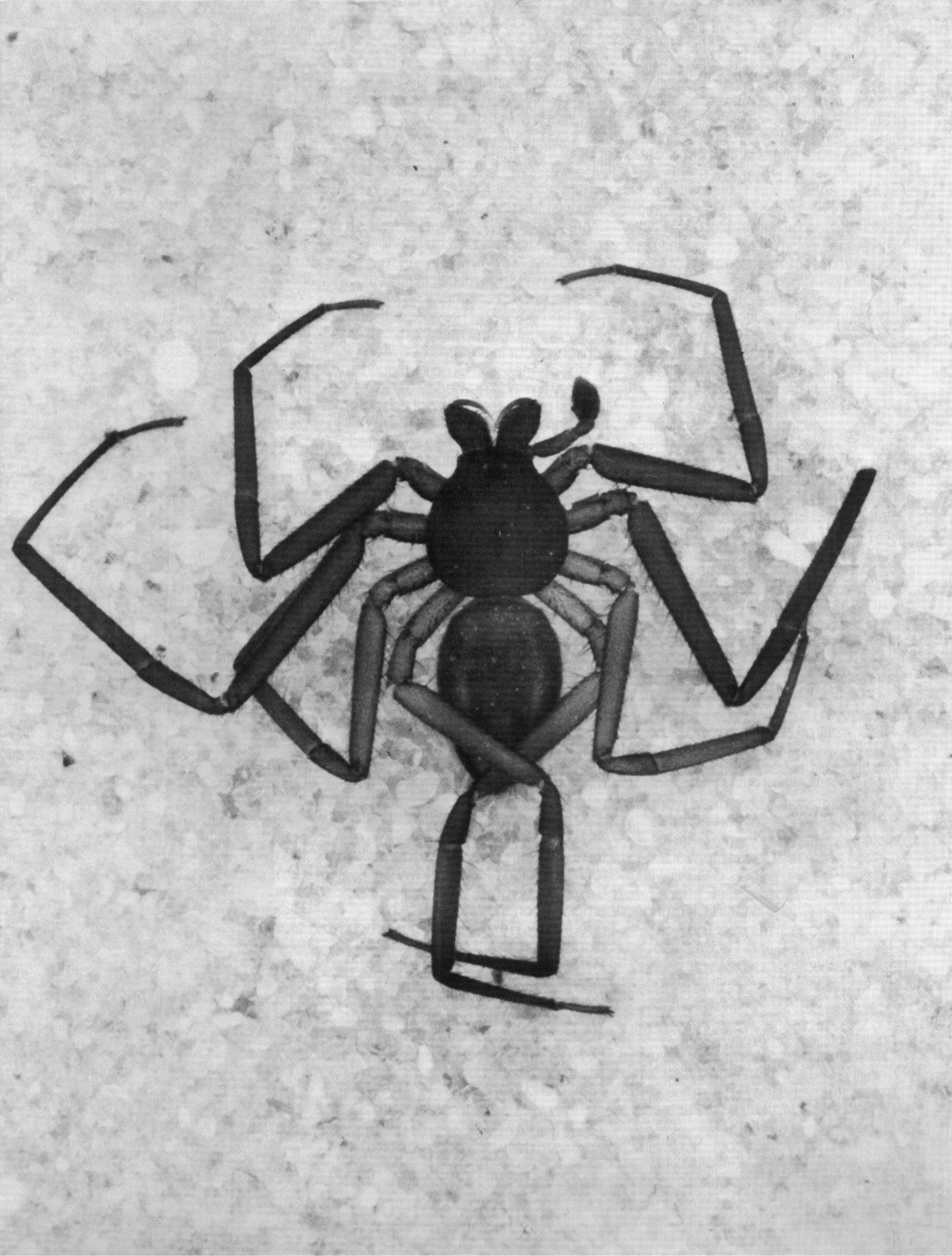
asites, chemical secretions, fossils and economic importance. A catalog provides references to the original descriptions of all 622 available names, along with subsequent references. The catalog is cross-indexed and most references are annotated.

The purpose of the paper is to summarize in one place all that is known about *Bledius*, to propose some new ideas and to suggest lines of further investigation. With the completion of the fourth part of the monograph, Dr. Herman ends his investigation begun in 1965. He has examined more than 50,000 specimens and taken more than a dozen field trips to collect and observe.

On a short field trip to Costa Rica, Dr. Herman collected specimens of rove beetles, with emphasis on the subfamily Paederinae.

Austral Spiders Norman I. Platnick, Curator, concentrated on the taxonomy of southern hemisphere spiders. Based largely on specimens from the classic French collections of Malagasy spiders, made available by Roland Legendre of the Université des Sciences et Techniques du Languedoc in Montpellier, France, Dr. Platnick completed the first two papers in a series on the spiders of Madagascar. One of these papers revised the family Gallieniellidae, which is found only in Madagascar and the nearby Comoro Islands. Although only a single species had previously been known, the revision covered two genera and eight species. It showed that the gallieniellids have more affinity with the superfamily Gnaphosoidea than with the Clubionoidea affinities (as had been

This specimen of Platyoides grandidieri, characterized by a flat body, is the first found in mainland Africa. Previously, it was believed to exist only on Madagascar and the Mascarene Islands. It was donated to the Department of Entomology by Associate Walter Sedgwick. The Museum's collection of insects and arachnids, now numbering more than 16 million, is enlarged through fieldwork, exchanges and donations.



previously presumed). The second paper revised the genus *Platyoides*, a group of African spiders remarkable for their completely flattened bodies. The closest relative of the group was shown to be the genus *Trochanteria*, from Argentina.

The rest of Dr. Platnick's taxonomic work involved the spiders of Chile. With support from the Biological Research Resources program of the National Science Foundation, Dr. Platnick spent six weeks in Chile collecting arachnids, accompanied by Oscar F. Francke, a scorpion specialist from Texas Tech University. Collecting efforts concentrated on the families Thaididae and Amaurobiidae, for which revisions are planned.

Ongoing work on Chilean spider taxonomy was augmented by a three-year grant from the Systematic Biology program of the National Science Foundation. With this aid, Dr. Platnick and Research Associate Raymond R. Forster completed their eight-year study of the newly recognized family Orsolobidae, an austral group now known from Australia, Tasmania, New Zealand, the Auckland and Campbell Islands, Chile, Argentina, and the Falkland Islands. Seven genera were transferred from other families (Oonopidae and Dysderidae) and 18 new genera were described. The known fauna was increased from 41 species to 170. Of particular interest was the discovery of a primitive genus, *Chileolobus*, from the southern islands of Chile.

Dr. Platnick also continued work on theoretical aspects of comparative biology, collaborating with Gareth Nelson, from the Department of Ichthyology, on two papers dealing with biogeographic topics. Dr. Platnick spent three weeks in China, lecturing on cladistics as a guest of the Academia Sinica, Beijing. He was also appointed editor of a new journal in the field, *Cladistics: The International Journal of the Willi Hennig Society*.

Curator Emeritus Willis Gertsch published his revision of the Nestidae, a group of largely cave-dwelling spiders from North and Central America and the West Indies, and he continued work on a similar study of the family Telemidae.

New World Moths Frederick H. Rindge, Curator, continued his long-

range systematic studies of the moths of the family Geometridae from the New World. Most of his time was spent completing generic descriptions of the Lithinini, a tribe of the very large subfamily Ennominae. Six genera are present in North America, one of which also occurs in Eurasia; 19 are recognized from Chile and adjacent Argentina. Of the latter, 10 are described as new to science, together with their respective type species, and for another a replacement name is being proposed. It is highly probable that members of the Lithinini occur in the area between North America and Chile but, due to our very limited knowledge of Neotropical geometrids, it is not possible to assign other taxa to the tribe at this time. This paper has been submitted for publication in the Museum's *Bulletin* series.

Dr. Rindge began a study of the genus *Eupithecia* in Chile. This genus is one of the largest in the Geometridae, and is practically worldwide in distribution; it is placed in the Larentiinae. All that has been published about the members of the group in Chile are several original descriptions dating from between 1863 and 1904, plus three more (from the Juan Fernandez Islands) published in 1922. None of these includes genitalic descriptions or illustrations. Hence, identifications are almost impossible. The task is well underway on the numerous dissections that must be made before the species can be separated and defined.

Kurt Johnson, resident Research Associate, continued his analysis of the Eumaeini butterflies (Lycaenidae) for his revision of the worldwide Callophryina group, with special emphasis on their vicariance biogeography. He and Henri Descimon, of the University of Marseilles, continued their research on the Neotropical butterfly genus *Agrias* (Nymphalidae), and expanded their revisionary work to include the sister genus *Prepona*. Dr. Johnson also has been working on species level diversity in *Papilio* (Papilionidae) in the New World fauna.

Bees and Ants Bees are widespread in the world's deserts and research on solitary and cleptoparasitic bees, conducted by Jerome G.

Rozen, Jr., Curator, centered on two widely separated arid regions—Pakistan and the U.S. Southwest. Dr. Rozen coordinated the first expedition by bee specialists to Pakistan, with the support of the Smithsonian Institution Foreign Currency Program. He was accompanied by Sarfraz Lodhi, Scientific Assistant; Ian Stupakoff, Volunteer, and Ronald J. McGinley, Associate Curator, of the Smithsonian Institution. They amassed extensive collections of adult bees, especially from Sind Province and Baluchistan, and were able to carry out investigations on the nesting biology and immature stages of a number of important, little-studied taxa. Drs. Rozen and McGinley are now completing a manuscript on the nesting biology and immature stages of the solitary, ground-nesting bee *Pararhophites*, heretofore placed in the tribe Exomalopsini within the Anthophoridae. Strong biological-ecological data now indicate that this strange, tiny bee may be a relic form that arose from the common ancestor of the Megachilidae and Anthophoridae. A careful study of the larva of *Pararhophites* should shed further light on its evolutionary relationships. Dr. Rozen is also finishing the first modern study of the behavior and larva of the Old World panurgine genus *Camptopoeum* as a result of his finding a new species nesting in Baluchistan.

With a keen interest in the native U.S. bee fauna, Dr. Rozen furthered his long-term study of the cleptoparasitic bee genus *Oreopasites*, a taxon centered in the Southwest. Species of this genus enter and lay eggs in the nests of such solitary ground-nesting panurgine bees as *Nomadopsis*, *Hypomacrotera*, and *Perdita*. *Oreopasites* is the sole New World representative of the anthophorid tribe Ammobatini, consisting of a score of Old World genera found from Europe to South Africa and eastward into Asia. Dr. Rozen's revision of *Oreopasites* is in its final stages and will treat not only the taxonomy but also the life history and evolutionary relationships of these small to tiny, red-tailed bees. The study will attempt to analyze what effect the evolutionary diversification of the host bees has had on the pattern of speciation within *Oreopasites*.

Research Associate Howard Topoff

and graduate student Linda Goodloe investigated the social organization of the slave-making ant genus *Polyergus*. They discovered that individual scouts use optical cues to lead the raiding swarm to target colonies, and that colonies of *Polyergus* will conduct raids on each other. With graduate student Philip McDonald, Dr. Topoff also studied the social regulation of behavioral development in the ant *Novomessor albisetosus*.

Scientific Publications:

- Coyle, Frederick A.
1984. A revision of the African mygalomorph spider genus *Allothelie* (Araneae, Dipluridae). Amer. Mus. Novitates, no. 2794, pp. 1-20, figs. 1-74, map 1, tables 1-3.
- Gertsch, Willis J.
1984. The spider family Nesticidae (Araneae) in North America, Central America, and the West Indies. Texas Mem. Mus. Bull., no. 31, pp. 1-91, figs. 1-298.
- Johnson, Kurt
1985. Prairie and plains disclimax and disappearing butterflies in the central United States. *Atala*, vols. 10-12, pp. 8-21.
- Johnson, Kurt, and Eric L. Quinter
1984. LepidopteroLOGY's "Blue Bomb" controversy: A comment on Ehrlich and Murphy. *Syst. Zool.*, vol. 33, pp. 422-426.
- McDonald, Philip, and Howard Topoff
1985. Social control of behavioral development in the ant *Novomessor albisetosus*. *Jour. Comp. Psychol.*, vol. 99, pp. 3-14.
- Platnick, Norman I.
1984. On the pseudoscorpion-mimicking spider *Cheliferoides* (Araneae: Salticidae). *Jour. New York Ent. Soc.*, vol. 92, pp. 169-173, figs. 1-6.
1984. Studies on Malagasy spiders, 1. The family Gallieniellidae (Araneae, Gnaphosoidea). Amer. Mus. Novitates, no. 2801, pp. 1-17, figs. 1-53.
1985. Studies on Malagasy spiders, 2. The family Trochanteriidae (Araneae, Gnaphosoidea), with a revision of the genus *Platyoides*. *Ibid.*, no. 2808, pp. 1-17, figs. 1-48.
1985. Philosophy and the transformation of cladistics revisited. *Cladistics*, vol. 1, pp. 87-94, figs. 1-3.
- Platnick, Norman I., and John A. Murphy
1984. A revision of the spider genera *Trachyzelotes* and *Urozelotes* (Araneae, Gnaphosoidea). Amer. Mus. Novitates, no. 2792, pp. 1-30, figs. 1-62.
- Platnick, Norman I., and Gareth Nelson
1984. Composite areas in vicariance biogeography. *Syst. Zool.*, vol. 33, pp. 328-335, figs. 1-3.

- Rindge, Frederick H.
1985. A revision of the moth genus *Acronyctodes*, with a review of the New World Bistonini (Lepidoptera, Geometridae). Amer. Mus. Novitates, no. 2807, pp. 1-24, figs. 1-32, tables 1-4.
1985. The *Eupithecia* (Lepidoptera, Geometridae) of Mississippi and Louisiana. *Ibid.*, no. 2809, pp. 1-18, figs. 1-38.
- Rozen, Jerome G., Jr.
1984. Comparative nesting biology of the bee tribe Exomalopsini (Apoidea, Anthophoridae). Amer. Mus. Novitates, no. 2798, pp. 1-37, 37 figs., 2 tables.
- Schuh, Randall T., and Michael D. Schwartz
1985. Revision of the plant bug genus *Rhinacloa* Reuter with a phylogenetic analysis (Hemiptera, Miridae). *Bull. Amer. Mus. Nat. Hist.*, vol. 179, pp. 379-474, figs. 1-258, tables 1-4.
- Schwartz, Michael D.
1984. A revision of the black grass bug genus *Irbisia* Reuter (Heteroptera, Miridae). *Jour. New York Ent. Soc.*, vol. 92, pp. 193-306, figs. 1-101, maps 1-23, tables 1-3.
- Topoff, Howard
1984. Social organization of raiding and emigrations in army ants. In J. S. Rosenblatt, ed. *Advances in the study of behavior*. Academic Press, New York, vol. 14, pp. 81-126.
1984. Levels of integration in army ant behavior. In G. Greenberg, and E. Tobach, eds. *Levels of organization, evolution and behavior*. Erlbaum Associates, Hillsdale, N.J., pp. 241-257.
- Topoff, Howard, B. LaMon, and Linda Goodloe
1984. Social and orientation behavior of *Polyergus breviceps* during slave-making raids. *Behav. Ecol. Sociobiol.*, vol. 15, pp. 273-279.

Abstracts and Popular Publications:

- Nelson, Gareth, and Norman I. Platnick
1984. Biogeography. Carolina Biology Readers, Carolina Biological Supply Co., Burlington, no. 119, pp. 1-16, figs. 1-20.
- Topoff, Howard
1984. Slavery in ants: invasion of the booty snatchers. *Nat. Hist.* vol. 93, no. 10, pp. 78-84.

Department of Herpetology

The department is committed to advancing knowledge on the comparative biology of amphibians and reptiles. The National Science Foundation has been a strong supporter of the department's fieldwork, research, and collection maintenance. The latest NSF grant was awarded for purchase of new sound spectrographs and other equipment to be used for interdisciplinary studies of animal vocalization. In addition to new specimens acquired on the Cerro de la Neblina Expedition and other field trips, an important collection of 3000 preserved amphibians and reptiles was donated by the Newark Museum.

Bioacoustical Laboratories Outfitted The National Science Foundation awarded a grant of \$55,648 for upgrading bioacoustical laboratories in the Departments of Herpetology and Ornithology, which have distinguished histories in studies of frog and bird vocalizations. The acquisition and integration of new digital spectrum analyzers, oscilloscopes, real time FFT analyzers and other instruments will permit more detailed analyses that will greatly increase the usefulness of acoustic data.

The department ended the first year of its three-year NSF facilities grant of \$142,488, which includes salary for a curatorial assistant in the second and third grant years. New microscopes for visiting scientists and a Polaroid MP-4 camera were purchased, and installation of steel specimen cases with specially fabricated wooden trays was completed in a new collection room. NSF funding was received for the fourth year of Curator Charles J. Cole's five-year grant of \$140,000 for investigations on the genetics, origin and relationships of unisexual species of reptiles.

A fourth annual award was received from the Swedish pharmaceutical company Astra Läkemedel AB for fieldwork on tropical poison frogs. Still in progress is the Museum's two-year



NSF grant of \$36,307, which with support from the William H. Phelps Fund permitted continued participation in the Cerro de la Neblina Expedition.

Mountain of the Mist Cerro de la Neblina is an immense table mountain that rises precipitously from lowland rain forest on the border of Venezuela and Brazil just north of the equator. Such isolated mountains are scattered over a vast extent of eastern Venezuela and are popularly called "Lost Worlds," after a 1912 novel by Sir Arthur Conan Doyle. The American Museum conducted expeditions to several of the Venezuelan table mountains in 1927, 1928, 1937 and 1978, and in 1984 sent 14 scientists to participate in a Venezuelan-sponsored survey of the fauna and flora of Cerro de la Neblina. The first phase of this year-long international expedition included work in February-March 1984 by American Museum herpetologists Charles J. Cole and Richard G. Zweifel.

A second team included Chairman and Curator Charles W. Myers, Research Associate Janis A. Roze and Assistant Linda S. Ford, who were joined in Caracas by Sr. Alfredo Pao-lillo, a Venezuelan herpetologist from the Universidad Central. With a few other Venezuelan and North American biologists, this team traveled eight days by dugouts to Neblina base camp in June and returned the same way in late July. The team was the only scientific party to make the round trip

by boat. Part of the route included the Casiquiare Canal, a unique natural waterway that connects two major river drainages—the north-flowing Río Orinoco and the south-flowing Río Negro. The sole objective of this trip was to sample the lowland biota in the remarkable drainage system at the base of Cerro de la Neblina.

With helicopter support in November and December, Dr. Myers and Ms. Ford returned to Venezuela to join a larger group of scientists in establishing a new high-elevation camp for continuing the survey of Neblina's highland flora and fauna. Most amphibians and reptiles from the upper slopes appear to represent undescribed species, although it is a depauperate fauna.

Dr. Myers collaborated with Graphics Manager Joseph M. Sedacca in producing *Mountain of the Mist*, a six-month photographic exhibit in Akeley Gallery. Some 40 large color photographs taken by members of the Museum's field parties at Cerro de la Neblina imparted the flavor of biological exploration in a tropical wilderness.

Frog Studies Dr. Myers' third field trip led to Central America, where he was successful in finding the tadpoles of *Dendrobates speciosus*—a bright red poison frog that lives only in a small region of cloud forest on the continental divide of western Panama. The tadpoles provide new information on systematic relationships.

Curator Richard G. Zweifel completed a manuscript revisionary study of the microhylid frogs of Australia based largely on fieldwork that he conducted there in 1980-1981. Dr. Zweifel investigated the relationships of a seemingly undescribed genus and species of microhylid frog that he collected on the first phase of the Cerro de la Neblina Expedition.

Lizard Genetics and Behavior

Curator Charles J. Cole spent two weeks in the laboratory of Research Associate Herbert C. Dessauer at the Louisiana State University Medical Center, New Orleans, working on biochemical genetics of unisexual (all-female) species of lizards of the genera *Cnemidophorus* (whiptail lizards) and *Gymnophthalmus* (shiny lizards). He spent the summer in the Southwest, using the

Museum's Southwestern Research Station as the base of operations for field and laboratory research. He was assisted part time in the field by Dr. Dessauer and Senior Scientific Assistant Carol R. Townsend. They conducted a variety of investigations in reproduction, genetics, hybridization, origins and systematics of whiptail lizards, including unisexual and bisexual species.

A major accomplishment involved collaborative work with Dr. Dessauer in biochemistry. Analyses of tissue proteins determined by 30 gene loci in 136 whiptail lizards, representing 12 ancestor-descendant laboratory lineages of six unisexual species, demonstrated that a lineage of these remarkable vertebrates normally constitutes a clone; the most sensitive tests indicate that all individuals within a lineage are genetically identical. The Museum's unique lizard colonies continue to provide important data concerning the origin of parthenogenesis, cloning and polyploidy in animals.

The preliminary work of Drs. Cole and Dessauer and Ms. Townsend on the unisexual shiny lizard (*Gymnophthalmus underwoodi*) from the West Indies and northern South America, indicates that this species originated through hybridization between two other perhaps still-existing bisexual species. Work is now focusing on identifying the ancestral species in South America and documenting that the unisexual species is a clone that reproduces by means of unfertilized eggs.

Research Associate Carol A. Simon pursued field research in Arizona, where she is conducting comparative studies of tongue-flicking behavior and chemoreception among several ecologically diverse species of *Sceloporus*.

Collection Utilization and Growth

Departmental resources are heavily used by the scientific community. A total of 3889 specimens were lent to or returned by 97 researchers at other institutions in this country and abroad. The department received on average one professional visitor every five work days. An increasing number of visitors and requests for information are coming from state agencies in the process of developing nongame wildlife pro-

Outside her tent at Cerro de la Neblina in southern Venezuela, Linda S. Ford, a Ph.D. candidate from the University of Kansas, begins preservation work on the new species of frogs and lizards she helped members of the Department of Herpetology collect. Scientists from five Museum departments participated in a multinational expedition that collected and studied the biota of the region at intervals from February to December of 1984. Providing graduate students with opportunities to participate in field research is one of the ways the Museum contributes to the training of young scientists.

grams. Museum research collections provide the raw data for documenting past and present ranges of animals whose distributions have been altered by human activity. The subject of amphibian and reptile survivors in urban areas was treated by Senior Scientific Assistant Michael W. Klemens, in an article published in the Yale University magazine *Discovery*.

Some 36 percent of the 4833 newly accessioned specimens derived from fieldwork by staff members in the northeastern and southwestern United States, Panama, Venezuela, and the West Indies. But the largest accession, comprising some 61 percent of the total, consisted of a collection transfer from a neighboring institution, the Newark Museum in New Jersey. With the addition of these specimens, the American Museum has an unrivaled collection of the New Jersey herpetofauna and of larval stages of eastern frogs.

Scientific Publications:

Daly, John W., Robert J. Highet, and Charles W. Myers

1984. Occurrence of skin alkaloids in non-dendrobatid frogs from Brazil (*Bufo* nidae), Australia (*Myobatrachidae*) and Madagascar (*Mantellinae*). *Toxicon*, vol. 22, no. 6, pp. 905-919.

Maxson, Linda R., and Charles W. Myers

1985. Albumin evolution in tropical poison frogs (*Dendrobatidae*): A preliminary report. *Biotropica*, vol. 17, no. 1, pp. 50-56.

Simon, Carol A., and George P. Moakley

1985. Chemoreception in *Sceloporus jarrovi*: Does olfaction activate the vomeronasal system? *Copeia* 1985, no. 1, pp. 239-242.

Simon, Carol A., and George A. Middendorf

1985. Changes in resource usage of *Sceloporus jarrovi* (*Sauria*, *Iguanidae*) during periods of high and low food abundance. *Southwestern Nat.*, vol. 30, no. 1, pp. 83-88.

Townsend, Carol R., and Charles J. Cole

1985. Additional notes on requirements of captive whiptail lizards (*Cnemidophorus*), with emphasis on ultraviolet radiation. *Zoo Biol.*, vol. 4, no. 1, pp. 49-55.

Abstracts and Popular Publications:

Cole, Charles J.

1984. Taxonomy: What's in a name? *Nat. Hist.*, vol. 93, no. 9, pp. 30-34.

Cole, Charles J., and Herbert C. Dessauer

1984. Clonal inheritance in parthenogenetic species of lizards. Program and Abstracts, combined meetings Amer. Soc. Ichthyol. Herpetol., Soc. Study Amphib. Rept., and Herp. League. Univ. Oklahoma, Norman.

Dessauer, Herbert C., and Charles J. Cole

1984. Genetics of *Cnemidophorus tigris* populations in a contact zone in New Mexico. *Ibid.*

Klemens, Michael W.

1985. Survivors in megalopolis: Reptiles of the urban Northeast. *Discovery* (Yale Peabody Mus. Nat. Hist.), vol. 18, no. 1, pp. 22-25.

Myers, Charles W., and Linda S. Ford

1985. *Atopophrynus syntomopus*, wrongly assigned to the frog family Dendrobatidae. Program and abstracts, 65th ann. meeting Amer. Soc. Ichthyol. Herpetol., Univ. Tennessee, Knoxville.

Department of Ichthyology

Curation of the department's uncataloged materials resulted in a 15 percent increase in the cataloged collections. The department's formidable collection of more than one million fish specimens serves as an important resource for research and study by the department's staff and by scientists from all over the world. The past year also saw the completion of a comprehensive guide to inland fishes of New York State, with publication expected in the latter half of 1985. Also brought to fruition was a review of all known fossil anchovies. Research projects took staff members to the West Indies, Venezuela and Central Mexico.

"The Inland Fishes of New York," finished in the summer of 1985, culminates 12 years of research by Curator C.L. Smith. This species-by-species account is a guide not only to the identification of freshwater fishes of the state and marine fishes in the Hudson Estuary, but also to the extensive scientific literature devoted to these fishes from colonial to modern times. The volume was sponsored by

the New York State Department of Environmental Conservation.

Elephant Fishes Elephant fishes (Family Mormyridae), including some 150 species native to African freshwater, have long been known to produce weak electric signals. Through studies by Peter Moller, Research Associate, Jacques Serrier, Associate, and Research Scientist of the Centre National de la Recherche Scientifique, Gif sur Yvette, France, the significance of electricity in the behavior of these unusual fishes has been clarified.

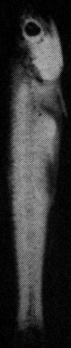
Experiments have demonstrated the importance of electricity for social interaction in one species (*Brienomyrus niger*) by use of a specially designed device called LINEX.

LINEX moves a pair of fish closer together, or farther apart, permitting measurement of the response of each fish to the electric signals produced by the other. Dr. Moller now compares the fishes' electric activity to bird song, important in maintaining territory and attracting a mate. Unlike birds, however, elephant fishes can interact electrically only over short distances (two-three meters maximum).

Prior field studies in the Ivindo River of Gabon, in cooperation with the University of Libreville, and in Kainj Lake, Nigeria, provided background necessary for meaningful experimental work in the Museum. This research was supported by a joint grant from the National Science Foundation and the Centre National.

*The world's largest known anchovy, left, *Thryssa scratchleyi*, reaches about 50 centimeters. This specimen was collected from the Fly River in Papua New Guinea in 1975 by former Research Associate Tyson Roberts. *Anchoviella elongata*, right, measuring about six centimeters, was found in the waters of the Rio Tatín in Guatemala by Curator Donn E. Rosen and Research Associate Reeve M. Bailey. Department Chairman Gareth Nelson has found evidence that marine anchovies have geographic limits that correspond with tectonic boundaries. This information illuminates the evolution of this commercially important group of fishes.*

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Accessions and Loans Efforts to curate the department's extensive backlog of uncataloged material, aided by grants from the National Science Foundation and the Hudson River Foundation, added 130,000 specimens and 17,000 lots, including 250 skeletons, to the permanent collection. Through use of a newly acquired microcomputer-based cataloging system, the past year's effort has added about 15 percent to the cataloged collection. During the two-year duration of the project additions total 480,000 specimens and 41,000 lots—a 60 percent increase.

During the year there were 35 accessions of 408,000 specimens, including 60 skeletons of Gulf Coast species. Nearly 50 loans and 25 exchanges were sent out to investigators throughout the world.

Marine Larval Fishes With James C. Tyler, Research Associate, and Naomi Stern, Volunteer, Dr. Smith began a descriptive study of the larval coral-reef fishes of the Virgin Islands. Working from the West Indies HYDROLAB facility, and from the West Indies Laboratory of Fairleigh Dickinson University, Drs. Smith and Tyler have so far collected about 4000 larvae. Many of these belong to species whose larva has never before been collected, identified, and described.

Hermaphrodites During the last few decades scientists have discovered that many groups of fishes are hermaphroditic in reproductive habit, with sex change normally occurring in the lifespan of an individual. Dr. Smith began collaboration on a study of the reproductive biology of the two-lined damselfish with ichthyologist Abby L. Schwarz. This research followed Dr. Schwarz's discovery of hermaphroditism in the two-lined damselfish from Guam, a first for this family of coral-reef fishes.

Guppies and Swordtails These popular aquarium fishes and their relatives in the family of live-bearers (Poeciliidae) have been a long-standing research interest of Donn E. Rosen, Curator. He has recently discovered that the true guppy occurs only in and around Caracas, Venezuela, and that the fish of the aqua-

rium trade is a related, but different, species. With Klaus Kallman, Research Associate, he has also discovered four previously unknown species of swordless "swordtails" from specimens collected by Dr. Kallman in the Rio Panuco System of Central Mexico.

Fossil and Recent Anchovies

Gareth Nelson, Chairman and Curator, completed a review of all known fossil anchovies. Most of them proved to be not anchovies at all but fishes of other families, such as lantern fishes, flying fishes, etc. Of note was the discovery of the world's oldest fossil anchovy in Cyprus, from the Miocene epoch, which closely resembles the species today living in the Mediterranean Sea (the European anchovy, *Engraulis encrasicolus*). This work was done with R. Lance Grande, Research Associate in the Department of Vertebrate Paleontology and Assistant Curator of Geology at the Field Museum of Natural History.

Dr. Nelson has found evidence that marine anchovies have geographic limits that correspond with tectonic boundaries, such as those of the Caribbean Plate. He anticipates that, if true, this fact will prove helpful in solving long-standing problems in the taxonomy and systematics of tropical American anchovies, and in understanding the evolution of this group of biologically and commercially important fishes.

Marine Ecology During his continuing study of hakes of the genus *Urophycis*, Joseph W. Rachlin, Research Associate, discovered that three local and very similar species which live together and are caught in the same net hauls have different food preferences. Although the fishes all consume the same food item when it is abundant, they have distinctly different preferences for scarcer items. Dr. Rachlin also completed a study aimed at establishing limits for heavy metal pollutants in the Hudson-Raritan Estuary and in coastal zones and estuaries generally.

Freshwater Ecology Dr. Smith began a study of ecology of fishes of the Mary Flagler Carey Arboretum, Millbrook, N.Y. Dr. Smith plans to carry out a long-term study of the non-

game fishes of the section of the east branch of Wappingers Creek that flows through the arboretum. Among the objectives are investigation of life histories of all species, evaluation of the factors that limit populations and comparative studies of the adaptations that assure competitive success and lead to community stability. He is assisted in this research by Scientific Assistant Barbara A. Brown.

Scientific Publications:

Aronson, Lester R.
1984. Levels of integration and organization: A reevaluation of the evolutionary scale. G. Greenberg and E. Tobach, eds. Behavioral Evolution and Integrative Levels. L. Erlbaum Associates, Hillsdale, New Jersey, pp. 57-81.

Breteler, R. J., Joseph W. Rachlin, and D. W. Engel

1984. Metals subpanel report. Breteler, R. J., ed. Chemical Pollution of the Hudson-Raritan Estuary. NOAA Technical Memorandum, NOS OMA 7, Rockville, Maryland, pp. 12-35.

Ferraris, Carl J.* (Sponsors: Donn E. Rosen and Gareth Nelson)

1985. Redescription and spawning behavior of the muraenid eel, *Gymnothorax herrei*. Copeia 1985, pp. 518-520.

P. Gorner, Peter Moller, and W. Weber

1984. Lateral-line input and stimulus localization in the African clawed toad *Xenopus* sp. Jour. Exp. Biol., vol. 108, pp. 315-328.

Nelson, Gareth

1984. Cladistics and biogeography. T. Duncan and T. Stuessy, eds. Cladistics: Perspectives on the Reconstruction of Evolutionary History. Columbia University Press, New York, pp. 273-293.

1985. Outgroups and ontogeny. Cladistics, vol. 1, pp. 29-45.

Platnick, N.I., and Gareth Nelson

1984. Composite areas in vicariance biogeography. Syst. Zool., vol. 33, pp. 328-335.

Rachlin, Joseph W. and Jensen, T. E.

1984. Effect of varying sulphur deficiency on structural components of a cyanobacterium *Synechococcus leopoliensis*: A morphometric study. Cytobios, vol. 41, pp. 35-46.

Rachlin, J. W., and B. E. Warkentine

1984. Population growth of the Atlantic red hake from the outer New York Bight. Annals New York Acad. Sci., vol. 435, pp. 331-332.

Rivlin, K., Joseph W. Rachlin, and G. Dale

1985. A simple method for the preparation of fish chromosomes, applicable to fieldwork, teaching, and banding. Jour. Fish Biol., vol. 26, pp. 267-272.

Rosen, Donn E.

1984. Zeiforms as primitive plectognath fishes. *Amer. Mus. Novitates*, no. 2782, pp. 1-45.

1984. Hierarchies and history. J. W. Pollard, ed. *Evolutionary Theory: Paths into the Future*. John Wiley and Sons, London and New York, pp. 77-97.

Schmidt, R. E., C. Lavett Smith, and P. R. Warny

1984. Discovery of the brook lamprey (Pisces, Petromyzontidae) in Long Island's fresh waters. *Northeastern Environmental Sci.*, vol. 3, pp. 73-74.

Szabo, T., and Peter Moller

1984. Neuroethological basis for electrocommunication. L. Bolis, R. D. Keynes, H. S. P. Maddrell, eds. *Comparative Physiology of Sensory Systems*. Cambridge University Press, Cambridge, pp. 455-474.

Toerring, M.-J., and Peter Moller

1984. Locomotor and electric displays associated with electrolocation during exploratory behavior in mormyrid fish. *Behavioral Brain Res.*, vol. 12, pp. 291-306.

Warkentine, B. E. and Joseph W. Rachlin

1984. Population dynamics of the Atlantic Silverside, *Menidia menidia*. *Ann. New York Acad. Sci.*, vol. 435, pp. 358-360.

Abstracts and Popular Publications:

Feinberg, M. Norma

1984. All Head and Mouth. *Nat. Hist.* vol. 93, no. 8, pp. 28-32.

Nelson, Gareth

1985. [Review of] *The Secular Ark: Studies in the History of Biogeography*, by J. Browne. *Cladistics*, vol. 1, pp. 107-111.

1985. [Review of] *The Expanding Earth: A Symposium*, by S. W. Carey, ed. *Syst. Zool.* vol. 34, pp. 103-104.

1985. [Review of] *Fishes of the World*, Second Edition, by J. S. Nelson. *Syst. Zool.*, vol. 34, pp. 104-105.

Nelson, Gareth, and Norman I. Platnick

1984. *Biogeography*. Carolina Biology Readers, Carolina Biological Supply Co., Burlington, no. 119, pp. 1-16, figs. 1-20.

Department of Invertebrates

The Department of Invertebrates is dedicated to the scientific study of all major groups of animals except vertebrates and terrestrial arthropods. Maintaining a tradition of integrating field studies with collections-based systematics investigations, the department made significant contributions to understanding of the evolutionary process in general, and to knowledge of trilobites and crustaceans, gastropod, cephalopod and bivalved mollusks, bryozoans, nemertine ribbon worms, parasites, and microorganisms.

Major Acquisitions Among the 68 accessions to the Recent mollusk collection, four were especially significant. The John and Dorothy Germer collection is worldwide in scope with more than 10,000 specimens. Nathan Halpern donated two rare species of cowries. The Betty Jean Piech collection, also worldwide, consists of some 3500 specimens. The Stanley Sokoloff collection contained 1500 specimens. In addition, Assistant Curators Neil H. Landman and Judith E. Winston added significant numbers of ammonites and bryozoans, respectively, to the collections.

Evolutionary Theory

Niles Eldredge, Chairman and Curator, published "Time Frames," the story of the theory of punctuated equilibria, which he developed with Stephen Jay Gould, Research Associate, in the early 1970s. He also completed work on another book, "Unfinished Synthesis," which examines the writings of the early architects of the Synthetic Theory of Evolution. Dr. Eldredge develops a hierarchical description of biological nature as a point of departure for a more complete evolutionary theory. He also pursued his interests in Silurian and Devonian trilobites of the southern hemisphere.

Gastropod Paleobiology Roger L. Batten, Curator, completed his study of the Permian gastropods of

Malaysia, the largest and most diverse such fauna in the eastern hemisphere, with over 90 species. His discovery of a number of species belonging to Mesozoic families reinforced his prior conclusion that the Permo-Triassic mass extinction was less severe for gastropods than for the other marine invertebrate groups.

Recent Mollusks The ongoing study by William K. Emerson, Curator, on the zoogeography of the marine mollusks of tropical American waters resulted in the discovery of a living member of a genus of snail that was thought to have become extinct some 3 million years ago. The species, *Pterorytis hamatus*, is not known to exist in the Caribbean. But a specimen was found living off the coast of Ecuador. Apparently it survived in the eastern Pacific after being separated from other members of this genus by the rise of the Isthmus of Panama.

Ribbon Worms Ernst Kirsteuer, Curator, has almost completed his monograph of the family Ototyphlonemertidae—minute, sand-inhabiting ribbon worms. The work involved the revision of two genera, the description of seven new species, and the description of several little known taxa based on new collections. He has confirmed the evolutionary integrity of the family, and provided a critical review of its geographic distribution, with new ecological data obtained from field studies in the Caribbean Sea.

Shelled Cephalopods Neil H. Landman, Assistant Curator, has focused on the question: why did the ammonites, a diverse group of shelled cephalopods, become extinct at the close of the Cretaceous period, about 65 million years ago? With Karl M. Waage of the Yale Peabody Museum, he is studying the history of one particular group of late Cretaceous ammonites, the scaphites, which were abundant in the seaway that covered North America at that time. For clues into the life history of ammonites, Dr. Landman is also studying their only living relative, the pearly nautilus. With J. Kirk Cochran of State University of New York, Stony Brook, he has deter-

mined that the nautilus is a slowly growing animal which may live up to 15 years.

Moss Animals Judith E. Winston, Assistant Curator, continued her research on the systematics and ecology of Recent bryozoans—tiny, colonial marine organisms closely related to brachiopods and phoronid worms. Much of her work was in the field, with visits to Antarctica (with Curatorial Assistant Beverly Heimberg), Florida, and Belize. During the year, Dr. Winston discovered that bryozoans undergo a regular process of molting—a feature of bryozoan biology previously completely unknown. She also solved some of the mystery of the function of avicularia, showing that these pincerlike members of bryozoan colonies snare predaceous polychaete worms that apparently feed on the bryozoans.

Mass Extinctions Norman D. Newell, Curator Emeritus, continued his research into the causes of mass extinctions, particularly the event that terminated the Paleozoic at the Permo-Triassic boundary. Skeptical of the recently proposed impact theory, Dr. Newell, the pioneer student of mass extinctions, has analyzed the actual pattern of extinction, and found that species's disappearances do not occur in a few days, weeks or years, as the impact theory predicts. Rather they take place over periods of hundreds of thousands of years. With Donald W. Boyd, Research Associate, Dr. Newell has also continued his systematic revisions of Permo-Triassic bivalved mollusks.

Natural Selection John Damuth, Thorne Research Fellow, has been investigating evolutionary processes that may occur at higher levels than that of pure, natural selection. Results so far indicate that traditional "species selection" is not a valid hierarchical extension of microevolutionary selection theory, but higher level selection processes do occur within the ecological hierarchy: between populations of different species within a community, and potentially among communities themselves. With I. Lorraine Heisler, of the Department of Biology at Vassar College, Dr. Damuth has

developed a general formal model of multi-level selection.

Symbiosis John J. Lee, Research Associate, and his collaborators continue to focus on symbiosis in larger Foraminifera. He carried out extensive field and laboratory work on diatom-bearing Foraminiferans at the H. Steinetz Marine Laboratory of Hebrew University of Jerusalem at Elat on the Red Sea. Dr. Lee also organized and was chairman of a symposium on Symbiosis in Protozoa at the annual meeting of the Society of Protozoologists.

Green Crabs Linda H. Mantel, Research Associate, continued studies of the effects of hydrocarbons on energy storage and osmotic regulation in the green crab, *Carcinus maenas*, and in the snail, *Littorina littorea*. She also applied new techniques to study hormonal regulation of salt and water balance in the green crab.

Computer Applications Leslie F. Marcus, Research Associate, continues to provide essential support in the department's program to computerize its collections. He completed work on simulation of "Offshore Leasing Rates and Undiscovered Oil and Gas." The work was for the Office of Technology Assessment of the U.S. Congress.

Parasitic Flatworms Horace W. Stunkard, Research Associate now in his 64th year at the Museum, continued his work on parasitic flatworms, curating the extensive collection of specimens, which he has contributed to the department. During the year, Dr. Stunkard published a paper on the genus *Spirorchis*.

Departmental Outreach During the year, the department made 78 loans to researchers at other institutions in the U.S. and abroad. The department was visited by 78 scientists, and 27 appointments were made with amateur collectors, artists and others interested in the reference collections. Behind-the-scenes tours were conducted for Museum members and outside organizations. Department staff members continued to serve also on the faculties of several local universities, and to participate in

the Discovery Tours program, to lecture for the Museum's Department of Education, and to lecture at universities and at scientific meetings throughout the world.

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- Curator William K. Emerson, right, and Scientific Assistant Walter E. Sage III, both of the Department of Invertebrates, review a portion of a major donation to the Museum's collection of Recent Mollusks. Sixty-eight major accessions were made to the department this year. Researchers in the Department of Invertebrates study virtually all major groups of animals, and make the collections available to researchers from other institutions around the world. Last year, more than 100 scientists, amateur collectors and artists made use of the Museum's Invertebrate reference collections.



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- Emerson, William K.
1985. *Murex hamatus* Hinds, 1844, a living west American species assigned to the Neogene Paciphile genus, *Pterorytis* Conrad (Gastropoda: Muricidae). The Nautilus, vol. 99, no. 1, pp. 14-17, 9 figs.
1985. Two new species of *Lyria* from the western Atlantic (Gastropoda: Volutidae). The Nautilus, vol. 99, no. 1, pp. 28-33, 15 figs.
1985. Remarks on some western Pacific species of *Morum* (Gastropoda: Tonacaea). In Stratigraphy, palaeontology, malacology, papers in honor of Dr. Nell Ludbrook. J. M. Lindsay, ed., Spec. Publ. S. Aust. Dept. Mines and Energy, vol. 5, pp. 51-56, 2 pls.
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1984. The use of free-living nematodes as a bioassay for estuarine sediments. Mar. Environ. Res. vol. 11, pp. 233-251.
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1984. [Review of] *Marine Bivalve Molluscs of the Canadian Central and Eastern Arctic: Faunal Composition and Zoogeography* by Irene Lubinsky. *Hawaiian Shell News*, vol. 32, no. 8, p. 8.
1984. [Review of] *Catalogue of the Living Bivalvia of the Eastern Pacific Ocean: Bering Strait to Cape Horn* by F.R. Bernard; *Freshwater Snails of Africa and Their Medical Importance* by David S. Brown. *Hawaiian Shell News*, vol. 32, no. 9, p. 13.
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Department of Mammalogy

The Department of Mammalogy translates the highly technical work of its scientists into informative exhibitions for the general public. Research topics include inking behavior in sea hares, systematics of Australian bats, distribution of rats throughout the Philippine Archipelago, and the role of the amino acid tryptophan in neuro-transmission. This year the special exhibition, "Captured Motion: Skeletal Studies by S. Harmsted Chubb," brought to the public the unique work of the world-renowned osteologist who was employed at the Museum for nearly half a century. Reaching both scientists and a general audience with their findings, department staff advance understanding of mammal species and the relationships among them.

Storage Facilities Expanded In order to better use specimens for research and assure their safe storage and accessibility to other scholars, the department reorganized and expanded parts of the collection to provide safer and more efficient storage. Staff members recurated the primate collection (aided by funds from the National Science Foundation), the large collection of African and Indian ungulates, the extensive holdings of Latin American edentates and African hyraxes, and groups of rodents from North America, South America, Africa and Asia.

The collections were heavily used by visitors and borrowers. The depart-

ment had 288 loans outstanding, including 895 specimens; 162 visitors spent 678 days studying in the department.

Mammals in Motion Scientific Assistant Marie A. Lawrence developed an exhibition describing animal motion using the exquisite mounted skeletons of horses, a wolf and dogs that were assembled by the Museum osteologist S. Harmsted Chubb. The exhibition, "Captured Motion: Skeletal Studies by S. Harmsted Chubb," is an informative and beautiful exposition of some of the Museum's treasures revealed in context of their research significance.

Bolivian Fauna Understanding the natural history of the mammals occurring in the state of Bolivia occupied Curator Sydney Anderson and his field team from mid-July through October. His expeditionary work is partially supported by the National Science Foundation, and he is collaborating with colleagues at the University of New Mexico's Museum of Southwestern Biology. Dr. Anderson obtained more than 1000 specimens of mammals. The specimens are accompanied by information concerning place and date of capture, altitude, type of habitat and other observations related to natural history of the populations they represent.

Predator Response Curator Ethel Tobach in collaboration with Graziano Fiorito of the Zoological Station in Naples, Italy, studied inking in the genus of sea hares, *Aplysia*. The release of ink by *Aplysia* has been thought to be a response to action by predators. Three species, *A. punctata*, *A. depilans* and *A. limacina*, are being studied. They are sympatric for most of their life cycles, but do not all ink. Larvae from the eggs are being examined in order to determine whether hybrids were formed in a laboratory situation. This study may explain the erratic inking pattern in *A. depilans*.

The opportunity to conduct this comparative research is of additional interest regarding the discovery of the metabolic source of the ink emitted by sea hares. The metabolic pathways of each of these species may vary sufficiently to make species identification of these animals more precise.

Social/Emotional Behavior In their study of the evolution and development of social/emotional behavior in several species, the role of genetic processes in development and evolution engaged Dr. Tobach, Scientific Assistant Dr. Joseph DeSantis and their colleagues. As an example of the complex relationship between genes and behavior, they studied the mutant Fawnhooded rat stock, which has a peripheral serotonin deficiency.

Serotonin is an important substance in the regulation of diurnal variations in activity cycles, temperature control, food intake and reproductive function. Seeking to understand whether peripheral serotonin deficiency in the Fawnhooded rat expresses itself in other aspects of biological function derived from central nervous system serotonin, Dr. Tobach's research group found that this rat is probably different in regard to pineal function when compared with its putative ancestors—the long-Evans stock, a pigmented, dark-hooded rat; and Wistar stock, an albino. The pineal plays an important role in daily variations in activity and reproductive function, and is rich in serotonin. The significantly different light response patterns presented by Fawnhooded rats suggest differential distribution of whole-body serotonin in this stock.

The ubiquitous presence of serotonin in many animal and plant forms, and its pervasive implication in so many essential life functions places this biochemical in an important evolutionary position, beyond that of a neurotransmitter. Serotonin is metabolized by the organism from an essential amino acid, tryptophan, which is ingested in many forms by mammals. Dr. Tobach and her group compared the Fawnhooded rat's differential response to fluid solutions of sweet- and bitter-tasting tryptophan with its putative ancestral stocks.

When the three rat stocks were offered either solution, or water, the Fawnhooded rat drank significantly more bitter-tasting liquid than sweet-tasting when the two solutions were presented together; they drank more of the bitter-tasting substance when it was paired with water. This was not true of the other two rats.

This study, coupled with the study of the effects of continuous darkness

on serotonin metabolism, establishes the Fawnhooded rat as an important subject for the elucidation of genetic processes in speciation.

In addition to its other characteristics, serotonin also expresses its critical role in central nervous system function. In humans, serotonin is implicated in psychological depression. As the central theme of the comparative psychology group is the study of the social-emotional behavior of animals, this is another reason for studying serotonin function.

One of the standard ways to study the emotional reactivity of rats is to observe them in an unfamiliar, uniformly lit environment. This situation stimulates a mild stress response. As the rat becomes more familiar with the environment, it "learns" that the experience of being in this particular place is time-bound and that it will soon be returned to a typical home cage.

Dr. Tobach and colleagues observed weanlings and adult females and males of the three rat stocks in such a situation. They found that the weanling Fawnhooded rat, in contrast with the Long-Evans and Wistar, persisted in activity associated with an unfamiliar situation throughout four days of observation, an unusually long period of time. As it has been found that rats deprived experimentally of central nervous system serotonin are hyperactive, this finding may indicate that the Fawnhooded weanling is deficient in central nervous system serotonin. As adults, there were no such differences among the three stocks. In view of the slow developmental pattern of the Fawnhooded stock, this finding may indicate another expression of serotonin deficiency.

The visual adjustments of the spiny desert mouse, *Acomys*, were also studied by Drs. Tobach and DeSantis along with Margorie Goldman, a visiting scientist. *Acomys* are of interest to people studying retinal structure, biochemistry, and *in utero* and neonatal auditory function. Knowledge about the sensory development of *Acomys* will be important in understanding the relative significance of these factors in the social-emotional adjustments of the species in contrast to altricial desert rodents.

South American Mammals

Exploration in South America and study of its unique mammalian fauna are a significant part of the department's research program. Dr. Sydney Anderson, along with co-editors Alfred Gardner of the U.S. Fish and Wildlife Service and James L. Patton of the Museum of Vertebrate Zoology, Berkeley, worked on a collaborative three-volume report on South American mammals to be published by the University of Chicago Press. Two curators in the department, Drs. Karl F. Koopman and Guy G. Musser, were among the collaborators.

Areography Dr. Anderson also investigated the nature of geographic ranges of vertebrates, studies that fall under the heading of Areography. An analysis of geographic ranges of Australian vertebrates (other than fish) is in progress and a report on the general theory of range size distributions has been submitted for publication in *Novitates*.

Bats of the World Dr. Karl F. Koopman worked on taxonomy, geographic distribution and phylogenetic relationships of bats throughout the world. He paid particular attention to further work on systematics and distributions of Australian bats, additional records and summation of recent taxonomic work on the Sudanese bat fauna, taxonomy of South American bats, and a comprehensive treatise on

After a 24-year career in the American Museum's Department of Mammalogy, Curator Karl F. Koopman, world renowned for his research on bats, retired in April. As a Curator Emeritus, he will complete his Museum research projects. The department's extensive collections of mammals are an important source of information to both Museum staff members and visiting researchers. Some 160 scientists from other institutions made use of the Mammalogy Department's resources in 1984-85.



the "Systematics of Chiroptera" for the *Handbuch der Zoologie* series.

In April, Dr. Koopman retired after 24 productive years in the department. He has been appointed Curator Emeritus and plans to continue daily research on bats. Specific projects include a chapter on systematics of vampire bats for a book about the natural history of that animal, and reports on bats of the Moluccas and Celebes. Members of the department look forward to having Dr. Koopman's continued personal and professional association.

Asian Zoogeography Discerning geographic and phylogenetic patterns of species in space and time is important to understanding the faunal history of a region, especially the vast area extending from the mainland of southeast Asia over thousands of islands to New Guinea and Australia. Dr. Guy G. Musser's research involves discovering patterns formed by living and fossil species of rats and mice native to this region of continents and islands. His intent is to determine what significance the patterns may have in understanding the biogeographic history of the Indo-Australian region. Basic to the inquiry is sound taxonomic revision of the region's fauna documenting the morphological, geographic, and, when possible, the ecological limits of each species.

New species are still being discovered in the Indo-Australian region. Dr. Musser's efforts, along with those of his colleagues, have focused on naming and describing rats from the mountains of southern Vietnam, the Sulu Archipelago, the Philippine Islands and the large island of Sulawesi. The characteristics of each of these new species add information to the overall patterns of native rat species and provide clues to zoogeographic relationships among faunas of the islands and mainland.

Mammals of New Jersey. Curator Richard G. Van Gelder published a preliminary checklist of New Jersey mammals, and an article outlining the status of the state's mammals. The formation of a cooperative mammal-study venture was undertaken through the New Jersey Audubon Society. Other research on New Jersey mammals emphasized deter-

mining the status of species at the beginning of New World written history, and the development of computer programs for handling data on the mammals.

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See Lazell and Koopman.
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Department of Mineral Sciences

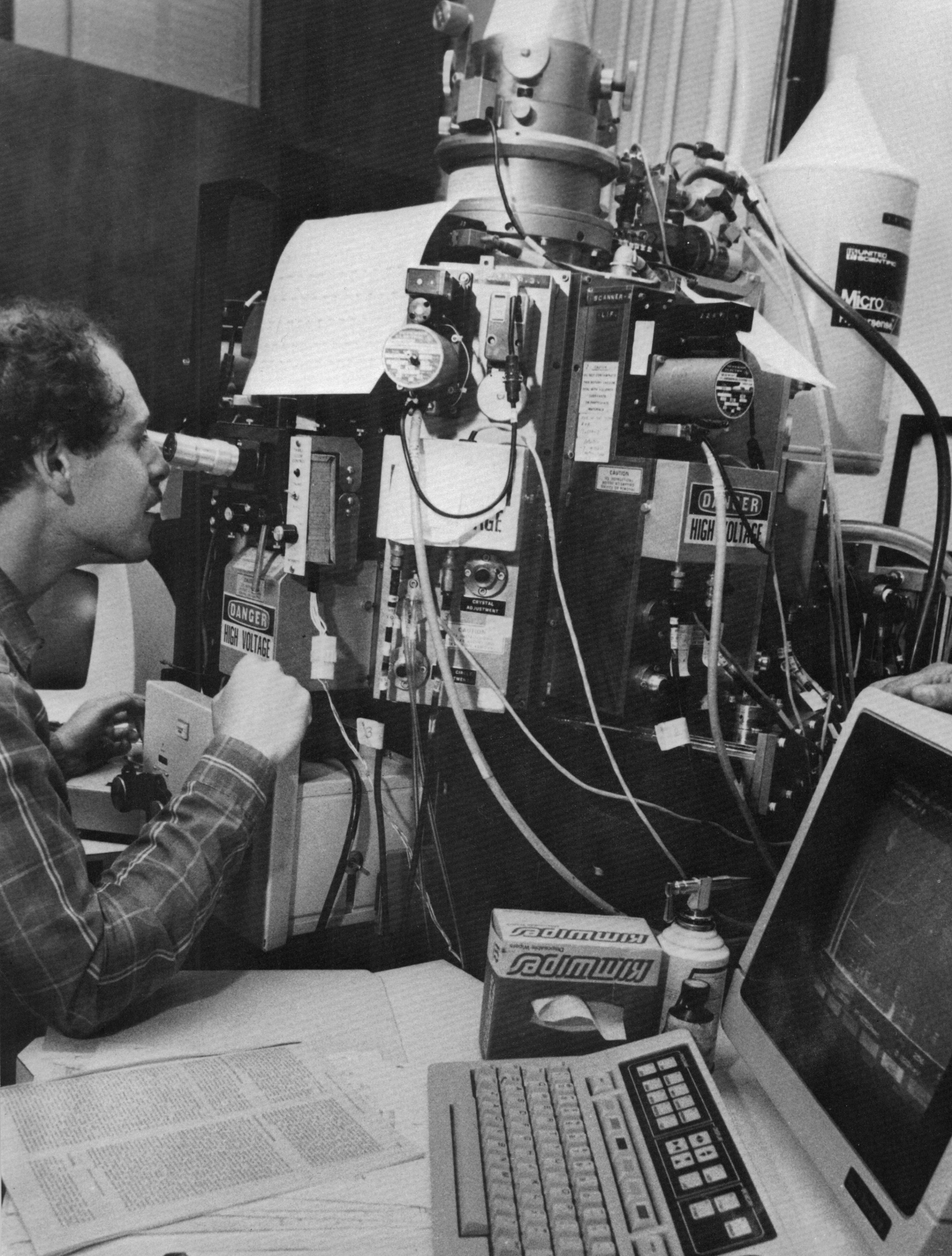
The Department of Mineral Sciences is responsible for managing the extensive mineral, gem, rock and meteorite collection. Research was diverse and focused on jade, asbestos, chondrules and chondritic meteorites, pallasite meteorites, mineral spectra, ore deposits in Peru, and gem deposits in Pakistan. Educational and exhibition programs are an important part of the overall program. They included a graduate course at Columbia University, a gem course, lectures, popular articles, traveling exhibits, and upgrading of the permanent exhibition halls.

Increased Acquisitions and

Loans The mineral and gem collections increased by 735 specimens. Notable acquisitions include a magnificent group of vanadinite crystals from Mibladen, Morocco; a superb gem quality emerald crystal, in matrix, from Muzo, Colombia; a green fluorapophyllite from Poona, India; a golden barite crystal group from Meade Co., South Dakota. Several fine gem crystals from the pegmatite deposits of the Gilgit region of Pakistan were obtained; they join the Museum's Pakistan collection which is one of the best in the world. Finally, a collection of 21 animal carvings rendered in the Fabergé style were donated by the estate of Clara Peck.

A total of 277 minerals and other specimens were loaned, continuing a distinct upward trend in the external use of the collection. These loans were made to 13 institutions, as diverse as the California Institute of Technology, Memphis State University, University of Tasmania and the New York State Triboro Bridge and Tunnel Authority.

The meteorite collection also maintained an upward trend in acquisition and lending activity. Donations to the collection were received from Gero Kurat of the Natural History Museum of Vienna (Hraschina, Quesa), Michael Lipschutz of Purdue Univer-



sity (Qingzhen), the Western Australian Museum (North Haig), Robert Haag (Edmond) and Sandy Siegel (Nuevo Mercurio). Exchanges were made with the collector James Dupont for the Guin, Lewiston, Eth-iudna and Grayton Beach meteorites. Loans were made to 14 institutions, as diverse as Columbia University, University of Tokyo and Texas A&M.

Slivers from Space A concerted effort has been maintained over the last nine years to develop collections of polished thin sections of meteorites. These are essential for carrying out mineralogic-petrologic research on meteorites. Two new items needed to develop the thin section collection were acquired. These are: a wire saw capable of thinly slicing or wafering a small sample, and a petrographic cutting and grinding unit which speeds up the early part of sample preparation.

A computer generated listing of the entire meteorite collection was completed, and the database for complete documentation of the meteorite collection is being refined and broadened. The "Old Museum Collection" as listed by Curator Edmond O. Hovey in his 1896 *Catalogue of Meteorites* is being researched for possible future exhibition.

Classroom and Field Activities

The department's educational activities increased markedly with courses offered at the graduate level, to adult education classes, and to special

interest groups. Associate Curator George E. Harlow, Senior Scientific Assistant Joseph J. Peters and Chairman and Curator Martin Prinz taught a seven-week course on the "Gems of the Earth." In addition, Dr. Harlow presented his popular "Weekend in Geology" to a sold-out audience in May.

Drs. Prinz and Harlow cooperated with Columbia University to present two graduate courses which will alternate with one another. Department staff also presented lectures to such groups as the Closter Nature Center and the New York Mineralogical Society.

Lighting, label copy and carpeting in the Guggenheim Hall of Minerals and the Morgan Hall of Gems were upgraded. New exhibition material has been prepared for the central case in the gem hall and a new audiovisual presentation on gold is in preparation. The small exhibit, "Is it a Meteorite?," was installed in the Arthur Ross Hall of Meteorites; it deals with the recognition of unusual objects as meteorites.

Traveling exhibits featuring tourmalines were sent to the Tucson Gem and Mineral Show, the Detroit Gem and Mineral Show, and the New Jersey Earth Science Show at Seton Hall University.

Jade and Asbestos Dr. Harlow studied the mineralogy and petrology of the unusual rocks called jadeitites, which consist of 90 percent of the mineral jadeite. Museum samples from four of eight worldwide localities have been examined with emphasis on determining the minerals present and understanding the varieties of jadeite that are emerald green in color.

One major facet of Dr. Harlow's research involved a month-long field trip to Guatemala made in conjunction with E. Peter Olds, a graduate student at Princeton University. Dr. Harlow and Mr. Olds studied the occurrences of jadeite and associated inclusions in the extensive serpentinite bodies along the Motagua Fault, which is similar to the San Andreas Fault in California.

Dr. Harlow also investigated the mineralogical properties of amphibole asbestos as they relate to pulmonary disease among asbestos workers. This work is conducted in collabora-

tion with Martha R. Kimball, Research Fellow, and is funded by the National Institute of Occupational Safety and Health (NIOSH). Two amphibole varieties of asbestos, commonly known as brown (amosite or asbestiform grunerite) and blue (crocidolite or asbestiform riebeckite) have been examined with mineralogical techniques, especially transmission electron microscopy (TEM). Of particular interest are data indicating that blue asbestos from the Cape Province of South Africa is far more active in producing the cancer mesothelioma than blue or brown asbestos from the Transvaal Province.

Frozen Drops in Rocks Dr. Prinz's meteorite research included collaboration with Research Fellow Jeremy S. Delaney, Research Associate C. E. Nehru, Scientific Assistant Carol O'Neill, and graduate students Michael K. Weisberg and Christopher P. Stokes. Dr. Delaney was named an Associate Editor for the *Journal of Geophysical Research*. One aspect of the study involved two separate projects on carbonaceous chondrite meteorites which contain layered chondrules. Chondrules are the tiny frozen droplets, about one millimeter across, which make up a large part of primitive meteorites. Previously they had been thought to have been formed by a single flash heating event which recorded an early nebular process. The work carried out on meteorites from Renazzo, Italy; Al Rais, Saudi Arabia, and Karoonda, Australia, shows that some chondrules are distinctly layered, and that the layers can record vastly different conditions in the short time span of their deposition.

Chondrites within Aubrites

Chondrites are chondrule-bearing primitive materials which later melted to form planets. There are ordinary chondrites (because they are the most abundant), carbonaceous chondrites (carbon-bearing) and enstatite chondrites (formed under extreme reducing or oxygen-poor conditions). Each is complex and they are rarely found together within the same meteorite.

Aubrites are closely related to enstatite chondrites, and are melted from them, but are not primitive. The

Michael Weisberg, Curatorial Assistant in the Department of Mineral Sciences, uses an electron microprobe to examine a section of meteorite. The microprobe does non-destructive microbeam analysis of very small areas. An electron beam bombards the specimen, which gives off characteristic X-rays of elements that can be recognized and quantified. Department scientists use the meteorite, mineral and gem collections for their research. They maintain the physical environment for each specimen's care and protection, and determine what specimens should be acquired to enhance the Museum's mineral and gem collections.

Cumberland Falls (Kentucky) aubrite is known to contain large pieces of ordinary chondritic material. One study showed that the chondritic material was unusual and different from other known chondrites; another study suggested that it started as "normal" chondritic material but became unusual because it was modified by the aubrite host. Recently, a second occurrence of this type was found in the Allan Hills area of Antarctica.

The department's study of these meteorites attempts to determine if their chondritic inclusions are similar, if they represent primary or metamorphosed assemblages, and if metamorphosed, whether that process occurred before or after incorporation within the aubrite. This work was done in collaboration with Michael Lipschutz of Purdue University, who carried out detailed chemical studies. The results to date indicate that the chondritic materials are similar and that the assemblages have been metamorphosed by reduction. That is, they formed initially in a more oxygen-rich environment and were modified in an oxygen-poor environment. Some iron oxide in the silicate minerals was expelled and changed into metallic iron. The final question, whether this took place before or after incorporation into the aubrite, is not yet resolved. This study illustrates how difficult it is to know whether meteoritic samples are recording fundamental characteristics, or modifications of these properties.

New Position Established The new curatorship in economic geology was filled in October by Assistant Curator Demetrius C. Pohl. The position was created through the efforts of Trustee Plato Malozemoff, who organized a consortium of mining and related companies to help in funding. Dr. Pohl will carry out research programs on precious and base metal ore deposits in order to better understand their origin and geologic significance.

His first major research project involved study of the silver-lead-zinc vein deposits of the Castrovirreyna Silver District in central Peru. This is a polymetallic vein deposit which occurs in relatively young volcanic rocks in South America. Some unanswered questions are: how do the

deposits relate to the volcanic rocks in which they occur; how are they tied to a particular stage in the volcanic cycle; and are they derived directly from solutions emanating from the volcanic magma or does volcanic activity merely heat the surrounding groundwater? Two months were spent studying field relationships and related deposits in Peru. Mapping in an area of more than 600 square kilometers demonstrated that the deposits in this district are a part of a superbly exposed fossil geothermal system. The fluid inclusions in the minerals will be studied in the samples collected, using newly acquired fluid inclusion equipment purchased this year. Fluid inclusions in minerals are trapped samples of the actual fluids present at the time of ore deposition.

Vibrational Spectra of Minerals

Curatorial Fellow Eric Dowty has made substantial progress in the study of the vibrational spectra of minerals using infrared and Raman spectra. A spectrum is a range of interactions over a specific wavelength or type of vibration. These spectra are used to interact with minerals to help characterize their atomic structure, which then helps explain the mineral characteristics. Infrared and Raman spectra have been calculated for many minerals using a complex computer program designed by Dr. Dowty. These spectra are then compared with those spectra actually measured.

Crystalline Clues Hiroshi Mori of the University of Tokyo is the new Boeschenstein Research Fellow. He joined the department this year to carry out a research program on the Pallasite group of meteorites. Pallasites are stony irons that consist of half iron-nickel metal and half large olivine crystals. They are thought to originate near the core-mantle boundary of a small planet which has been disrupted, but their origin is still uncertain. Dr. Mori is studying the deformational history recorded in olivine crystals by examining dislocations, or mistakes, in the crystal structure caused by strain. From the quantity and orientations of the dislocations one can determine if they are pristine (part of the original growth process), larger scale (due to geologic pro-

cesses such as slow mantle deformation), or caused by disastrous events (such as impact shock). The rate of deformation can also be deduced.

In order to find the dislocations, which are optically invisible, the meteorites must be "decorated," which entails coating them with a thin layer of iron oxide. Preparing the samples for this study is an arduous task. Twenty-one pallasites are being studied. For each an olivine crystal is selected and X-rayed so that it can be mounted in epoxy with the correct orientation, sliced to make it transparent, heated in an oven, polished to a flat surface, studied with an optical microscope and the results recorded on film. Preliminary conclusions show that most pallasites experienced low strain rates indicative of mantle processes, although some show evidence of intense shock.

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Department of Ornithology

Backed by the world's largest and most significant bird collection, the department's staff carried on their curatorial duties, assisted colleagues on six continents, worked out details of major exhibitions such as that on Audubon, and conducted research in North and South America, Cuba, Africa and Papua New Guinea. New specimens included many from the Cerro de la Neblina, Venezuelan Expedition, in which the department is strongly involved.

Notable accessions to the collections were received through staff participation in the Cerro de la Neblina Expedition in southern Venezuela, funded by the National Science Foundation and Research Associate William H. Phelps, Jr. Significant donations of specimens were made by Novaks Aviary, Nathaniel Whitney, the Osprey Foundation, the Raptor Trust and Heinz Meng. Research Associate Jean Delacour contributed a large portion of his ornithological library, including hundreds of books and reprints.

The National Science Foundation awarded a grant to the Ornithology and Herpetology departments for upgrading their bioacoustical laboratories. The acquisition and integration of new digital spectrum analyzers, oscilloscopes, real time analyzers and other instruments will greatly increase the usefulness of acoustic data gathered by the staff.

Honeyguides Lester L. Short, Chairman and Curator, was involved in research with Jennifer Horne, Research Associate of the Kenya National Museum, especially field studies of honeyguides. At a central Kenyan base camp they banded 31 and observed 50 honeyguides of five species, including the almost unknown Pallid Honeyguide. A major paper is in press on African honeyguides including their research results and all information reported in the last three decades on these wax-eating,

parasitic species.

Studies were also made of African barbets, supported by the L. C. Sanford Fund and Marianna Collins. Results of the barbet and honeyguide studies were presented at meetings in Colorado, and at the Francistown, Botswana, VI Pan-African Ornithological Congress.

Ivory-billed Woodpecker Dr. Short was invited by the Cuban Dirección de la Flora, Fauna y Areas Protegidas to lead a search for the last remaining Ivory-billed Woodpeckers in eastern Cuban mountains. With bioacoustician George Reynard, he went to Cuba in late February to early March. Plagued by heavy rains in the largely cut-over montane pinelands of northern Guantánamo Province, some 600 miles east of Havana, they walked and traversed in a jeep many miles of rugged country with roads in nearly impossible condition. Although he did not find the woodpecker, he located trees recently scaled by at least one Ivorybill in one area. Search of a neighboring area revealed the presence of Gundlach's Hawk, a rare hawk whose nest was observed and photographed for the first time. This bird is large enough to feed on the woodpecker. Findings indicate the existence of several individual Ivorybills, but no viable population of the birds.

Tyrant Flycatchers Wesley E. Lanyon, Lamont Curator of Birds, studied the systematics of higher categories of tyrant flycatchers. The structural complexes of the nasal capsule of the skull and the syrinx are being examined for clues to general relationships. Derived patterns of nesting behavior supplement morphological results. Visits were made to several museums to study critical specimens and arrange loans of some of them for dissection, staining and photographing at the Museum.

A major paper on the phylogeny of *Empidonax* flycatchers was submitted for publication. A shared derived character state of the skull attests to the similarity of this group. Also, the morphology of the syrinx, and to a lesser extent nesting behavior and external appearance, help determine relationships within the group. Three new

genera were proposed in this investigation.

Andean Birds Curator François Vuilleumier arranged publication of a book on high altitude tropical biology, co-edited with Maximina Monasterio of the University of the Andes, Mérida, Venezuela. He completed papers on the biogeography of high Andean birds. Papers being done with Research Associate Ernst Mayr were also completed, including one assessing validity of new avian species proposed between 1976 and 1980. Dr. Vuilleumier also did research on the interchange of fossil and recent avifaunas in the Americas, avian diversity in tropical ecosystems in relation to national parks in such areas, and major niche shifts during avian speciation in South America.

Bird Demographics Assistant Curator George Barrowclough undertook collecting trips to obtain skin, skeleton and tissue samples of juncos in Maine, Pennsylvania and Virginia. The materials will be used in his studies of geographic variation in the genus *Junco*. He also participated in the Cerro de la Neblina Expedition, obtaining many specimens, some being the department's only specimens. Among them is the second existing skeleton of the owl *Otus watsoni*.

With Associate Sadie Coats, Dr. Barrowclough completed an analysis of owl demographics and genetics, using for the first time for a major taxonomic group the computer reduction of data from existing literature. With Russell Lande of the University of Chicago, he completed a study of the genetic requirements of wild populations for long-term survival. Guidelines were established for use of managers in monitoring inbreeding and other problems in critical or endangered populations.

Hawks and Owls of the World

Lamont Curator Emeritus Dean Amadon prepared a reference list of hawks and owls of the world, with Field Associate John Bull and Joe T. Marshall of the U.S. Fish and Wildlife Service. He revised a review manuscript on recent research on Hawaiian Honeycreepers, and gathered information on polymorphism in hawks.

Senior Scientific Assistant Mary LeCroy conducted research for the special exhibition 'John J. Audubon: Science into Art.' The end result of her efforts was an exhibition that provided an in-depth look at the life of the artist and his paintings. Ms. LeCroy also studied the birds of Papua New Guinea in cooperation with Research Associate Jared Diamond. In addition, she spent much of October studying birds of paradise in two areas of Highland Papua New Guinea.

Allison V. Andors joined the staff in February as Scientific Assistant, and continued his doctoral research on the anatomy, systematics and paleobiology of the extinct giant *Diatryma*.

Chapman Research Fellow Robert Bleiweiss spent October to March in Ecuador, studying the evolutionary and behavioral significance of female-limited polychromatisms in hummingbirds, and locating a population of mixed male-colored and female-colored specimens of *Heliangelus exortis*. He was made Research Associate at the beginning of 1985.

Chapman Research Fellow David Wells progressed on his preparation of a speciation atlas of southern Asian birds, but had to leave for Malaysia to teach early in 1985. Chapman Fellow Mary McKittrick joined the department in May to begin studies of flycatcher muscle variation, a field and laboratory endeavor.

Research Associate Walter J. Bock studied the functional morphology of the avian feeding apparatus, passerine bird relationships, and worked on the second edition of the "Reference List of Birds of the World." Jean Delacour, Research Associate, reviewed manuscripts, and donated to the department a large segment of his ornithological library, obtained over the last 70 years. Research Associate Jared Diamond analyzed the evolution of ecological segregating mechanisms among Papua New Guinea's mountain birds, using the department's collections, and published a number of scientific and popular articles on island biogeography and extinctions.

Robert W. Dickerman, Research Associate, collected specimens in Nebraska and South Dakota, studied birds obtained on the Cerro de la Neblina Expedition, and is completing several papers on birds of Guatemala. As

his health permitted, Research Associate James C. Greenway, Jr., worked on the list of the department's type specimens, aided by Mary LeCroy and Associate Richard Sloss.

Research Associate Cheryl Harding studied the role of hormone metabolism in control of male social behavior, particularly the role of female hormones in activating certain behaviors in male Zebra Finches. In collaborative research with Rockefeller University, Population Council scientists and graduate students Joanne Oliva-Purdy and Michael Walters demonstrated levels of the female hormone estradiol in male Zebra Finches 100 times higher than levels found in other male songbirds, and higher than levels of this hormone in some female species. Research Associate William H. Phelps, Jr., assisted with the Cerro de la Neblina Expedition, which he funded in part.

G. Stuart Keith, Research Associate, completed writing up the genus *Vanellus*, and co-edited the six-volume handbook "The Birds of Africa." Field Associate John Bull prepared the department's reference collection of birds of the world, completing the *Tyrannidae*, and worked with Curator Emeritus Dean Amadon on the reference list of hawks and owls of the world. Associate Sadie Coats researched owls and aspects of the collections of birds from Cerro de la Neblina. Associate Ruth DeLynn facilitated the research of all users of the anatomical collection, caring for

The syrinx, which produces the call of one of the Myiarchus flycatchers, also provides Wesley E. Lanyon, Lamont Curator in the Department of Ornithology, with clues to general relationships within this group of birds. Similarities in the physical structure of the birds, including the syrinx and skull, as well as shared nesting behavior, led Dr. Lanyon to describe several new genera in the family of tyrant flycatchers. The Museum's collection of more than one million specimens of birds, containing 96 percent of the 9000 known bird species, is the largest and most complete collection of birds in the world.

Financial Statements



Revenue	1984-85	35,251,119
Expenses	1984-85	34,789,448



Treasurer's Report

The statements reflecting the financial condition of the American Museum of Natural History, consisting of the Balance Sheet, Statement of Revenue and Expenses of Current Funds and Statement of Changes in Fund Balances, appear on the following pages. These statements have been audited by Coopers & Lybrand and the notes related to these statements appear on pages A-8 and A-12.

In reviewing the Balance Sheet it should be noted that investments in marketable securities are recorded at cost and amount to \$108,346,194. These investments include the General Fund of \$6,841,620; Special Funds of \$10,551,254, and Endowment Funds of \$90,953,320. The total market value of these investments on June 30, 1985, amounts to \$122,475,929, as detailed in Note 2 to the financial statements. General Fund investments of \$6,841,620 consist largely of cash received from Museum members for benefits due them in future years, and are generally offset by the liability for unearned membership which amounts to \$7,094,862. Special Funds investments of \$10,551,254 consist primarily of funds received for the completion of special programs and projects funded by grants from individuals, private foundations and government agencies, as well as Museum funds set aside for specific programs to be completed in future years. Endowment Funds investments of \$90,953,320 represent the balance of funds allocated by donors or by the Board of Trustees for endowment purposes since the organization of the Museum in 1869.

The revenue and expenses of the General Fund and Special Funds

appear on page A-6, in the Statement of Revenue and Expenses of Current Funds. The total revenue for these funds amounted to \$35,251,119; the total expenses amounted to \$34,789,448. After adjusting for the support grants of \$660,000, the revenue exceeded expenses by \$1,121,671. It should be noted that while the combined operations of these funds showed an excess of revenue over expenses, the General Fund, which supports the ongoing activities of the Museum, had an excess of expense over revenue of \$302,644; the Special Funds, which cover programs restricted in nature and which may take several years to complete, had an excess of revenue over expenses of \$1,424,315.

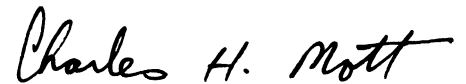
In fiscal 1984-1985, the General Fund revenue amounted to \$27,944,403, an increase of \$1,457,927 over the prior year. The major areas accounting for this increase were the appropriated funds contributed by the City of New York, distribution from Endowment Funds, increased revenues from *Natural History* magazine and membership, and auxiliary activities. Appropriated funds increased \$196,825 and primarily represented negotiated salary increases and social benefits costs for current and prior years. The increase in distribution from Endowment Funds of about \$182,389 resulted from the growth in the value of the Endowment Funds. The increase in *Natural History* magazine and membership revenue of \$765,650 primarily reflects an increase in the associate membership annual dues rate. The revenue from auxiliary activities increased by about \$267,401 and is detailed in Note 9.

The General Fund expenses for the

year amounted to \$28,907,047, compared to \$27,377,284 in the previous year. The increase in General Fund expenses for scientific and educational activities, administrative and general, plant operation and maintenance, and pension and other social benefits included cost of living adjustments to the salaries of employees and the increased cost of personal services and supplies the Museum purchases from outside vendors. The rise in costs for *Natural History* magazine and membership and auxiliary activities included increases for paper and postage as well as cost of living salary adjustments.

The generous support the Museum receives from donors, members, the general public and various government agencies has enabled the Museum to expand the services and educational programs it offers each year.

We thank all of our contributors and look forward to their continuing interest in helping the Museum to broaden the range and the scope of its exhibitions and programs.



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, 1985 and 1984 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, 1985 and 1984 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 4, 1985

American Museum of Natural History Balance Sheets, June 30, 1985 and 1984

Assets:

Cash
Receivable for securities sold
Accrued interest and dividends receivable
Accounts receivable, less allowance for doubtful accounts of \$293,000 in 1985 and \$149,000 in 1984
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.

1985				1984			
Current Funds				Current Funds			
General Fund	Special Funds	Endowment Funds	Total	General Fund	Special Funds	Endowment Funds	Total
\$ 628,611	\$ 541	\$ 119,843	\$ 748,995	\$ 138,468	\$ 724	\$ 239,685	\$ 378,877
		1,663,071	1,663,071			238,019	238,019
41,721	67,275	1,003,625	1,112,621	149,170	235,668	726,757	1,111,595
1,616,523	122,683		1,739,206	1,611,821	88,129		1,699,950
6,841,620	10,551,254	90,953,320	108,346,194	5,981,832	8,824,032	82,903,144	97,709,008
	425,000		425,000		425,000		425,000
1,085,227			1,085,227	1,155,680			1,155,680
921,184	84,737		1,005,921	951,683	86,054		1,037,737
\$11,134,886	\$11,251,490	\$93,739,859	\$116,126,235	\$9,988,654	\$9,659,607	\$84,107,605	\$103,755,866
\$ 2,192,167	\$ 631,072	\$ 614,005	\$ 3,437,244	\$2,016,594	\$ 533,568	\$ 486,611	\$ 3,036,773
2,164,985			2,164,985	2,005,748			2,005,748
		1,608,358	1,608,358			1,120,832	1,120,832
7,094,862			7,094,862	6,246,189			6,246,189
(317,128)			(317,128)	(279,877)			(279,877)
	10,620,418		10,620,418		9,126,039		9,126,039
		91,517,496	91,517,496			82,500,162	82,500,162
\$11,134,886	\$11,251,490	\$93,739,859	\$116,126,235	\$9,988,654	\$9,659,607	\$84,107,605	\$103,755,866

Statements of Revenue and Expenses of Current Funds for the years ended June 30, 1985 and 1984

	General Fund		Special Funds		Total	
Revenue:	1985	1984	1985	1984	1985	1984
The City of New York:						
Appropriated funds	\$ 5,369,077	\$ 5,172,252			\$ 5,369,077	\$ 5,172,252
Value of energy services and contributions to pension costs (Notes 10 and 11)	2,168,058	2,296,141			2,168,058	2,296,141
Gifts, bequests and grants	1,633,885	1,534,070	\$2,640,580	\$2,667,336	4,274,465	4,201,406
Distribution from Endowment Funds (Note 8)	2,720,000	2,537,611	1,051,952	924,657	3,771,952	3,462,268
Income from investments	987,835	1,019,163	482,650	442,689	1,470,485	1,461,852
Visitors' contributions			2,205,898	2,086,678	2,205,898	2,086,678
Natural History magazine and membership	10,558,992	9,793,342			10,558,992	9,793,342
Other revenue	735,697	630,439	925,636	1,107,136	1,661,333	1,737,575
Auxiliary activities (Note 9)	3,770,859	3,503,458			3,770,859	3,503,458
Total revenue	27,944,403	26,486,476	7,306,716	7,228,496	35,251,119	33,714,972
Expenses:						
Scientific and educational activities	5,026,277	4,576,841			5,026,277	4,576,841
Exhibition halls and exhibits			1,482,918	1,984,747	1,482,918	1,984,747
Other special purpose programs and projects			3,810,988	3,704,001	3,810,988	3,704,001
Administrative and general	2,897,185	2,794,623	399,850	398,202	3,297,035	3,192,825
Plant operating and maintenance (Note 10)	6,008,579	5,950,424			6,008,579	5,950,424
Pension and other social benefits (Notes 11 and 12)	2,602,973	2,498,725	188,645	245,283	2,791,618	2,744,008
Natural History magazine and membership	9,735,716	9,078,333			9,735,716	9,078,333
Auxiliary activities (Note 9)	2,636,317	2,478,338			2,636,317	2,478,338
Total expenses	28,907,047	27,377,284	5,882,401	6,332,233	34,789,448	33,709,517
Excess of revenue over expenses (expenses over revenue) before support grants	(962,644)	(890,808)	1,424,315	896,263	461,671	5,455
Support grants (Note 13)	660,000	625,000			660,000	625,000
Excess of revenue over expenses (expenses over revenue)	(\$ 302,644)	(\$ 265,808)	\$1,424,315	\$ 896,263	\$ 1,121,671	\$ 630,455

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

Statements of Changes in Fund Balances for the years ended June 30, 1985 and 1984

	Current Funds					
	General Fund		Special Funds		Endowment Funds	
	1985	1984	1985	1984	1985	1984
Balance (deficit), beginning of year	(\$279,877)	(\$297,012)	\$ 9,126,039	\$8,387,566	\$82,500,162	\$72,962,182
Additions:						
Gifts, bequests and grants					699,352	1,576,004
Interest and dividend income (Note 8)					2,312,617	1,591,682
Net gain on sale of investments					6,960,917	7,134,997
Excess of revenue over expenses			1,424,315	896,263		
Total additions			1,424,315	896,263	9,972,886	10,302,683
Deductions:						
Excess of expenses over revenue	302,644	265,808				
Administrative and general expenses					425,047	461,612
Prior service contributions to CIRS (Note 11)					195,048	177,938
Total deductions	302,644	265,808			620,095	639,550
Transfers between funds:						
Financing of:						
1984 and 1983 General Fund deficits	279,877	297,012	(30,293)	(200,000)	(249,584)	(97,012)
Special Funds activities	(14,484)	(14,069)	100,357	42,210	(85,873)	(28,141)
Total transfers	265,393	282,943	70,064	(157,790)	(335,457)	(125,153)
Balance (deficit), end of year	(\$317,128)	(\$279,877)	\$10,620,418	\$9,126,039	\$91,517,496	\$82,500,162

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 (most of which are owned by the City of New York ("City")), fixed assets (which are expensed at time of purchase), exhibits, collections and the Library are not reflected in the balance sheets.

To ensure observance of limitations and restrictions placed on the use of the resources available to the Museum, the accounts of the Museum are maintained in accordance with the principles of fund accounting. This is the procedure by which resources for various purposes are classified for accounting and financial reporting purposes into funds that are in accordance with 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 as income ratably over the membership term.

2. Investments:

Cost and market values of investments at June 30 are as follows:	1985		1984	
	Cost	Market	Cost	Market
General Fund	\$ 6,841,620	\$ 7,237,336	\$ 5,981,832	\$ 6,098,462
Special Funds	10,551,254	11,159,552	8,824,032	9,008,904
Endowment Funds	90,953,320	104,079,041	82,903,144	86,652,434
	\$108,346,194	\$122,475,929	\$97,709,008	\$101,759,800
The Museum's investments consist of the following:				
Short-term obligations	\$ 15,893,601	\$ 15,988,447	\$34,439,038	\$ 34,340,311
Fixed income securities	34,001,226	36,612,887	17,715,683	17,113,684
Common and preferred stocks	57,651,367	69,074,595	45,154,287	49,905,805
Other investments	800,000	800,000	400,000	400,000
	\$108,346,194	\$122,475,929	\$97,709,008	\$101,759,800

The Museum's investments at June 30, 1985 include a capital contribution of \$800,000 to a limited partnership; the total capital contribution will be \$2,000,000. An additional \$400,000 was paid on July 29, 1985. The remaining \$800,000 is due in two equal instalments 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, 1985 and 1984, the market value of securities loaned amounted to approximately \$18,250,000 and \$12,800,000, respectively, and the market value of the related collateral amounted to approximately \$18,300,000 and \$12,803,000, respectively. Under the terms of the lending agreement, the Custodian has agreed to indemnify the Museum against any loss resulting from the borrower's failure to return securities or a deficiency in collateral.

3. Planetarium Authority Bonds: The 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, 1985 and 1984, interest income on these bonds (at 4½%) of \$25,650 is included in the General Fund.

4. Inventories: Inventories comprise:	1985	1984
Natural History magazine paper	\$ 820,904	\$ 904,333
Museum shop merchandise	264,323	251,347
	\$1,085,227	\$1,155,680

5. Special Funds: Included at June 30, 1985 in Special Funds (funds which are received or appropriated for specific purposes) is approximately \$4,484,000 of funds restricted by the donor as to use.

6. Overdrafts: The balances at June 30, 1985 and 1984 of Special Funds are net of overdrafts of certain of these funds of approximately \$1,544,000 and \$1,332,000, 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 summarized as follows:	June 30, 1985	June 30, 1984
Endowment Funds, income available for:		
Restricted purposes	\$40,546,451	\$37,407,497
Unrestricted purposes	13,007,266	11,948,287
Funds functioning as endowment, principal and income available for:		
Restricted purposes	17,836,560	14,637,207
Unrestricted purposes	20,127,219	18,507,171
	\$91,517,496	\$82,500,162

8. Investment Income: Total interest and dividend income for the Endowment Funds for fiscal 1985 and 1984 was \$6,084,569 and \$5,053,950, respectively. In accordance with the policy adopted by the Board of Trustees, distributions to the General Fund and Special Funds and funding of pension support were fixed at 5 percent of the average of the market value of the Endowment Funds for the three preceding years. The distributions were as follows:

	1985	1984
General Fund	\$2,720,000	\$2,537,611
Special Funds	1,051,952	924,657
	\$3,771,952	\$3,462,268

The excess of income over the distributions was retained in the Endowment Funds. This amount includes \$195,048 and \$177,938 for pension support in 1985 and 1984, respectively, which offsets, in part, prior service cost contributions to the Cultural Institutions Retirement System ("CIRS").

9. Auxiliary Activities: The revenue and expenses for auxiliary activities in fiscal 1985 and 1984 are as follows:

	1985		1984	
	Revenue	Expenses	Revenue	Expenses
Museum shops	\$1,839,898	\$1,498,642	\$1,530,386	\$1,229,650
Discovery tours	537,141	457,451	555,233	449,640
Naturemax	474,749	325,154	562,177	472,283
Other auxiliary activities	919,071	355,070	855,662	326,765
	\$3,770,859	\$2,636,317	\$3,503,458	\$2,478,338

10. Operating and Maintenance Expenses: Plant operating and maintenance expenses in fiscal 1985 and 1984 include the value of energy services supplied by the City of New York of \$1,758,341 and \$1,858,079, respectively.

11. Pension Plans: The Museum accrues and funds annually the normal cost for eligible employees participating in the Cultural Institutions Pension Plan ("CIRS Plan") administered by CIRS. To be eligible under the CIRS Plan, all employees must have attained age 22 and have been 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 is administered by CIRS. Total pension costs amounted to approximately \$1,219,000 in fiscal 1985 and \$1,253,000 in fiscal 1984. Of these costs, \$409,717 in fiscal 1985 and \$438,062 in fiscal 1984 were paid directly by the City of New York to CIRS.

Approximately \$809,000 and \$815,000 in 1985 and 1984, respectively, were paid by the Museum, of which \$195,048 in fiscal 1985 and \$177,938 in fiscal 1984 were funded through Pension Support Endowment Funds. The balance of approximately \$614,000 in fiscal 1985 and \$637,000 in fiscal 1984 (representing normal service cost and amortization of unfunded prior service cost over a 20-year period) was charged to current funds. The CIRS Plan is a multiemployer plan and, 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.

12. Post-retirement Benefits: The Museum provides health and life insurance for retired employees. These costs, charged to current operations, amounted to \$285,428 in 1985 and \$250,438 in fiscal 1984, which are as follows:

	1985	1984
Health Insurance	\$241,794	\$203,129
Life Insurance		
(net after dividends)	43,634	47,309
	\$285,428	\$250,438

13. Support Grants: In fiscal 1985 and 1984, support grants were received from New York State Council on the Arts and the Institute of Museum Services as follows:

	1985	1984
New York State Council on the Arts	\$585,000	\$575,000
Institute of Museum Services	75,000	50,000
	\$660,000	\$625,000

14. Related Party Transactions: The Museum provides certain services, including accounting, security and maintenance services, for which the Planetarium was charged an aggregate amount of \$190,070 in fiscal 1985 and \$188,360 in fiscal 1984.

15. Buildings: The buildings occupied by the Museum are owned by the City and the City appropriates funds for their renovation, improvement and alteration. Funds committed by the City for these capital projects in fiscal 1985 and 1984 amounted to \$39,000 and \$2,002,000, respectively.

16. Reclassifications: Certain amounts in the 1984 financial statements have been reclassified to conform to the fiscal 1985 presentation.

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, 1985 and 1984, and the
related statements of revenue and ex-
penses of unrestricted funds and changes
in fund balances for the years then ended.
Our examinations were made in
accordance with generally accepted
auditing standards and, accordingly,
included such tests of the accounting
records and such other auditing
procedures as we considered necessary
in the circumstances.

In our opinion, the financial statements
referred to above present fairly the
financial position of the American
Museum of Natural History Planetarium
Authority as of June 30, 1985 and 1984
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 20, 1985

American Museum of Natural History Planetarium Authority Balance Sheets, June 30, 1985 and 1984

Assets:

Cash
Short-term investments
Accounts receivable
Planetarium shop inventory

Equipment and fixtures:
Zeiss planetarium instrument, at cost
Building improvements, at cost

Less, Accumulated depreciation (Note 2)

Furniture, fixtures and equipment

Buildings, at cost

Liabilities:

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

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, 1985 and 1984

1985	1984
\$ 178,162	\$ 24,691
700,000	500,000
32,067	12,350
58,306	42,548
968,535	579,589
221,928	221,928
662,289	662,289
884,217	884,217
(532,592)	(465,056)
351,625	419,161
1	1
351,626	419,162
1,019,210	1,019,210
\$2,339,371	\$2,017,961
\$ 43,593	\$ 31,784
78,999	93,724
570,000	570,000
315,450	315,450
1,008,042	1,010,958
156,869	156,869
429,455	429,455
400,000	400,000
986,324	986,324
(533,279)	(847,284)
878,284	867,963
1,331,329	1,007,003
\$2,339,371	\$2,017,961

	1985	1984
Revenue:		
Admission fees, less commissions	\$ 984,055	\$ 804,268
Auxiliary activity, sales booth	234,225	183,590
Special lectures and courses	60,325	44,840
Other revenue	74,152	31,072
Total revenue	1,352,757	1,063,770
Expenses:		
Preparation, presentation and promotional	488,972	470,371
Operation and maintenance	197,998	194,656
Auxiliary activity, sales booth	182,446	153,159
Administrative and general	80,630	88,996
Pension and other social benefits (Note 5)	119,108	92,587
Special lectures and courses	31,342	27,548
Interest on past-due 4½% Refunding Serial Revenue bonds (Note 3)	25,650	25,650
Provision for depreciation	67,536	67,536
Total expenses	1,193,682	1,120,503
Excess (deficiency) from operations	159,075	(56,733)
Contributions	98,500	24,000
Net profit (loss)	\$ 257,575	(\$ 32,733)

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

Statements of Changes in Fund Balances for the years ended June 30, 1985 and 1984

	Unrestricted Fund		Restricted Funds	
	1985	1984	1985	1984
Balance (deficit), beginning of year	(\$847,284)	(\$870,981)	\$867,963	\$787,166
Additions:				
Contributions			15,250	57,232
Proceeds from special presentations (Note 4)			253,130	234,556
Income from investments			50,409	35,081
Expenditures:				
Special purpose programs and projects			(27,034)	(26,340)
Special presentation expenses (Note 4)			(225,004)	(163,302)
Transfers between funds (Note 2)	56,430	56,430	(56,430)	(56,430)
Net profit (loss)	257,575	(32,733)		
Balance (deficit), end of year	(\$533,279)	(\$847,284)	\$878,284	\$867,963

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 improvements and replacements of equipment and other items 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 which are stated at cost, which approximates market value.

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

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

2. Equipment and Fixtures: 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 were purchased by the Museum in 1948. The Charles Hayden Foundation contributed \$200,000 to the Museum toward the purchase of such bonds.

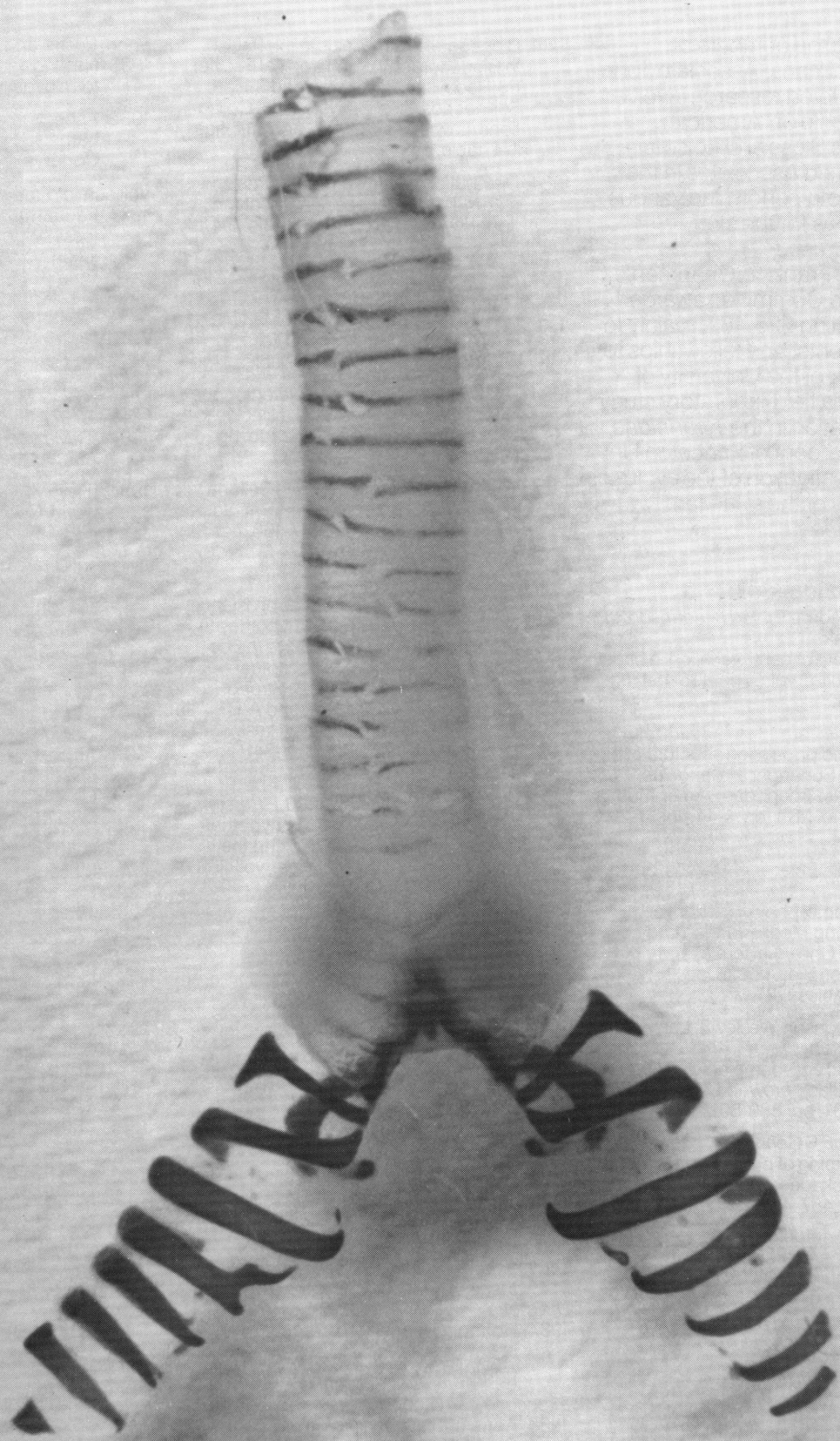
4. Special Presentations: The Board of Trustees of the Planetarium has designated that the net income from special presentations be set aside in a board designated restricted fund to finance current and future improvements and renovations.

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

Pension expense for fiscal 1985 and 1984 was \$45,085 and \$42,395, respectively. 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 benefits are not determinable on an individual institution basis.

6. Related Party Transactions: The Planetarium receives certain services, including accounting, security and maintenance services, from the Museum. The aggregate charges for such services in fiscal 1985 and 1984 aggregated \$190,070 and \$188,360, respectively.

Admission fees paid upon entrance to the Planetarium also include entrance to the Museum. To compensate the Museum for visitors who enter the Museum from the Planetarium, approximately \$55,000 and \$48,000 during fiscal 1985 and 1984, respectively, was paid to the Museum by the Planetarium.



and cataloging the numbers of incoming specimens. Associate John Farrand conducted research involved with his editorship of "American Birds." Richard Sloss and Lois Heilbrun were named Associates in the department, both performing various curatorial chores for the staff.

Awards The Frank M. Chapman Memorial Fund Committee awarded 52 grants, totaling \$25,482, mainly to graduate students, and fellowships to Mary McKittrick of the University of Pittsburgh, for a field-laboratory study of muscle variation in the *Tyrannidae*, and to Nina Pierpont of Princeton University, for investigation of the evolution of diversity of the avian family *Dendrocolaptidae*.

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Gilpin, M. E., and J. M. Diamond
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Harding, C. F., M. J. Walters, and B. P. Parsons
1984. Androgen receptor levels in hypothalamic and vocal control nuclei in the male Zebra Finch. *Brain Res.*, vol. 306, pp. 333-339, fig. 1, tables 1-2.

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Department of Vertebrate Paleontology

The department is the most active center of vertebrate paleontology in the world. Its holdings number several hundred thousand specimens. Its curators, research associates and students represent areas of interest in all the major groups of vertebrates. Recent efforts have involved an increase in the fossil fish collections, a study of mammalian cranial characteristics, collection of several excellent specimens of extinct turtles, and field expeditions to the Plains and Rocky Mountains, Mexico and Brazil. The study of vertebrate fossils requires expertise in field collection, preparation, illustration, systematic zoology, a firm understanding of ontogeny and comparative anatomy of recent organisms, and a thorough knowledge of biogeography, plate tectonics, geochronology and stratigraphy.

Field Trips Funded The activity of the department has benefited greatly from generous contributions. The Childs Frick Laboratory Endowment continues to provide initial funding for field projects whose successes have attracted additional support from outside sources. The Frick Fund also supports the publication costs of certain curators and research associates and a wide range of other activities within the department. The James Carter Memorial Fund supported visits by Qi Tao and Qui Zhanxiang, paleontologists from the Peoples' Republic of China, and supported our current Postdoctoral Research Fellow, Lawrence J. Flynn, in his second-year study of rodent phylogeny and Cenozoic Asian faunas. The Carter Fund and anonymous contributions led to the purchase of a computer system for the database management of the fossil vertebrate collections.

New Fossil Fishes This year has also seen a very important contribu-



tion to our fossil fish collections. Herbert Axelrod has donated several thousand Cretaceous fishes from Brazil, and has provided funds for the storage of a significant part of this collection. This massive acquisition constitutes the most comprehensive collection of this material anywhere outside of Brazil. A great many of these specimens are exquisitely preserved. The most exciting find thus far is a complete coelacanth, the first such fossil from South America. Other important material includes articulated pterosaur skeletons, primitive trionychids (soft-shelled turtles), and a vast array of undescribed fossil insects.

Associate Curator John G. Maisey was heavily involved with the transfer of the Axelrod collection of fishes to the American Museum. As part of this effort, he visited the famous source of these fishes in Ceara, northeastern Brazil. Dr. Maisey also conducted and completed a series of studies of fossil sharks and primitive gnathostomes. Some of his work is supported by the National Science Foundation. Major works on primitive bony fishes were published by Curator Emeritus, Bobb Schaeffer.

Mammal Classification Under Curator Malcolm C. McKenna's direction, the prodigious task of entering a classification of some 8000 mammalian taxa into the Museum's computer system was completed. During much of this year, Dr. McKenna, Scientific

Assistant Susan Koelle Bell and several co-authors painstakingly edited the classification, incorporated new or modified taxonomic names, and added geologic and geographic range data. The result is a document of mammalian history and diversity of unprecedented scope and detail. Final editing of the classification for publication is now under way.

Complementing these efforts is a comprehensive study of mammalian cranial characters of higher placental mammal relationships completed by Michael Novacek, Chairman and Associate Curator. This work, which represents the culmination of several years of comparative study, includes new proposals for the higher-level classification of placental mammals.

In addition to these projects, Dr. McKenna and Dr. Novacek produced a number of publications, some in collaboration with research associates, outside colleagues and students, on the systematics of important groups of fossil mammals.

Here Come the Turtles Curator Eugene S. Gaffney pursued his indefatigable survey of fossil turtles of the world. He received National Science Foundation support for a series of studies of the oldest turtles from North America. Dr. Gaffney was also active in the field, collecting several superlative specimens of extinct turtles from Eocene-age rocks of the famed Grizzly Buttes area of southwestern Wyoming. Works completed by Dr. Gaffney include reviews of the history of turtle classification, studies of turtle vertebrae and shells, and an account of extinct meiolaniid turtles in New Caledonia.

Dr. Gaffney also sponsored the dinosaur research of Columbia University graduate student Paul Sereno, who returned from a year-long odyssey through China, Mongolia, the Soviet Union and Eastern Europe.

Cenozoic History Curator Richard H. Tedford published important reviews of the Cenozoic history of the Atlantic and Gulf coastal plains and other areas of North America. At the invitation of the People's Republic of China, Dr. Tedford attended the opening of the Paleontological Museum in Linqu, Shandong Province, and lectured

on the history of North American late Cenozoic faunas at the Institute of Vertebrate Paleontology and Paleoanthropology in Beijing.

This year also saw the publication of an important Museum Bulletin on the stratigraphy and vertebrates of the Tertiary of Nebraska, by Curator Emeritus Morris F. Skinner and volunteer F. Walker Johnson.

In their studies of the North American Cenozoic, several curators continued field projects. Dr. Novacek and Research Associate John Flynn returned with a large crew to Baja California, made dramatic discoveries of new fossil mammals, and were awarded a grant from the National Geographic Society for their upcoming field expeditions. Drs. Tedford and McKenna swept through the Plains and Rocky Mountain states in the course of their paleontological reconnaissance of various Cenozoic vertebrate sites.

Horses, Rodents, Monkeys, and Bat Ears

Drawing on the vast resources of the Frick-American Museum collection of fossil horses, Research Associate Bruce MacFadden published a major monograph on the systematics of the New World "Hipparion horses" of the later Cenozoic. The collections also were the foundation of several important studies of rodent phylogeny by James Carter Memorial Fellow Lawrence J. Flynn and Research Associate John H. Wahlert. Research Associate Eric Delson continued his energetic studies of Old World monkeys and their role in the Plio-Pleistocene history of Africa. Michael Novacek published a report on the anatomical evidence for the powers of echolocation in the earliest known fossil bats.

The Geologic Perspective In addition to Dr. Tedford's contribution to geochronology, Dr. McKenna produced an important review of continental drift, biogeography and possible cosmic events that affect earth history. Dr. McKenna also presented a critical review of the recently much publicized link between extraterrestrial phenomena and the mass extinction of dinosaurs and other organisms. An incisive account of the problem of age-resolution and fossil faunas was also published by Drs.

A needle is used by the Department of Vertebrate Paleontology to remove rock from a seven-million-year-old fossil of a gerbil skeleton. It took about a month to remove the excess rock, grain by grain, from this delicate fossil. Cleaning and preparation of larger specimens, such as dinosaur bones, could take a year or more. Fossils, ranging from small fish and mammal skeletons to the remains of large prehistoric reptiles, are prepared in the department's laboratory where rock is removed from around the specimens, bones are hardened, and detailed work is done on fossils to bring anatomical details into relief. The American Museum is the most active center for the study of vertebrate paleontology in the world.

MacFadden, J. Flynn and McKenna.

Milestones Preparation of vertebrate fossils is a crucial aspect of paleontology, and it demands uniquely talented and dedicated personnel. In May, Otto Simonis, Senior Museum Technician, retired after three decades of distinguished service to the department. Mr. Simonis earned an international reputation for his superb work on important fossils, including the preparation of specimens for the special exhibition, "Ancestors: Four Million Years of Humanity," which opened at the Museum last April. The vertebrate paleontology community owes much to Mr. Simonis' virtuosity as a fossil preparator.

Nineteen eighty-four marked the death of George Gaylord Simpson, an outstanding figure of vertebrate paleontology and evolutionary biology. Dr. Simpson was, for many years, a curator and chairman of this department, where his accomplishments brought him acclaim as one of the best-known scientists of the twentieth century. His vast range of activities in mammalian classification, biogeography, evolutionary theory, South American and North American fossil faunas, and Mesozoic mammals inspired many curators and students at this museum and throughout the world.

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Research Stations

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

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. This year, both new and ongoing research projects were conducted on St. Catherines Island, one of the barrier islands off the coast of Georgia.

Samuel Jones, Director of the University of Georgia Herbarium, and Nancy Coile, Curator, continued their floristic study of the island. Fieldwork was conducted by 10 students and two staff members who collected more than 466 specimens. The investigators are accomplishing the

goals of establishing on the island a synoptic collection of the plants occurring there, training graduate and undergraduate students in field procedures, and improving the botanical collections at the University of Georgia Herbarium.

James H. Oliver, Jr., Director of the Institute of Arthropodology and Parasitology, Georgia Southern College, completed the third year of his research pertaining to ticks. Ticks are serious pests and vectors of diseases to man, domestic animals and wildlife in all major parts of the world, including the eastern coast of North America. Dr. Oliver's work involves determination of tick species present on the island, seasonal variation in tick population densities, and monthly surveys of the tick hosts for the presence of protozoan blood parasites, which are transmitted by ticks. The scientific results of Dr. Oliver's research will be of broad interest to acarologists, parasitologists and park and game management officials, and will contribute to a better understanding of the genetic and ecological basis of tick populations.

Archeological fieldwork under the direction of Dr. Thomas, Curator in the Department of Anthropology, is a multifaceted program completing the fifth year of Phase III research exploring the island's Spanish Mission complex, Santa Catalina de Guale. This program currently embraces Clark Larsen's work on the mortuary excavation of the Santa Catalina cemetery; Alan May's research at Fallen Tree Midden, an aboriginal Guale site which is counterpart to the largely Spanish-oriented excavation of Santa Catalina proper; and Rick Anuskiewicz's nautical archeological work aimed at locating possible Spanish-period shipwrecks associated with the mission.

Eugene Lyon, a noted scholar in the field of 16th-17th century Spanish Florida history, conducted historical research on Mission Santa Catalina de Guale. He has located documents regarding the founding, operation, configuration and final siege at Santa Catalina, and has translated specific accounts of sailors and soldiers who served in that mission complex. He has provided Dr. Thomas with translations of valuable material relating to

the expeditions to Santa Catalina and also other data which touch upon the native American groupings there in the mid to late 17th century. These data are being analyzed.

Great Gull Island The population of nesting common terns on Great Gull Island, Long Island Sound, New York, has more than doubled since the reintroduction of the meadow vole, *Microtus pennsylvanicus* in 1981. This small grass-eating mammal has enlarged the nesting areas for terns on the island. In 1984, about 4500 pairs nested and 3181 pairs were trapped. The project documents the increase in nesting pairs and follows the old pairs as they return to the island to nest. The oldest bird to return in 1984 was 22 years old. Some pairs have been together for 12 years, and have great-grandchildren nesting with them on the island.

In 1984, Joe DiCostanzo, a graduate student at City College, supervised the banding of adult birds. Matthew Male, Volunteer, completed his sixth season banding birds in colonies near the island.

The Thames Science Center's spring and fall work weekends set new records for achievement. In the fall, participants painted 32 towers and cleared half the island. In the spring, they put together 32 towers on their first morning, and then cleared away all the dead bayberry at the western end of the island.

The first and last work weekends in the spring and fall have been facilitated by energetic help from Robert Dickerman, Research Associate in the Department of Ornithology. Moves to and from the island were completed with his help.

The project will miss Al Hutson, who died this past year. Mr. Hutson, a former Vice-President of Bankers Trust in New York, had volunteered to coordinate the 1984 Bird-a-Thon.

The Great Gull Island Project was nominated for the President's Volunteer Action Award for exemplary volunteer achievements.

Archbold Biological Station The Archbold Biological Station, located in south-central peninsular Florida, carries on a broad program of research focusing on the terrestrial

and fresh water habitats of the southernmost portion of the Lake Wales Ridge and surrounding region.

Thirty-four research projects were conducted by staff and associates during the year. Emphasis in a number of these projects was on long-term monitoring of particular plant or animal populations or environmental factors. The importance of long-term studies for a better understanding of many complex ecological and evolutionary processes is being increasingly realized by the scientific community. The station, with its excellent facilities and extensive, diverse, and well-protected natural areas, provides an optimum setting for such investigations.

A cooperative staff project was begun this year to study the effects of fire in a mature sand pine scrub stand on the station's main property. The sand pine scrub association, with its high number of endemic species and subspecies of plants and animals, is one of the most characteristic of Florida's natural ecosystems. The conditions favored by most of the typical scrub endemics are dependent upon periodic burning of the vegetation.

However, there is little detailed information on the physical environmental changes and plant and animal species responses associated with burning of the habitat. The staff team study will lead to a better understanding of the role of fire in the establishment and maintenance of the scrub community, the adaptations of particular plants and animals to fire, and the trends in vegetation and animal species composition and numbers following burning.

In addition to the basic scientific knowledge to be gained from the study, the research will also contribute to more effective management of scrub habitats. As a result of development, the Florida scrubs are being lost at an increasing rate, and thus it will be necessary to more intensively manage those scrubs remaining to maintain them in the stage most favorable for their characteristic species. To do this successfully will require detailed knowledge of when and how to burn in order to create a given set of conditions.

Ronald L. Myers, Assistant Research Biologist, began collection of data on several aspects of vegetation and soils as part of the scrub fire ecology project. Biomass measurements were made on sand pines in the area to be burned, vegetation on experimental and control plots was sampled, and preparations were made for sampling soil nutrients before and after the burn. Particular attention will be directed to the effect of "hot spots" in the burn on spatial heterogeneity of regenerated vegetation following the burn.

James N. Layne, the station's Executive Director and Museum Research Associate, took samples of amphibian, reptile, and small mammal populations and monitored the air and soil temperatures and wind movement on the scrub area to be burned and an adjoining control area. He also pursued his long-term work on the habitat relationships, population dynamics, movements, and reproductive biology of mammals at the station, utilizing a variety of methods such as mark-and-release trapping on permanent grids and line transects, track counts, visual censuses, and nest boxes.

Mark A. Deyrup, Assistant Research Biologist, investigated the effectiveness of flight traps, Berlese funnels, and pitfall traps in providing reliable data on diversity and relative abundance of key insect species of the scrub community in connection with his phase of the scrub fire ecology project. He also worked on a flight trap survey of insects of sand pine scrub as part of a comprehensive inventory of the arthropods of the station. This study has yielded a number of undescribed species and new locality records.

Thomas Eisner, of Cornell University, made further progress in his work on courtship and chemical defense in the moth *Utetheisa ornatrix*, in which toxic substances from the host plant are sequestered by larvae for defense and also transferred by the male to the female at mating, eventually passing to the eggs to protect them from predators.

Thirty-six visiting investigators from universities and colleges, other field stations and state agencies worked at the station during the year on projects ranging from feeding biology of ant lions to alarm calls in the Florida scrub

jay. Fifty-four groups totaling 1139 persons also visited the station this year, a substantial increase over previous years.

Southwestern Research Station

In 1955, the Southwestern Research Station was established near Portal, Arizona, in the Chiricahua Mountains. It is the leading research station in the region and one of the larger operating inland biological field stations.

During its 30th anniversary year, the station had 1032 visitors. This figure includes 159 researchers, 20 more than the number that visited the facility in 1983-84.

Visiting scientists represented 49 institutions, including some from France, Israel, West Germany, England and Canada. These investigators worked on a variety of research, much of it in animal behavior. Entomologists, ornithologists, herpetologists, botanists, geologists, arachnologists and researchers in other fields worked on scientific studies at the station.

The station also serves as a study center for student groups, naturalists and families. Fourteen science-oriented classes, consisting of 233 students, made use of the station's facilities. Naturalist tours from the United States, Canada and Sweden brought 220 guests to the station. Approximately 420 naturalists and tourists were also among the visitors in 1984-85.

Nineteen research papers were published this year, covering such topics as parent-offspring relations in communal breeding birds, social regulation of behavioral development and the ant, and footdrumming in the bannertail kangaroo rat.

Several research projects have been ongoing at the station. Howard Topoff of Hunter College, City University of New York and the Department of Entomology of the American Museum studied the obligatory slave-making ant *Polyergus breviceps*. Slave-making behavior is a form of social parasitism that occurs with varying degrees of worker and queen specialization. This species relies on individuals of the related species *Formica gnava* for food, brood rearing, and colony maintenance. In previous years, colonies located in an oak-



juniper woodland, at an altitude of 1600 meters, were studied.

Topoff and his assistants added data to their comparative study of the behavior and ecology of *P. breviceps*, by concentrating their research in the high desert near Portal, at an altitude of 1400 meters. The two characteristics that differed significantly between the desert and oak-woodland habitats were the timing of slave raids and the direction to target colonies at *Formica*. In the desert, raids typically commenced 30 minutes later than at higher elevations. This difference can probably be attributed to the higher diurnal temperatures in the desert environment. Most slave raids are preceded by a period of scouting of up to one hour duration. When a successful scout returns to the nest, there may be another delay of up to 20 minutes before the raid begins. Thus it appears that the limiting factor of temperature may exert its primary effect on the onset of scouting, and on the scout's arousal of nestmates after her return.

Samuel N. Beshers, of Boston University, began his doctoral research on the ant *Novomessor albiguttatus*. The objective was to perform a field test of one of the most important hypotheses in insect sociobiology: George Oster and E. O. Wilson's hypothesis that castes have evolved in the social insects to maximize the efficiency, and hence the fitness, of colonies. His plan was to manipulate caste ratios in experimental colonies to see if this would reduce fitness.

His field observations led him to

believe that a direct test was not possible, because colonies would quickly regain their normal caste balance. However, some other significant observations were made.

Colonies have a distinctive daily rhythm, with different tasks being emphasized at different times. Contrary to previous beliefs that they were essentially nocturnal, peak activity seems to occur after dawn and before dusk, in the cooler daylight hours.

Foragers do not search at random, but follow permanent trails up to 40 meters from the nest. The ants seem to orient along these trails by a combination of olfactory and visual cues.

Where trails of two colonies intersect, territorial displays occur: a group of workers from each colony hovers around the intersection, with about 30cm separating the groups. Workers that enter the other colony's space are quickly seized and dismembered; however, large conflicts were not seen.

Charles R. Bryan, of the Department of Geology at the University of New Mexico, Albuquerque, mapped a portion of the eastern Chiricahua Mountains in order to determine the structure and stratigraphy of the mid-Tertiary ash-flow tuff and rhyolite rocks in the area, and to determine if the eastern edge of the Rodeo cauldron, a volcanic feature partially exposed in the Peloncillo Mountains of New Mexico, extended into the Chiricahua Mountains. Geologic samples were collected from major volcanic units for chemical analysis, strontium isotopy, and radiometric age dating.

Accurate location and characterization of Tertiary cauldrons and their related ash-flow tuffs is critical to understanding processes which shaped the western U.S. The results of these investigations show that ash flows in the eastern Chiricahua Mountains are stratigraphically equivalent to those of Weatherby Canyon formation in the Peloncillo Mountains in New Mexico. It appears that the Rodeo cauldron does not extend into the Chiricahua Mountains but that another cauldron, the source of the Weatherby Canyon, may be present.

Resident Director Vincent Roth, who has been with the research station since 1962, will retire on March 1, 1986.

Department of Education

The Department of Education is firmly committed to bringing natural history and anthropology programming to the general public. Staff instructors and special events planners present programs to school children and adults on weekdays, in the evenings and on weekends. The Charles A. Dana Education Wing, the department's base of operations, was enlarged to include the Edith C. Blum Lecture Room. This facility is funded by a gift from the Edith C. Blum Foundation. A studio classroom is still under construction. The new 3600-square-foot addition combines with the Alexander M. White Natural Science Center, the Frederick H. Leonhardt People Center, the Louis Calder Laboratory, the Discovery Room, the Harold F. Linder Theater and the Henry Kaufmann Theater to create a flexible and diversified education complex capable of presenting the Museum's research and collections to people of all ages and backgrounds.

Programs for Children Programs and services to the schools of New York City are the department's biggest daily challenge. A total of 112,500 students registered for education department programs. Many more enrolled in Hayden Planetarium programs or saw the Naturemax Theater films.

The department staff taught nearly 21,000 youngsters in schoolday morning classes. This included three special one-week programs on the special exhibition, "Asante: Kingdom of Gold," Asia Week and National Wildlife Week.

The department offered programs especially tailored to the needs of handicapped groups, including the visually and hearing impaired. Most of these programs were presented by a full-time specialist whose services

Sunglasses add a unique touch to this Chinese bride's traditional wedding gown. Changes in the economic, political and social life of the inhabitants of a rural Chinese village were the focus of "Small Happiness," one of 40 documentaries presented in the Margaret Mead Film Festival, which attracted an audience of some 6000. One New York film critic called the festival "the most important documentary event in New York." The annual film festival is one of many public programs offered by the Department of Education each year. The Museum's educational programs provide adults and children with a better understanding of the natural sciences and the world's cultures. Photo by Richard Gordon.

were supported through gifts from the Charles E. Culpeper Foundation and the Cricket Foundation. Other small group activities for the disabled were taught by specially trained volunteers working under staff supervision. There were more than 2500 persons in 195 handicapped groups. They came mainly from special schools and other institutions serving the disabled.

A Museum staff teacher presents a film/lecture on ecology at elementary and junior high school assemblies in the city. Nearly 2800 students attended these presentations.

Many of 86,200 children in 24,500 independent school groups visited the Museum with their own teachers and encountered a volunteer Museum instructor in the exhibition halls.

More than 400 youngsters participated in weekend "Workshops for Young People." Topics ranged from crafts, such as mask-making and origami, to more scientific sessions on dinosaurs, endangered mammals, reptiles and marine life. Most of these workshops were held in the Louis Calder Laboratory, supported by a grant from the Louis Calder Foundation. Each workshop regularly reserves places for gifted but needy children.

Programs for Adults The number of people who can be accommodated in afternoon and evening programs has increased substantially in the past decade with new spaces, such as the Harold Linder and Henry Kaufmann Theaters and the Edith C. Blum Lecture Room. Some 6000 persons enrolled in 30 lecture series programs in the fall and spring. The topics included gems, music of the Andes, great parks of the world, Alaska, Maya civilization, Islamic arts and sciences, insects and varieties of Jewry. These lecture programs are presented by Museum staff, or guest speakers. Among the latter were Donald G. Johanson, the paleontologist, and Ashley Montagu, the anthropologist.

More than 654 people went on local field trips organized by the department. Most popular were morning bird walks in Central Park during the spring and fall migrations. Some 160 took field-study trips in geology, bird watching, botany and whale-watching. During the summer more than 1000 people registered for the

Hudson River events. These included an academic symposium and the popular Hudson cruises, with talks on its geology and ecology. The eighth annual Margaret Mead Film Festival drew 6000 people in four evenings to see 40 films of anthropological interest.

Gifts from the Helena Rubinstein Foundation and the Vincent Astor Foundation made possible many free public programs. Some 6900 people attended these special events, which included films on Pacific peoples and Native Americans, a lecture by Mary Leakey, a traditional Balinese shadow play, a musical presentation for young people by the Bloomingdale Chamber Orchestra, and other programs.

Interpretive Facilities The Frederick H. Leonhardt People Center presents live weekend programs. Each month a different cultural region is featured. These programs are made possible by an endowment from the family of Frederick H. Leonhardt. In the past year there were weekend music and dance demonstrations and talks on Japan, the Caribbean, Celtic lands, Pacific peoples, the Middle East, South America, Africa, African-American culture and China. Some 55,000 weekend visitors participated in these free activities.

Another 35,000 family weekend visitors enjoyed the child-oriented, interactive exhibits on the ecology of New York City in the Alexander M. White Natural Science Center. Renovation of some of the exhibits in the Center was made possible with funds raised by a group of the Museum's young contributors. The Discovery Room, with its "discovery boxes" and touchable exhibits, drew an estimated 900 young children and their parents.

Community Programming For 15 years the department has sponsored activities specifically directed to include local African-American, Caribbean and Latin-American communities. During the past year these programs were supported by the Evelyn Sharp Foundation, the Henry Nias Foundation, the William Randolph Hearst Foundation, the Avon Products Foundation, the Sidney, Milton and Leoma Simon Foundation and the Helena Rubinstein Foundation.

Some 50,000 attended these community programs. There were theatrical performances on the American Black West, a jazz tribute to Count Basie, a performance by Maori artists from New Zealand, lectures on the Asante, a musical tribute to the late Martin Luther King, Jr. and workshops in African beadwork, basketry and batik. There also were demonstrations of music and dance of the Andes, puppets and mime by an experimental Hispanic children's theater, a children's musical fantasy, talks and demonstrations on the Mayas, a film forum and other programs.

Black History Month was celebrated in February with films, demonstrations and performances by a dance company for more than 100 school classes. There were also an Afro-Caribbean dance workshop and programs on folktales from Africa and the Caribbean.

A generous gift from the Samuel and May Rudin Foundation made it possible to recruit college and high school interns. Under the supervision of the education staff, the first group of interns spent a summer term at the Museum pursuing individual programs.

During the year a pilot program began with the Dalton School, whereby Dalton provided a part-time anthropology instructor who is attached to the department.

Staff members also led Discovery Tours to Alaska and Morocco and participated in a workshop in India.

Skeletal mount of the famous racehorse Sysonby caught at a moment in its stride was among the many anatomical studies presented in the special exhibition "Captured Motion: Skeletal Studies of S. Harmsted Chubb." In the course of his four-decade career at the Museum, Chubb became the world's leading expert on the movement and articulation of bones. The innovative design of this exhibition made use of mirrors that enabled the viewer to see the mounts from a variety of angles.



SYSONBY RUSSIAN WOLF-HOUND
completed 1908 completed 1925

The mounts of the famous American racehorse Sysonby and a Russian wolfhound were prepared at approximately the same time. The mounts are based on a close examination of the original animal.

Department of Exhibition and Graphics

The department mounts at least three special exhibitions each year, designs a new hall an average of once every two years, and services the print needs of other offices throughout the Museum. This year it completed a new hall devoted to the work of Margaret Mead, and created special exhibitions dealing with animal motion and the work of John James Audubon. Based on American Museum collections, these will travel to other institutions throughout the United States. The department's designers and artists also work closely with other museums to bring to New York City the resources held in trust elsewhere. Such efforts resulted in the mounting of exhibitions about the Asante people of Ghana and the art of ancient Maya.

Special Exhibitions "Asante: Kingdom of Gold," a collection of some 800 gold sculptures, bronze counterweights, royal cloth, jewelry and household items which recreated the splendors of precolonial Asante society, opened at the Museum in October. The exhibition came to the American Museum from the Museum of Mankind (the Ethnography Department of the British Museum), which has the largest collection of Asante material outside the West African nation of Ghana. More than 350,000 people visited "Asante."

Department of Exhibition and Graphics "Ban Chiang: Discovery of a Lost Bronze Age," a special exhibition circulated by the Smithsonian Institution Traveling Exhibition Services was on view in Gallery 1 from November through January. This exhibition of models of burial sites with 150 artifacts was the first comprehensive view of a previously unknown, highly

innovative prehistoric society in north-east Thailand.

Following Ban Chiang in Gallery 1, was the special exhibition "Captured Motion: Skeletal Studies by S. Harmsted Chubb." This exhibition of the remarkable collection of mammal skeletons mounted by Mr. Chubb at the American Museum during the early years of this century ran from mid-March through mid-June. Mr. Chubb's skeleton mounts included a draft horse, wolf, trotting horse, dog, donkey and the familiar man with a rearing horse which inspired the American Museum's logo.

In April, "Maya: Treasures of an Ancient Civilization," a major special exhibition designed and built by the Albuquerque Museum, premiered in Gallery 3. The Museum was pleased to be the first to present this exciting show before it went on tour to several other U.S. museums. This exquisite collection of Mayan art, including artifacts made of stone, wood, jade, shell and ceramics, gave the visitor a unique opportunity to learn about the great Central American culture. Many of the objects were never seen before in the U.S.

A spring exhibition of the work of John James Audubon as naturalist, printmaker and painter marked his 200th birthday. Designed and curated under the direction of Graphics Manager Joseph Sedacca and Senior Scientific Assistant Mary LeCroy of the Ornithology Department, "John J. Audubon: Science into Art" opened in Naturemax Gallery in mid-April.

The Akeley Gallery was the location of "Mountain of the Mist," a photographic story of the expedition to the Neblina plateau in Venezuela by members of the Museum's scientific staff. This was partially funded by the Arthur Ross Foundation.

Other exhibits during the year in the Arthur Ross Exhibit-of-the-Month program included: the "Origami Holiday Tree," "Moving a Museum: the Rothschild Collection of Birds," and "Collector's Choice: Sea Shells of Nathan L. Halpern." The Rothschild exhibit told how the American Museum obtained the wonderful collection of birds from the Tring Museum in England and the shell exhibit illustrated many cowries and other shells donated or financed by Mr. Halpern.

The department refurbished a tour-

ist-oriented exhibit on the Museum in the lobby of the Empire State Building, updating the one that had been there for more than fifteen years.

Permanent Halls The Margaret Mead Hall of Pacific Peoples officially opened to the public in December. Many years of redesign work by Senior Designer Eugene Bergmann resulted in a new look for this great collection of artifacts from Polynesia, Micronesia, Melanesia, Australia, Indonesia and the Philippines. The department experimented with a new remote dimming system for lighting in certain exhibit cases in this hall. Plans to use this microprocessor technology in future permanent halls are on the drawing boards now. In addition to saving energy, the system reduces damage to fragile, light-sensitive objects by keeping the lighting at a low level, until the nearness of the visitor signals the microprocessor to bring the lights up to normal viewing levels.

Plans are well underway on two major new permanent exhibition halls, the Hall of South American Peoples, expected to be completed in 1987, and the new Hall of Human Evolution and Biology.

The continuing refurbishing project on the habitat dioramas progressed with the Osborn Caribou Group and the Grant Caribou Group, both in the North American Mammal Hall. Repair work was also completed on the painted sky (damaged by a water leak) of the Sambar diorama in the Hall of South Asiatic Mammals. Exhibition Department personnel also spent several months on scaffolding, cleaning the vaulted ceiling mural in the Whitney Memorial Hall of Oceanic Birds.

The rebuilding of the Central Park West plaza and entrance steps began in April. To attract visitors to a new entrance through the Whitney wing, the Graphics Section designed and built a new structure, decorated with colorful directional graphics. This entrance will function for a period of six months to a year.

Department of Library Services

The Library's rich monographic, serial, rare book, manuscript, photographic and film collections, and its personalized reference, interlibrary loan and circulation services support the scientific, exhibition and educational programs of the Museum, as well as the international scholarly community. Grant support has enabled the Library to undertake major programs to preserve and catalog its resources for the use of future generations.

Consolidation and Growth The last several years have been spent on large scale grant-funded projects aimed at modernizing the collections and services. Since 1978 the Library has received well over \$1,500,000 in grants. With these funds, 6500 retrospective volumes were added to fill gaps in the collection; the Library joined an international computerized cataloging network (OCLC) and entered its holdings from 1960 and continues to catalog all monographs into the system; the entire photographic collection of more than 500,000 images was inventoried, sorted by collection and cataloged into a database designed by the Library; the 17,000 title (240,000 volume) serial collection was completely recataloged by nationally accepted standards, inventoried and entered into an automated database; various collections were restored and preserved; and this year, work was begun to preserve and catalog the rare film collection.

The past year has been spent consolidating and building on the results of these projects, and planning the future direction of the Library. A list of Museum-sponsored expeditions and field trips was compiled. It provides the title of the expedition, dates, geographic location, sponsors, scientists involved, and a citation to a published record. The list is invaluable for cataloging the photographic collection and film collection, and for searching the archives. Eventually the data will

be entered into the computer and linked to the automated film and photographic catalogs. A computer program for cataloging the film collection is being written and will be connected to the photographic collection database. In the future, the Museum archives, the expedition file, and the film and photographic databases—all interrelated—will be connected. Each image in the photographic collection is being given a unique number to facilitate refiling, inventory control and future cataloging of individual images.

A View toward the Future A collection management policy, including acquisitions, cataloging, weeding and retention, and conservation for all Library materials was written. The policy, which will be reviewed periodically with the scientific staff, will serve as the principal governing philosophy of the Library for years to come. Because more museums and galleries wish to borrow Library materials for exhibits, loan policy and procedures, including detailed loan forms, were developed to insure their safety and conservation. Two Library handbooks, one for the public and one for Museum staff, have been completed. The handbooks describe the Library's collections, services and policies. In addition a small brochure describing the special collections in greater detail has also been completed.

Film Archives Preserved The U.S. Department of Education Title II-C Program gave \$83,956 to preserve and catalog half of the 1500 reels of rare and vintage films of Museum expeditions and of natural history subjects. The Exxon Foundation gave \$22,000 to duplicate the films in order to preserve the original film and provide a research viewing copy. The U.S. Department of Education has funded a continuation grant for \$145,700 to complete the second half of the films. The project, which began in October, involved reviewing, researching, writing extensive narratives, cleaning, and splicing some 100 films. The film collection, when completed, will be a unique historical and scientific documentary resource in natural history.

Science as Art An exhibition, "Titian Ramsay Peale, 1799-1885,"

was mounted in the Library Gallery and received considerable notice in the press. The Library staff helped research and mount "John J. Audubon: Science into Art" which included many rare books and works from the Library collections. The photographs in "Captured Motion: Skeletal Studies by S. Harmsted Chubb" all came from the photographic collection. The two volume folio of Catesby's "Natural History of Carolina, Florida and the Bahama Islands" (1731-1743) were loaned to the St. Petersburg Historical Society; five Ugo Mochi silhouette panels were loaned to the Cooper Hewitt Museum; Hunter College Gallery borrowed Moses Harris' "An Exposition of English Insects" (1782); and the IBM Gallery borrowed Robert Hooke's "Micrographia" (1667).

Services Delivered The Library served 7550 readers, answered 8756 reference questions, circulated more than 34,000 items to the scientific staff, screened 11 films, received 2142 requests for interlibrary loans, requested 584 items for the Museum staff from other libraries, and photocopied 10,939 pages for users. Sales from the photographic collection totaled \$59,488. Added to the collection were 2019 volumes representing 1884 monographic titles, 7288 journal issues representing 6113 titles, 25 new serial titles, 24 reels of microfilm and 3579 microfiches. In addition, 1500 photographic images and four art and realia collections consisting of 372 items were cataloged, 409 titles were recataloged, 36,000 photographic images were numbered and 28,991 cards were filed into the catalog.

Recent Publications in Natural History (RPINH) received 622 review volumes, prepared 1739 citations and published 10 reviews. The Library distributed 36,647 issues of scientific publications, 3566 issues of *RPINH*, 93 copies of the "Photographic Cataloging Manual," and bound 2013 volumes.

Nine first edition volumes plus an atlas of the voyages of Captain James Cook were donated to the Library by Mr. and Mrs. William Shore.

Staff Activities Nina Root, Chairwoman, was named to the Advi-



sory Council to the New York State Board of Regents and to the Finance Committee of the American Institute of Aeronautics and Astronautics. Bryan Johnson, Acquisitions Librarian, was elected Vice President of the New York Chapter of the American Printing History Association.

Abstracts and Popular Publications:

Johnson, Bryan R.

1984. [Review of] Private press books 1978. The Papers of the Bibliographical Society of America, vol. 78, no. 3, pp. 378-379.

1985. Caring for your Vandercook. Small press, vol. 2, no. 3, pp. 19-21.

Johnson, Bryan R., editor

1984. Book Arts Review, vol. 3, no. 3.

1984. Book Arts Review, vol. 3, no. 4.

1984. Recent Publications in Natural History, vol. 2, no. 2.

1984. Recent Publications in Natural History, vol. 2, no. 3.

1984. Recent Publications in Natural History, vol. 2, no. 4.

1985. Book Arts Review, vol. 4, no. 1.

1985. Book Arts Review, vol. 4, no. 2.

1985. Recent Publications in Natural History, vol. 3, no. 1.

Root, Nina J.

1985. [Review of] Karl Bodmer's America. Recent Publications in Natural History, vol. 3, no. 1, p. 2.

William Byrne, Project Assistant in the Motion Picture Laboratory of the Department of Library Services, cleans valuable film strips as they are being wound on a spinning reel. Grants were awarded by the U.S. Department of Education and the Exxon Foundation to preserve, duplicate and catalog half of the Library's 1500 reels of rare and vintage film. These works record Museum expeditions and depict natural history subjects. The Museum's archival film collection is one of the many unique, historical and documentary resources within the Library, which is visited by 7000 people each year.

Conservation

To a natural history museum, conservation is an integral part of the collection management procedure, and normally commences the moment a specimen or artifact is discovered in the field. It is at this time that the staff begins the effort to preserve in perpetuity the significant nature of the object so that at the time the specimen or artifact is to be studied or exhibited, it will be as close to its original condition as possible.

Because of the almost unbelievable diversity of collections in a natural history museum (from fish to fowl, from artifact to insect, from meteorite to ammonite), the conservation techniques and knowledge span a great array of specialized disciplines. For that reason, conservation procedures for the American Museum's 35 million specimens and artifacts are the responsibility of specialists (Curators and their Scientific Assistants) within each of the departments.

Because of the highly complicated nature of anthropological conservation, a technology that is now growing by leaps and bounds, the American Museum placed particular emphasis this year on upgrading the department's conservation laboratory. It also established the permanent position of Conservator, to assume the general responsibility for all matters pertaining to conservation within the jurisdiction of that department.

To prevent damage to rare artifacts and specimens on exhibit, members of selected departments work with the Department of Exhibition and Graphics and the Department of Plant Operations. In the case of Anthropology, a team moves through permanent exhibition halls and storage areas on a regular basis, cleaning exhibit specimens and cases, installing pest control systems when needed, providing required conservation treatment, completing inventory documentation and monitoring light levels and the stability of exhibit mounts.

The Department of Mammalogy has been working with type specimens from the Maximilian Wied expedition that were collected between 1815 and 1817 and which were acquired by the Museum in 1869. These important historic and biologic specimens have survived almost 170

years but are extremely fragile. The Department of Mammalogy, working in cooperation with the Library's trained Conservator, has devised a chemically neutral transparent container that will prevent further deterioration while allowing the specimens to be studied. As this conservation device may be of use to other institutions, a publication describing the procedure is in progress.

The Department of Library Services has been concentrating on the conservation of its varied collections for well over a decade. During the past year, the Library cleaned, spliced, produced viewing copies and rehoused more than 200 reels of rare archival films. The rehousing of the 500,000-image Photographic Collection in mylar sleeves and inert boxes continued.

A new facility, doubling the storage capacity of specimens, is presently being constructed in the Department of Ichthyology. The need for the new facility was prompted by the recent acquisition of a major collection from the Virginia Polytechnic Institute. It includes a significant collection of fish from the southwestern United States.

The Department of Ichthyology has been working with the fishes that were collected during the Lang-Chapin Expedition to West Africa during the 1920s and 1930s. This collection is irreplaceable. Those early scientists, who carefully attached copper tags engraved with a collection number to the tail of each fish and then stored them in a copper-lined tank, did not know the copper would be detrimental to the preservation. It was discovered that while they were stored in alcohol, the copper leached out into the fishes, turning them green, making the flesh friable and obscuring their distinctive markings. In 1981, the Department of Ichthyology developed a process to remove the copper from the fishes.

In Anthropology, in addition to the establishment of the new permanent position of Conservator, two Conservators of Objects worked exclusively preparing specimens for installation in the new Hall of South American Peoples, scheduled to open in 1987. In addition, three Conservators of Textiles prepared a large portion of the Andean archeological textile display that will be rotated regularly to extend their effective exhibit life

in the new South American Hall.

The conservation and storage of ethnographic textiles continued; 227 Navajo rugs and 1050 pairs of North American Indian moccasins were cleaned, documented, photographed and placed in new storage. More than 50 artifacts in the Margaret Mead Hall of Pacific Peoples required conservation treatment prior to mounting in the new Hall. In preparation for the new Korean exhibit in the Hall of Asian Peoples, all specimens were processed by the Conservator for cleaning and other required treatments. The case environment, lighting and background materials were selected in accordance with conservation standards.

The new, two-level storage facility is nearing completion on the fourth floor and will house a major portion of the ethnographic collections. This project is a crucial part of the overall collections management program, an ambitious project which began in 1981. It is designed to provide a new physical and organizational approach for managing and conserving the Anthropology collections. When completed, the storage area will provide 20,000 square feet of centralized, environmentally controlled space and will be equipped with a study room for use by visiting researchers. One level of new storage is equipped with mobile storage units, providing maximum utilization of the floor area. The other level will house very large artifacts that will be protected in custom-built compact storage systems.

Ethnographic collections are being cleaned and inventoried in anticipation of their transfer to the new storage area. The African collections have been prepared, and work has progressed on the ethnographic collections from Siberia and the Northwest Coast.

Interdepartmental Facilities

Included in Interdepartmental Facilities are the Scanning Electron Microscope Laboratory and the Museum's central computer facility. Computer application programs were written for users in the Departments of Education, Entomology, General Services, Ichthyology, Mammalogy, as well as the Office of Deputy Director for Research, the Office of the President and the Volunteer Office.

Because of increasing demands on Interdepartmental Facilities, a Scientific Assistant was hired last November to expand and better serve the users of these major pieces of equipment.

New steps were taken this year to add flexibility to the computer system. Whereas in the past workstations have been connected to the main computer, the Department of Entomology replaced their workstation with a Wang PC microcomputer that is capable of operating either as a stand-alone computer or as a workstation which can log on to the central computer. Several more of these PC/workstations will be added to the system in the immediate future in an attempt to adapt the Wang system more closely to the demands of the Museum.

The total number of devices on the system (e.g., workstations and printers) either planned or already on line reached the maximum (32) for the present VS80 central processor (CP). This CP has now been traded in for a VS85 which was installed in June. The VS85 has an immediate 48 device capacity which can be upgraded to handle 64 devices. The VS85 also has 2048 kilobytes of main memory and 32 kilobytes of cache memory compared with 512 kilobytes of main memory and no cache on the old VS80. This increased memory will mean that programs will run about three times faster on the VS85 than they run on the VS80.

Grants and Fellowships

The Office of Grants and Fellowships administers the Museum's Grants and Fellowships Programs and acquaints visiting scholars not only with Museum procedures and practices, but also with the environs and opportunities of New York.

The Grants Program supported a total of 131 predoctoral candidates and postdoctoral investigators. The program awarded 52 Frank M. Chapman Memorial Grants (ornithology); 31 Lerner-Gray Grants for Marine Research; 47 Theodore Roosevelt Memorial Grants (North American zoology and paleozoology); and 1 Lounsbery Grant for pre-doctoral research in anthropology.

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

Two Weatherhead Grants for Asian Studies were awarded this year. Paul Sereno, a Columbia University doctoral candidate, who is studying in the Museum's Department of Vertebrate Paleontology, conducted part of his dissertation research at the State Museum in Ulan Bator, Mongolia. The second Weatherhead Grant permitted Song Daxiang, a Chinese scholar from the Institute of Zoology in Beijing, to visit the Museum and examine the collections of the Department of Entomology and confer with curators here.

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 six Research Fellows were in residence. John Damuth was appointed the Thorne Research Fellow in the Department of Invertebrates, and he examined the significance of invertebrate commu-

nities, their ecology and the role these play in large-scale evolution; Lawrence Flynn, a second-year Carter Research Fellow in the Department of Vertebrate Paleontology, completed studies on the phylogeny and geographical dispersal of small mammals in eastern Asia; J. Alan May, the Lounsbery Research Fellow in Anthropology, conducted archeological research on St. Catherines Island; Hiroshi Mori, the Boeschenstein Research Fellow in Mineral Sciences, worked on olivine crystals present in stony-iron meteorites; Gary M. Stone-dahl, the Kalbfleisch Research Fellow in Entomology, conducted research on plant bugs and David R. Wells, the Chapman Research Fellow in Ornithology, conducted investigations on avian speciation in southern Asia.

The Curatorial Fellowship Program, established last year, brings to the Museum individuals holding doctoral degrees or equivalents to assume all the duties and responsibilities of members of the curatorial staff for a limited-term appointment. This year, the Department of Ichthyology successfully recruited and recommended for appointment Michael Smith as Kalbfleisch Assistant Curator (Fellow) to explore the relationship between ontogeny and systematics, as exemplified by fishes.

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

An updated booklet available at the end of summer 1985 will describe each of the Grants and Fellowships Programs and explain the application procedures.

Publications

Natural History Magazine As newspapers and electronic media were spotlighting the famine in sub-Saharan Africa, *Natural History* dedi-

cated 24 pages of its 85th anniversary issue in April to making some broad connections between stressed natural systems and crises in the world economy. In this supplement, titled "State of the Earth 1985," Lester Brown and his co-authors analyzed the pressures of human society on such basic resources as water, forests and topsoil, and pointed to public policy changes that might set earth on a path to a sustainable ecosystem.

The anniversary issue also celebrated the bicentennial of the birth of John James Audubon with three articles on his life and work; and, in "The Maya Enter History," told how the decoding of hieroglyphics has led to a more realistic understanding of this enigmatic culture. Both articles ran in conjunction with Museum exhibits.

Current scientific fieldwork provided readers with articles covering two areas. Coevolved relationships between plants and animals were addressed in "Fruit for all Seasons," by Edmund Stiles; "Banana's Best Friend," by Donald Strong; "Pollen Shortcomings," by Nicholas Waser, and "Secrets of a Cryptic Flower," by Delbert Wiens. Competition and cooperation within animal groups was the theme of "The Little Foxes" by J. David Henry; "Family Feuds," by Carolyn Crockett; "Knockouts in the Nest," by Douglas Mock, and "A Mound of One's Own," by W. Thomas Jones and Betsy Bush.

Museum staff were also regular contributors. Neil Landman, Assistant Curator in the Department of Invertebrates, wrote the August 1984 cover story, "Not to Be or to Be?," on the survival of the nautilus and the extinction of the ammonites. Charles Cole, Curator in the Department of Herpetology, wrote "What's in a Name?," an entertaining essay on taxonomic classification, and Howard Topoff, Research Associate in the Department of Entomology, authored "Invasion of the Booty Snatchers," on western slavemaking ants.

Stephen Jay Gould's "This View of Life" and Raymond Sokolov's "A Matter of Taste" have remained well-read mainstays among the regular columns, and preliminary results of a three-month reader survey indicate that "The Natural Moment" and "This Land" (the newest addition to the magazine) are also quite well

received. "The Living Museum" chronicled the scientific achievements and expeditions of staff members past and present, from Roy Chapman Andrews' quest for dinosaur eggs in Mongolia in the 1920s to the Museum's 1984 biologic survey of the Mountain of the Mists, in a remote region near the Venezuela/Brazil border.

The year 1985 also marks the return of Halley's Comet. The monthly "Celestial Events" column by Museum Director Thomas D. Nicholson and the sky maps of Helmut Wimmer kept amateur skywatchers apprised of the comet's progress, while articles by Stephen Maran and others delved into Halley's scientific and historic importance.

Natural History's advertising and circulation revenue continued to grow in a very competitive and somewhat erratic magazine market.

Advertising revenue as measured by the Publisher's Information Bureau was more than \$4.9 million, up 7.4 percent from the prior year. Advertising pages fell from the record level of 520 achieved the year before, to 497, a decrease of 4.6 percent. Advertising in *Natural History* by various Museum departments continues to promote special offers and activities for Museum members and friends. For the second year, the May issue featured a special pullout section detailing the 1985 tours offered by the Museum's Discovery Tours program.

Net paid circulation, as measured by the Audit Bureau of Circulation, remained more than 500,000, and circulation revenues hit record levels. Most readers of *Natural History* are Associate Members of the Museum. Circulation promotion efforts included a television commercial starring David Attenborough filmed at the Museum.

Membership The Participating and Donor Membership categories grew steadily from 20,700 members to 22,200 members in 1984-1985. These categories have become an increasingly important source of support for the Museum.

Rotunda, the Members' newsletter and calendar of events, increased from 10 to 11 issues, and many issues increased in size. This was necessary

in order to provide better coverage of the Museum's expanding number of events, exhibitions and research activities. The newsletter included features on the Asante exhibition, the renovation of the Biology of Birds Hall and a special year-end spread illustrating the global scope of the Museum's work. A "Natural Curiosity" column was introduced, in which Museum scientists answer members' questions.

Members continue to come to Museum events in record numbers. The Membership Office had the honor of hosting two sold-out performances of the Gyuto Tantric Monks in their premiere United States engagement. Planetarium events were particularly popular. All seats were sold for Bach by Starlight (a concert of classical music under the dome), a Space Shuttle update and the Members' opening for the "Violent Universe." The Membership Office also coordinated the Eighth Annual Man and Nature Lectures in which Nobel Laureate Gerald M. Edelman presented five lectures on the Science of Recognition. Other program highlights included behind-the-scenes tours of the Department of Invertebrates and Anthropology, an evening celebrating the centennial of Adirondack Park, a Dinosaur weekend and the seventh annual Origami Workshop.

In addition to providing programs for resident members, the Membership Office also launched a Members' New York Weekend program to give out-of-town members a special opportunity to enjoy the Museum and tour New York City.

Curator Four issues were published during the year, with a total of more than 300 editorial pages. The editor, Museum Director Thomas D. Nicholson, appointed a number of new members to the Editorial Board, including James E. Cruise, Director of the Royal Ontario Museum in Canada, to reflect *Curator's* growing circulation in Canada and worldwide. Now, 35 percent of *Curator's* circulation lies outside the United States.

On Jan. 1, the printing, promotion, and circulation functions of *Curator* were assumed by Meckler Publishing, of Westport, Conn. It is believed that this change will eventually result in the

elimination of the Museum's subsidy to the journal. The new publishing arrangement will also result in increased service to the subscribers. Two other significant changes that took place in *Curator* were: an increase in subscription price more in line with similar professional journals, and the acceptance of limited advertising for Museum-related products. Such advertising can be viewed as a service to the subscribers, while increasing revenues to the Museum.

The manuscript flow to *Curator* continues at a steady rate. Circulation is at a record level of 1500 readers, up 50 percent from last year.

Special Publications The Members' Book Program had a record year for book sales. More than 22,000 books and calendars were sold through the catalog, advertising in *Natural History* and through sales of the Museum Guide. The number of Museum Members taking advantage of the fine books offered through the program tripled from last year from 5000 to 15,000.

In addition to selling books from other publishers, Special Publications copublishes books of its own. It copublished a 1985 Museum calendar entitled "Dinosaurs," which sold 2000 copies. In production with Universe Book Publishers are two 1986 calendars: a new edition of "Dinosaurs" and "In Focus," featuring award-winning photographs from *Natural History* photo contests. The office received a publication grant from the National Endowment for the Humanities to publish an illustrated book on the Museum's collections of Northwest Coast Indian art. Most pieces in this collection, the finest in the world, have not been available through publication before. Plans for a special exhibition in conjunction with the book are now being discussed.

The largest project in the office's history is now well underway. The Museum and Editions Alecto, a London fine-art publisher, have created a new edition of six prints from Audubon's "Birds of America." The prints are from the original copper plates in the Museum's collection. The

official publication date of the portfolio was April, 1985, coinciding with the 200th anniversary of Audubon's birth. Royalties from the sale of the new edition will be used to create an Audubon fund for natural history research in the Museum.

FACES: The Magazine About People was launched in October. Published by Cobblestone Publishing, Inc., in cooperation with the Museum, *FACES* is a children's magazine (8-14) about anthropology, world cultures and geography.

A successful licensing program concluded during the year. MBI Incorporated published a "50th Anniversary" edition of the Roger Tory Peterson field guides, and promoted them to the Museum's Membership using a letter of recommendation signed by the Publisher of *Natural History*. The Museum received substantial royalties on the project. Special Publications is planning to expand its licensing projects to generate more revenue, while maintaining the Museum's very high standards of quality and accuracy for any book or product it recommends.

Micropaleontology Press *Micropaleontology Press* continued its record of service to academic and professional micropaleontologists in their studies of the remains of microscopic organisms in strata from ancient seas and lakes. *Micropaleontology Press* was pleased to acknowledge important gifts for the modernization of equipment and methods from Shell Oil Company, Mobil Corporation Exploration and Producing Division, Exxon Corporation and Texaco Incorporated. In addition, the editors were enormously grateful to the memory of the late Arthur Dusenberry, Jr., formerly Associate Editor and in retirement a tireless volunteer, who left a very generous bequest to the Museum in favor of *Micropaleontology Press*.

The "Catalogue of Foraminifera" was expanded to two supplements per year to accommodate the expanding rate of discovery in this field, and the new "Catalogue of Diatoms" went to press in May. In addition, the descriptions of more than 300 new species were added to

the "Catalogue of Ostracoda" during the year. The research quarterly "Micropaleontology" and the monthly information service "Bibliography and Index of Micropaleontology" were published in their 30th and 12th years, respectively. The first volume of the important new laboratory guide, "Handbook of Cenozoic Calcareous Nannoplankton," by Marie-Pierre Aubry of the Woods Hole Oceanographic Institution, appeared in April, in large part thanks to support from the Shell Oil Company, Elf-Aquitaine (France), Total (France), Arco Research, Gulf Oil Corporation, Texaco Incorporated, and the Sohio Oil Company.

The modernization program supported by the corporate friends of the *Micropaleontology Press* was responsible for major improvements. Computerization of the editorial process continued, and a high-performance film processor greatly speeded typesetting and photography work.

In September, 1984, L. Thomas Kelly was made Publisher of *Micropaleontology Press*, in recognition of its present mission as a scientific press. Under Mr. Kelly, it will be able to take advantage of the expertise and resources that have been developed so successfully at *Natural History*.

Scientific Publications The scientific publications present the results of research. They provide a means for the Museum's scientists, along with researchers from other institutions, to publish the results of expeditions, studies, and observations of animal specimens and human cultures. The Museum's three scientific series, the *Bulletin*, the briefer *Novitates*, and the *Anthropological Papers*, have a long-standing reputation for high-quality illustrations (some produced with the Museum's scanning electron microscope) and comprehensive written descriptions complete in exacting detail.

The Office of Scientific Publications published 36 articles totaling 2556 pages this year. Many describe biological specimens, both living and fossilized. The descriptions usually include an extensive taxonomic analysis. That is, the authors present scientific evidence to support their conclusions about the precise posi-

tion of the organisms under study within the universally accepted animal classification system. For example, Museum entomologists Randall T. Schuh and Michael D. Schwartz wrote a revision of the plant bug genus *Rhinacloa*. They assigned 37 species to this group, 17 of which were newly discovered.

By contrast, the *Anthropological Papers* focus on human culture and evolution. This year, for example, David Hurst Thomas, curator in the Department of Anthropology, and other contributors produced a 430-page archeological analysis of a 4000-year-old Native American culture located at Hidden Cave, Nevada.

Administration

Plant Operations, Construction, Maintenance and Building Services

The main objective for 1984-85 was program development and the introduction of more efficient production techniques.

For the exhibition "Asante: Kingdom of Gold," the carpentry unit prefabricated cases, platforms, partitions and mounts in the carpentry shop instead of constructing these components at the exhibition gallery. This method, used the first time for "Asante," significantly reduced total construction time and provided superior quality control. When possible, this system is now being used for all temporary exhibitions.

The electrical unit conducted a study of wiring and lighting throughout the Museum. A program is underway to improve the quality and energy efficiency of all lighting, and to redesign lighting systems for exhibition halls incorporating recent findings on the effects of light on artifacts by experts in conservation and preservation. With funds provided by the New York City Department of General Services' Office of Energy Conservation, energy saving, cost efficient lighting was installed in the Margaret Mead Hall of Pacific Peoples and interior courtyards.

The painting unit proceeded with its ongoing program to repaint all exhibi-

tion halls. Among the halls newly painted were: the Hall of Northwest Coast Indians; the Gardner D. Stout Hall of Asian Peoples; the Hall of Mollusks and Mankind; the Whitney Memorial Hall of Oceanic Birds and the Frank M. Chapman Memorial Hall of North American Birds.

The sheet metal unit, in cooperation with scientific departments, initiated a program of opening exhibit cases for cleaning and conservation on a one-day-a-week basis. This program will be extended to two days a week during the coming year.

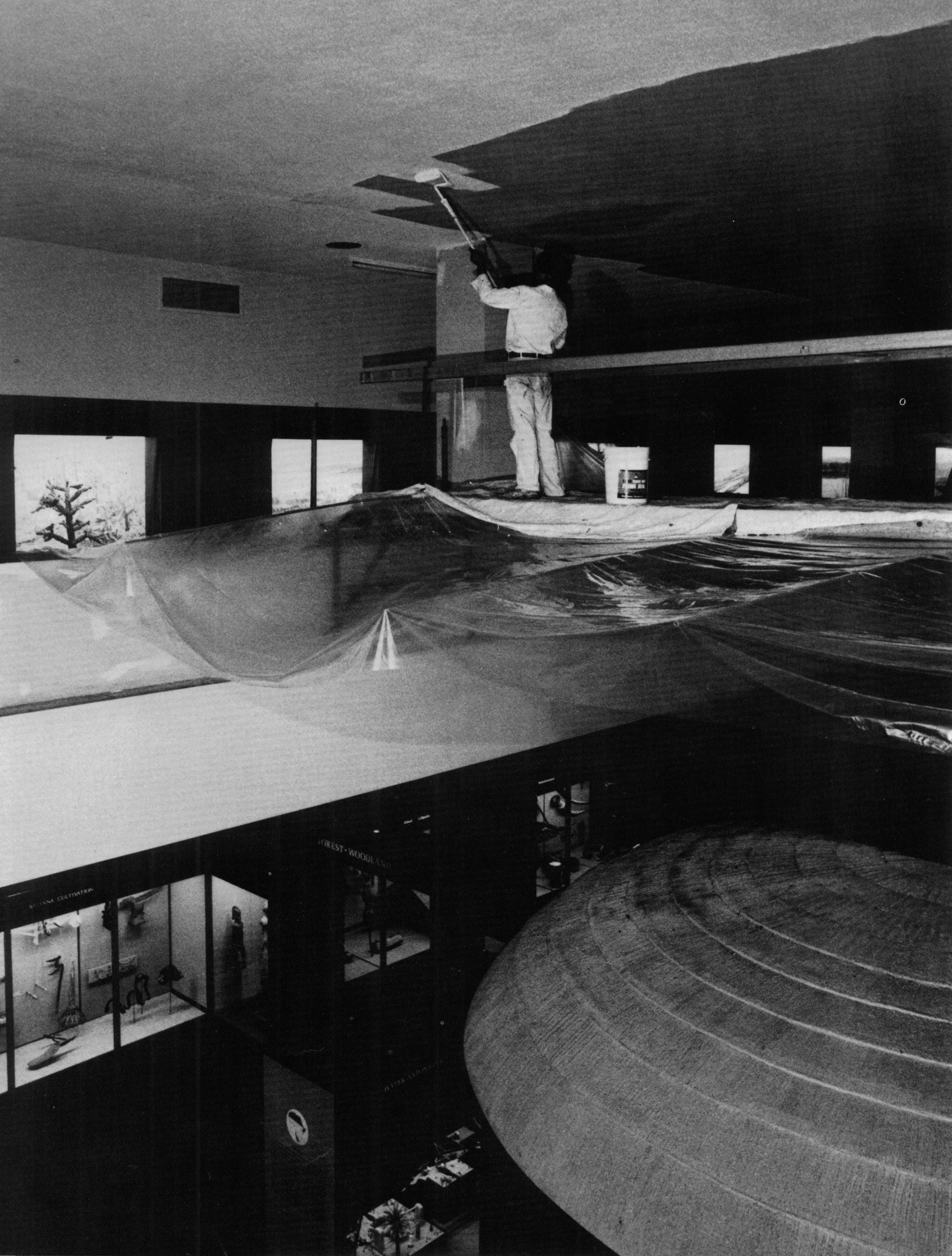
The Construction Department was involved in the Museum's program to upgrade storage facilities in scientific departments. The activities accompanying the installation of new compact storage facilities in Anthropology drew upon the resources of many who tiled, installed electrical outlets, painted and supervised the installation of the storage units. In addition, some storage and office areas of the Department of Vertebrate Paleontology, Mammalogy, Entomology, Invertebrates, Ichthyology and Anthropology were painted. Storage areas in Mammalogy were rewired.

Construction projects included building the Edith C. Blum Lecture Room, rebuilding the Planetarium Lobby Shop and supervising and assisting in the refurbishing of the Planetarium interior.

Construction design was completed for a new employee cafeteria and a new subway lobby. Work on these projects will begin during the coming year.

The Maintenance Department initiated a program to upgrade the performance of air-handling systems throughout the Museum. A new 40-ton compressor was installed in the mineral storage area and a 15-ton compressor was replaced to serve the Food Express area. Electrical controls on all three Food Express compressors were also upgraded. A new 10-ton cooling tower was purchased for the Library to provide cooling in the reading room.

The cleaning unit tested several new products including marble cleaner and restorer, floor stripper and floor finish. A new material used to clean marble replaced several solu-



tions used to do the same job. This resulted in a cost savings and a gain in work efficiency. Both of these factors are important in the unit's upkeep of more than one million square feet of Museum floor space. Lighting of this immense area is monitored by the lamping unit, which replaced 22,000 bulbs this year.

Plans are in place for the Department of Building Services to work with the New York City Department of General Services in installing the Museum's new multiplex computerized intrusion alarm system.

The greatest challenge to Plant Operations and all its resources was to provide attractive and efficient access for visitors during New York City's renovation of the Central Park West steps and plaza. Personnel in the Departments of Construction, Maintenance and Building Services worked with others to create the Museum's attractive and functional temporary entrance.

Museum Shop The Museum Shop experienced a 20 percent increase in revenue in the fiscal year 1984-1985 from approximately \$1,530,386 to \$1,836,463. One of the major factors contributing to this increase was the marketing of select merchandise in conjunction with the opening of special exhibitions.

For the exhibition, "Maya: Treasures of an Ancient Civilization," jewelry and pottery made in Central

America that depicted Maya culture was prominently featured in the main shop and its satellite shop in Gallery 3. In addition, a wide selection of literature on the Maya, including Charles Gallenkamp's bestseller, "Maya: The Riddle of a Lost Civilization," was made available to visitors.

A wider selection of jewelry and art works from the Pacific region were offered to coincide with the opening of the Margaret Mead Hall of Pacific Peoples. Because of the great interest in Dr. Mead and the Pacific region, these items sold well.

Keeping track of customer interests has also proved profitable. In response to inquiries about the mineral sciences, the Shop began to offer books on the subject, as well as mineral specimens and jewelry. All have proved to be fast-selling items. Customers have also expressed an interest in the cultures of India and Africa, and jewelry and artifacts from these regions have been made available.

An audio system has been installed in the Shop's book balcony, enabling shoppers to preview the cassettes and records that are offered. Additional shelf space has been provided in the balcony for the published works of Museum researchers. The 2800 square feet of space provided by the new balcony has also made it possible to make major presentations of new posters, stationery and globes.

Naturemax Theater The Naturemax Theater became the focus of an increased number of school class visits, as educators realized the value of its large screen offerings. Approximately 31 percent of the Naturemax Theater's patrons were school children. This marks a four percent increase over last year's figure.

While "To Fly" and "Living Planet" have shown their ability to draw Museum visitors since the opening of the theater more than three years ago, much of this year's efforts were directed at bringing to the Museum, for preview by the staff, many of the new films available for presentation in the IMAX format.

"The Dream Is Alive," selected as the next Naturemax feature, includes spectacular footage filmed by the astronauts aboard space shuttle flights. "The Dream Is Alive," narrated by Walter Cronkite, premiered in the

Naturemax Theater the last week in June.

The American Museum became a member of the Space Theater Consortium, the professional organization of IMAX theater operators, producers and distributors. At the September meeting in Huntsville, Alabama, a dozen films were presented and viewed as possible future features for the Naturemax Theater. The Museum was also represented at the March meeting in Los Angeles, where discussion centered on reducing the expenses of theater operation.

Attendance Museum attendance for the 1984-1985 fiscal year totaled 2,651,658. This figure includes 2,073,910 to the Museum and 577,748 to the Planetarium.

Development and Public Affairs

The two outstanding exhibitions that dominated the Museum's communications efforts assumed identities of their own that were far greater than the sum of the specimens and artifacts exhibited. "Ancestors: Four Million Years of Humanity" remained as a potent memory long after it closed in September. "Asante: Kingdom of Gold," which opened in October, became a magnet for thousands of new visitors and also forged a link between the Museum and new constituents.

The visit of the popular Asantahene and his entourage filled the Museum and indeed New York City with festivities, affection, glamour and excitement. This department staged two major events—a parade and community reception and an evening party and dinner—which brought the Asantahene into contact with thousands of people who were, or quickly became, his admirers.

Public Affairs Relationships were expanded with the city's growing number of news media that are aimed at minority audiences. Meetings and discussions with publishers, producers, editors and reporters established

A member of the Construction Department's painting unit applies a final coat of paint to the ceiling of the Hall of Man in Africa. It took two months and 228 gallons of paint to repair and repaint the walls of the 12,600-square-foot hall. The work is part of an ongoing project to repaint all of the Museum's 39 permanent exhibition halls.

a better understanding of the Museum's programs and its role in the community. Widespread media coverage of "Asante: Kindgom of Gold" and a month-long schedule of African cultural events was the result of these expanded contacts.

The Asante exhibition gained wide attention when the Asantahene, accompanied by Mayor Edward I. Koch, led a procession of Asante and African-American musicians and dancers from 72nd St. and Central Park West to the Museum's entrance while some 5000 spectators hailed his arrival. The event was coordinated by Public Affairs.

A year before the special exhibition "Maya: Treasures of an Ancient Civilization" opened at the American Museum, staff members began to contact major magazines and television outlets to discuss its importance as an artistic and scientific event. The exhibition generated widespread press coverage, including reviews in the New York Times and a feature on CBS network's "Sunday Morning." "Maya" was also covered by U.P.I., A.P., The Christian Science Monitor, The Wall Street Journal and the Daily News, Newsweek and Time.

Other exhibitions that received national media attention were "John J. Audubon: Science into Art," "Captured Motion: Skeletal Studies by S. Harmsted Chubb," and the Margaret Mead Hall of Pacific Peoples.

The promotion of special exhibitions and programs is only one of the ways the Museum reaches the public. Another important means of public outreach and education is the nationally distributed radio series, produced by the Office of Public Affairs. It experienced explosive growth when, for the first time in its 10-year history, two sections—for spring and fall—were produced, doubling the number of programs offered from 13 to 26. Each program is a three-minute scientific discussion between the Director and a Museum researcher.

Moreover, an intensified marketing effort increased the number of stations carrying the radio series from 400 to more than 600. New mailing lists that aimed at bigger commercial and college markets in the southern and midwestern United States were put to use.

"Legislator's Night" was originated to help members of the city and state legislative bodies become better informed about and more interested in the Museum. Some 230 guests, including State Senators and Assemblymen and members of the City Council and their families, visited for an evening of dining, dancing, special programs and tours.

The Museum's full-page advertisements offering a "menu" of activities were run quarterly in The New York Times. Created by the Ogilvy and Mather advertising agency, the print advertisements were supplemented by creative radio spots. The talents of Mayor Edward I. Koch were enlisted for two radio spots about the "Asante" exhibition. One of the advertisements, titled "The Parade," was nominated for a 1985 Big Apple Radio Award, along with the advertisement "Original People," which the agency produced for the exhibition "Ancestors: Four Million Years of Humanity." Two advertisements garnered high honors for the agency in 1984. "Original People," was given a silver award at the prestigious One Show Awards. A print advertisement designed for the fall 1983 exhibition, "African Textiles," won a silver award from the Art Directors Club. Both honors are recognized as major achievements in the advertising industry.

Development Special exhibitions, both current and planned, figured prominently in development activities. A sumptuous and lively party, at which the Asantahene received guests, brought many Museum contributors together.

Members of "Friends," the Museum's major donor group, were treated to several evening events centered around Museum exhibitions. These included a reception in the new Margaret Mead Hall of Pacific Peoples and an annual reception with Museum Trustees featuring the "Maya" exhibition.

The much publicized exhibition "Ancestors" was the focal point of a major Museum mail campaign which brought many new donors into the family of Museum supporters.

Under the leadership of Trustee Donald C. Platten, the corporate community continued to demonstrate

strong support for the General Fund with one third of the companies increasing their gifts. This brought the total over the \$1 million mark. Paced by the first of three \$50,000 gifts from the Chemical Bank Basic Grant Program and a \$55,000 gift from Exxon, 269 corporations—including 32 that were new to the Museum—contributed \$1,018,600. The Employee Admissions Program listed more companies than ever before, increasing revenue while attracting new visitors. In addition, income from the corporations who match the gifts of their employees grew by 18 percent.

Corporate gifts for special purposes also showed an increase this year. Johnson & Higgins sponsored the Audubon exhibition. The generosity of the Mobil Corporation continues to provide free admission to the public on Friday and Saturday evenings. Exxon Corporation provided generous support for several projects, including the preservation of the Museum's valuable film collection.

Thanks to the efforts of Trustee Plato Malozemoff, the Economic Mineralogy Endowment Fund supported a curatorship in Mineral Sciences.

Grants from the Howard Phipps Foundation, the High Winds Fund, and the LAW Fund have set the pace for a major renovation of the Theodore Roosevelt Rotunda. Plans are underway to restore this magnificent hall to its original condition as it appeared 50 years ago.

Continuing support was received from the Hearst Foundation and the Helena Rubinstein Foundation for Education Community Outreach Pro-

Audiovisual technician Michael Rapkiewicz operates the IMAX projector during a screening of a space shuttle motion picture "The Dream Is Alive," in the Naturemax Theater. The film, one of several giant-screen films shown in the theater, gave viewers a window seat aboard the shuttle and was described as the next best thing to being there. The Naturemax Theater's projection system weighs almost two tons; the projector itself is five feet long and four-and-a-half feet wide. Naturemax is the only theater of its type in the New York metropolitan area. Its retractable screen, 66 feet wide and four stories high, can be raised or lowered in four minutes.



grams, and a grant from the Surdna Foundation will provide the necessary funds for a special education teacher for physically and mentally handicapped Museum visitors. Restricted funds were also received for the St. Catherines Island Archeological Project and for the Museum's efforts on Great Gull Island.

The American Museum/Hayden Planetarium showed a marked increase in contributions in 1984/85, raising \$114,500. These funds will be used to pay for further improvements in the technical capabilities of the Planetarium.

Grants from the National Endowment for the Humanities included funding for the new permanent "Hall of South American Peoples" currently under construction. The two-part grant includes \$100,000 outright and \$250,000 awarded on a one-to-one matching basis. This grant will form the basis for future fund-raising efforts to support the completion of this important new hall. An additional NEH grant of \$132,166 was awarded to publish a book to highlight the Museum's Northwest Coast Indian collection.

The National Endowment for the Humanities also made two awards for the Asante exhibition. A grant of \$145,878 was used to implement this most important exhibition and \$25,755 was awarded to produce a publication on the symposium that was held in conjunction with the exhibition.

The \$250,000 National Endowment for the Arts Challenge Grant entered its final year. Matching new and increased contributions to the Museum on a one-to-four basis, this grant provided impetus for additional individual and corporate gifts. The Museum was also awarded a one-to-one matching grant for maintenance of the Andean Textile Collection.

The federal Institute of Museum Services approved a \$50,000 grant for general operating support and the United States Department of Education granted \$145,739 to strengthen the research library resource program.

The New York State Council on the Arts allocated \$591,000 for general operating support and special projects.

Benefit Events The Office of Benefit Events coordinated three successful and profitable parties. Thanks to an enthusiastic and generous group of committee members, total ticket sales and contributions reached \$280,000. Mrs. S. Christopher Meigher and Mrs. Robert Wilkis headed the annual children's Halloween Party which continued its tradition of selling out. Mrs. Ottavio Serena (Julia Middleton) and her committee created an imaginative and amusing "Splash Down to the Bottom of the Sea." A "Fiesta" dinner-dance to coincide with the Maya exhibition was ably chaired by Mrs. Charles A. Dana, Mrs. Robert G. Goelet and Mrs. Arthur Ross and netted nearly \$200,000. The Museum has many loyal committee members without whose help and support these events could not take place.

Guest Services The corporate sector as well as many organizations and associations increased their usage of Museum space. The Museum's conference facilities were actively marketed and attracted numerous workshops, seminars, conferences and general meetings. The facilities include a theater seating 1000, the Planetarium's domed projection theater, three smaller theaters, a board room and several meeting rooms. Many daytime meetings were designed to include Museum Highlights Tours, special screenings in the Naturemax Theater, Planetarium Sky or Laser Shows and breakfasts or luncheons. The exhibition spaces provided unique settings for numerous evening social events. Some of the events were designed for client entertaining, and some included product promotions and introductions.

Organizations that chose the Museum for their special events were International Business Machines Corporation; Ogilvy and Mather; the American Association for the Advancement of Science; Uniden; Waldenbooks; The Thursday Evening Club; Paine Webber and Salomon Brothers; Syntrex; Manhattan Industries; the Bermuda Biological Station for Research; the University of Pennsylvania Alumni Association; Showtime/The Movie Channel; Subaru; the United States of Mexico; the New York Urban Coalition; AT&T; the Hudson River Foundation; General Foods

Corporation; ICOM; the Boone and Crockett Club; the Chase Manhattan Bank; Manhattan Guild; Johns Hopkins University; the Institute of Human Origins; Federal Aviation Association; WCBS-TV; Asbach; the American Indonesian Chamber of Commerce; the National Association of Science Writers; the American Littoral Society; the New York State Department of Environmental Conservation; Johnson and Higgins; the Writers' Guild; the New York Fashion Council and Lightolier.

Guest Services coordinated numerous Museum-sponsored activities including social and press events, meetings, lectures, classes, screenings and performances.

Commercial filming and photography projects included a scene for Woody Allen's film, "Hannah and Her Sisters," an opener for the TV sitcom, "Love Long Distance," two tapings for Cable's MTV channel, educational filmings and tapings, and shoots for various advertisements.

The food facilities served increasing numbers of visitors and special guests. The American Museum Restaurant, now in its third year, attracted 63,400 people last year. The Food Express served 673,500 visitors.

Because of the extensive renovation work at the Central Park West Entrance, the Terrace Cafe was relocated to the plaza area of the 77th Street Entrance. Planning of a new employee cafeteria progressed.

A special promotion of the general information brochure proved very successful, and distribution increased to 357,135. The brochures are distributed by hotels, universities, con-

Anthony Michael Hall, star of such youth culture films as "Weird Science" and "Sixteen Candles," modeled the latest young men's fall fashions during a photo session for Rolling Stone magazine in the Museum's Hall of Early Dinosaurs. Media often use the Museum as a setting for commercial or news film and photography projects. Commercial activities are coordinated by the Office of Guest Services. Revenue from commercial use of the Museum's facilities provides additional support. Photo by Andre Rau/Rolling Stone.



vention and visitors bureaus, parks, Y's, airlines, buslines, automobile clubs, travel agencies, community centers and tourist attractions. An Italian edition was added to the existing inventory of English, French, German, Spanish and Japanese.

Floor plans, available in multiple languages were kept updated and 439,200 were distributed to visitors. This office provides the information visitors receive from the closed circuit television system, and from the telephone recording. The latter was heard by 231,516 prospective visitors.

Volunteer Office The vitality of the volunteer program was reflected in a 1985 President's Volunteer Action Award Citation given to the Great Gull Island Project of the Department of Ornithology. The project studies the breeding habits, survival and mortality rates of terns on the Museum's 17 acre island in Long Island Sound. Approximately 140 volunteers devote varying amounts of time to Great Gull Island projects. The Citation was given on behalf of President Ronald Reagan by Mayor Edward I. Koch at a City Hall ceremony.

In addition to placements for adults, the Volunteer Office recruits high school and college students. Two high school students volunteering in the Department of Ichthyology were semifinalists in the 1985 Westinghouse Science Talent Search Contest. Other young people assisted in projects ranging from the casting of *Tyrannosaurus rex* for the Philadelphia Academy of Natural Sciences to selling merchandise at the Museum's Dinosaur Sales Desk.

Education, Membership, Development, Guest Services and meetings sponsored by the scientific departments use the help of volunteers both during the day and in the evening to manage crowds, give information and register participants. The annual Margaret Mead Film Festival, organized by the Department of Education, used more than 60 volunteers during its four-evening run.

Volunteers took surveys of Museum visitors. Information gained in this way documented the increase in the number of minorities visiting during

the Asante exhibition. *Natural History* magazine's survey of its readership was assigned to a volunteer supervisor.

The closing of the Central Park West entrance and the opening of a temporary entrance necessitated the addition of a fourth Information Desk to the three already operating within the Museum. Sets of slides were added to the sale of memberships and merchandise at Information Desks. Sales by volunteers at the Dinosaur Sales Desk near the Hall of Late Dinosaurs were so encouraging that plans were made to enlarge the facility.

The Museum Highlights Tour program trained its volunteer guides to conduct tours of the newly opened Margaret Mead Hall of Pacific Peoples. Tours scheduled for members, covering the Museum's permanent halls as well as temporary exhibitions were well attended. In addition to the daily free Museum Highlights Tours, the program also arranged fee-based tours for groups whose members ranged from senior citizens to representatives of foreign governments.

Discovery Tours The Museum's travel program took 623 members and friends on 15 tours to 33 countries. During the tours lectures and informal discussions were given by 28 lecturers from 13 Museum departments and 5 universities. Behind-the-scenes visits, special performances and meetings with local dignitaries were also arranged.

The hallmark of Discovery Tours is its ability to combine educational programs with carefully planned travel arrangements. The Museum designs the itineraries and lecture programs, promotes each tour through ads and mailings, and performs extensive client services. Thirty-three ads were placed in *Natural History* and other magazines, and 24 mailings were completed. Client services include preparing comprehensive reading lists, guide information and suggestions on how to prepare for each trip. Logistical arrangements such as air ticketing were performed by six professional tour operators under contract with the Museum.

The travel program further developed the principle of tailoring itiner-

aries which parallel the work of the Museum's scientific staff and exhibition departments. In conjunction with the opening of the Margaret Mead Hall of Pacific Peoples, several new cruise itineraries were designed. "Borneo and the Spice Islands by Sea," and "South Pacific Odyssey" brought participants to the Moluccas of Indonesia, East Malaysia, Brunei, Tahiti, Moorea, Bora Bora, the Cook Islands, Western Samoa, Tonga and Fiji.

Plans for the 1985-86 tour program are completed and include new tours to the Amazon, Hawaii, French caves, the islands of Melanesia, the Red Sea, Israel and Jordan, and Zambia, Zimbabwe and Botswana. Two tours are timed to coincide with the peak of Halley's Comet visibility.

Restoration of the exterior of the Museum's Theodore Roosevelt Memorial, a registered historic landmark and the Museum's main entrance on Central Park West at 79th St., began in April. The construction will reinforce the foundation supports and restore the appearance of the steps and plaza, which have become uneven through exposure to the elements. The work is part of the ongoing program of maintenance and refurbishment of facilities at the American Museum. The \$2 million project is funded under New York City's capital budget through the Department of Cultural Affairs.



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COVER: The Asante people, among the most influential ethnic groups in West Africa, maintain their distinct traditions and cultural identity. That is very evident in this formal group photograph of gold-bedecked Otumfuo Opoku Ware II, the Asantehene (King of the Asante people), with U.S. Ambassador to Ghana Robert E. Fritts III. They are flanked by colorfully-robed chiefs of Asante communities here and in Ghana, and by others who participated in the events surrounding the major special exhibition, "Asante: Kingdom of Gold." The photograph was shot on the steps of the Museum's main entrance at the conclusion of one of the events, a scholarly symposium entitled, "Asante and Its Neighbors: Relations with the Exterior." The exhibition's opening procession up Central Park West, which resounded with Asante drumming and the chants of thousands of marchers, as well as the numerous Asante-related educational and social events in the Museum, delivered a clear message: Museum exhibitions and programs can provide unique forums for international outreach and cooperation, and for bringing together and sharing in the rich cultures and traditions of peoples half a world away.

