111th ANNUAL REPORT 1979/80
AMERICAN MUSEUM OF NATURAL HISTORY

COVER:
This intriguing mask depicts the Chinese monk Hwa-shang, who appears in the Black Hat Dance enacted at most Tibetan monasteries to mark each New Year. This religious dance-drama, some of whose characters are drawn from Tibetan history and legend, is designed to expel the evils of the past year and to symbolically defeat the enemies of Buddhism. The mask, along with many others, is in the beautiful Tibetan section of the new Gardner D. Stout Hall of Asian Peoples. Photograph by Lee Boltin.

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Moving toward the Twenty-first Century

The American Museum is the sum of its parts—it is research and education, collections and exhibition. Above all, it is people—employees, both volunteer and paid, and vast numbers of visitors. People have made it what it is; it is they who have enabled this Museum to be described in superlative fashion.

Graphically, at the right, are some of the milestones in the Museum's physical expansion, collection and exhibition programs that have made the past decade a period of intense excitement and vitality. The momentum will continue for years to come as this Museum moves into the 21st Century.

Some interesting facts:

- A total of 34 million artifacts and specimens in its collections.
- 2,487,761 visitors during the fiscal year—1,973,749 to the Museum and 514,012 (including 389,367 paid admissions) to the Planetarium.
- A membership roster of almost 500,000 in all categories.
- A total of 650 paid employees and 475 volunteer employees.
- 150 scientists and their assistants working on some 300 research projects in the natural sciences.
- Home of the world's largest meteorite, Ahnighito, which weighs 31 tons.
- A library, whose research collection at 335,000 volumes (135,000 monographs and 200,000 periodicals) constitutes the most comprehensive natural history library resource on this continent.
- One of the largest collections of Asian items—60,000—outside of that continent. About 5 percent of these are on display in the new Gardner D. Stout Hall of Asian Peoples, the Museum's biggest permanent anthropological exhibition.

Rare Book Room

Guggenheim Space Theater

Natural Scien Center

People Center

Chamberlin Arachnid Collection acquired

Calder Laborat

Ornithology Laboratories

St. Catherines Island Research Program begun

Gallery 77

Interdepartmental Laboratories with Scanning Electron Microscope

Archbold Biological Station expansior

1971 1972 1973 1974

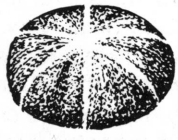
Hall of
Mollusks
and Mankind

Childs
Frick Building

Planetarium's
Perkin Wing
&
Astronomia

Hall of the Sun

Hall of Reptiles
and Amphibians



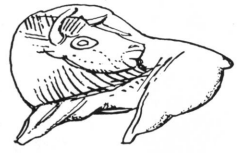
Meteorites,
Minerals & Gems
Section

Electron Microprobe

Ethnographic
Textile Room

Discovery Room

Gallery 3



Ice Age Art
exhibition

Auditorium
restoration

Southwest Field
Research Station
expansion

Columbia
University
Mineral Collection
acquired

Pompeii AD 79
exhibition

Hall of
Asian Peoples

Gold of El Dorado
exhibition

Feather
Arts

exhibition

Arthur Ross
Meteorite Hall

Hall of
Pacific Peoples

Shakespeare:
The Globe &
the World
exhibition

1975 1976 1977 1978 1979 1980 1981

One hundred and eleventh 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.

My association with the American Museum spans more than 50 years. I was entranced on childhood visits and the institution still holds me in thrall. I am well aware that great changes have taken place and that many beloved but outdated exhibits have been replaced by much brighter and more sophisticated ones. However, the main thrusts of the Museum—research, the dissemination of knowledge and the creative use of collections—have remained unchanged. The breadth and scope of our collections and the quality of the staff make this a center for research and education without peer.

I have directed the main thrust of my own efforts toward the improvement of the physical condition of our exhibition and research facilities, and, in particular, of our Anthropology storage areas. As an example, the Margaret Mead fund drive, which has already brought in $2,200,000, has enabled the Museum's Department of Anthropology to upgrade its storage system for ethnographic material, which includes the Museum's renowned American Indian collection.

A fine by-product of this work was the exhibition, "Objects of Bright Pride," entirely made up of Northwest Coast Indian artifacts from this Museum. Circulated under the auspices of the Center for Inter-American Relations and the American Federation of Arts, it has evoked great public interest over the year. And traveling exhibitions which we organized, "Ice Age Art" and "Peru's Golden Treasures," continue to circulate and captivate viewers.

Two very popular special exhibitions concluded—"POMPEII AD 79," and "Volcano!" These companion exhibitions excited imaginations and drew record numbers of visitors—600,000 over their three-month course.

There may have been a gold crisis throughout the world, but there was no shortage of the precious metal at the Museum. "Gold of El Dorado: The Heritage of Colombia" presented Museum visitors with the largest and most comprehensive display of pre-Columbian gold seen outside Latin America. It has since traveled to other American cities. Chemical Bank was the national sponsor, with support from the National Endowment for the Humanities and the Federal Council on the Arts and Humanities.

Our own staff developed the companion exhibition "It's Gold," to complement "El Dorado." Man's attachment to gold and the reasons the metal is so firmly embedded in our art, history and economics were examined in this exhibition.

A further example of the Museum's wide range of exhibitions was "Feather Arts: Beauty, Wealth and Spirit from Five Continents." Created by the Field Museum of Chicago, the unusual traveling exhibition demonstrated how feathers have played a role in religion, art and history.

Thanks to a number of foundations, our Trustees and other caring friends, a significant addition to the Museum's collections was made in the Department of Mineral Sciences. A total of $275,000 was contributed toward the purchase of some 40,000 mineral specimens from Columbia University, almost doubling our holdings in this field. The Museum now has 90,000 minerals, 20,000 rock specimens, 4,500 meteorites and 4,000 gems.

In the course of the year, the Department of Mineral Sciences continued to expand its research programs, utilizing its new offices and facilities, including its electron microprobe. This ongoing program has been made possible through the substantial financial support generated by corporations, foundations and individuals associated with the non-ferrous metals industry under the leadership of Museum Vice President and Trustee Plato Malozemoff.

One of the most exciting permanent galleries in the Museum's history—the Gardner D. Stout Hall of Asian Peoples—neared completion during the year. This ambitious effort, which was 14 years in planning and construction, brings to life traditional Asian cultures. The hall presents more than 3,000 objects and artifacts from one of the most comprehensive Asian collections outside that continent. It is our largest anthropological exhibition, occupying some 20,000 square feet. The new hall is a tribute to the vision and leadership of President Emeritus Gardner D. Stout.

We welcome to the Board three new trustees: William S. Beinecke, Donald C. Platten and Arthur Ross.

Mr. Beinecke, former chairman of Sperry and Hutchinson, is a director of a number of other corporations and a trustee of Yale University.

Mr. Platten is chairman of Chemical New York Corporation and Chemical Bank. He succeeds Trustee William F. May as Chairman of the Museum's corporate campaign. Mr. May headed the corporate drive for four years during which contributions went from $300,000 to $600,000 annually.

Arthur Ross has been a generous supporter of the Museum for many years. The "Exhibits of the Month" which he has made possible have ranged widely in subject matter, from volcanoes to endangered species. His scientific interests and support will enable the Museum to open the new and expanded Arthur Ross Hall of Meteorites in the spring of 1981.

The new Trustees succeed three persons with long years of service to the Museum—Nicholas F. Brady, Mrs. Francis H. Low and Edwin Thorne.

At the November, 1979, meeting, Plato Malozemoff was elected a Museum Vice President, succeeding Mrs. Constantine Sidamon-Eristoff. Mrs. Sidamon-Eristoff continues as a Trustee. At the same meeting, Mr. Thorne was elected an Honorary Trustee.

We were saddened by the death of Arthur Gray, Sr., Chairman of the Lerner Fund Advisory Commit-

This Northwest Coast Tlingit shaman's face mask was part of the popular "Objects of Bright Pride" exhibition which traveled to six institutions throughout the country during 1978-1980. All of its 100 items came from the American Museum collection.

tee. Working closely with the late Michael Lerner, Mr. Gray helped establish the Lerner Fund for Marine Research. The Board of Trustees voted to change the name of the fund to the Lerner-Gray Fund for Marine Research.

Given the sweep of men's imagination, there are no limits to the changes and improvements that can and will be made. Knowledge is cumulative, and each addition to the body of knowledge raises new questions and necessitates changes.

As a center of knowledge, this Museum will necessarily continue to undergo changes. We will add to our collections, carry forward research, improve educational programs and build new exhibitions. We count upon our friends and supporters to help us carry out our mission.

Robert G Goelet

Robert G. Goelet,
President

Director's Message

Cultural institutions in the United States are learning that there are real advantages in seeking economic support from widely diverse sources. Success in establishing a broad base of funding leads not only to economic soundness, but also to an underlying independence and versatility that should be welcomed by all.

This trend toward economic diversity and its effects is very nicely illustrated by the American Museum of Natural History. The Museum has turned from almost total dependence on a few main sources of income to an increasingly wide circle of support, and the transition has become more pronounced in the last ten years. Today we receive revenue in some amount from nearly every individual who uses our services. All of our constituents—visitors, students, Museum members, governments, corporations, schools and colleges, colleagues—have become partners in support of the Museum.

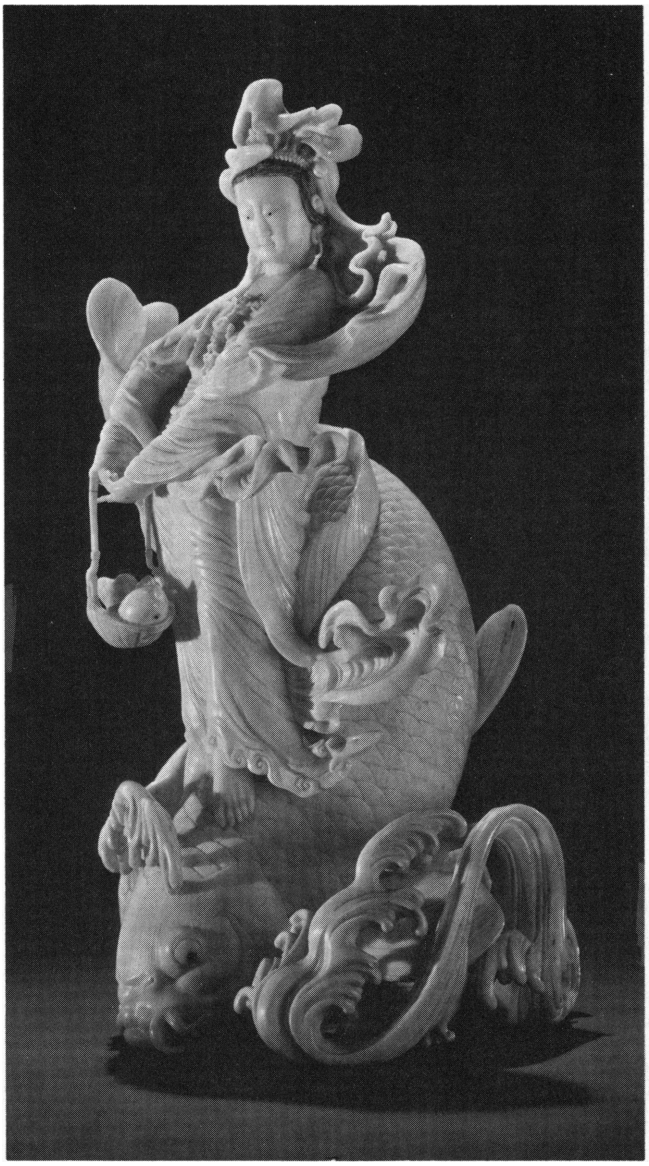
The benefits are many. Diversity of financial support shields us from the drastic effects of major cutbacks in any single source. A broader support base protects us from pressures of particular interest groups, allowing us to pursue the excellence in scientific research and cultural programming that has distinguished the Museum throughout its history. At the same time, the continuing need to earn support from multiple sources keeps the trustees and the staff extremely sensitive to the need for accountability to our constituents.

We work hard for our money and we communicate frequently with those who provide it. We use the pages of *Natural History,* letters, brochures, visits, social events, *Rotunda,* news stories, public and members' programs, advertising, and many other ways to communicate to individuals, to institutions, to groups large and small. And the constituents we reach respond with increasing interest.

Museum visitors support us handsomely, daily making the point that a valuable service is highly valued by its users. Each of our 2.5 million annual visitors is asked to pay something when entering the building, but the amount is discretionary. The average contribution (about 70 cents per person) has increased regularly each year. This income now accounts for nearly 7 percent of the Museum's total revenue.

Visitors provide us with further income as they purchase items in the Museum Shop, use the parking lot, dine in the cafeteria, or sip wine in the new Lion's Lair Lounge. They spent more than $2.5 million on these services this year, yielding a substantial sum after expenses to support general Museum operations.

Some people want a closer, deeper relationship with the Museum than a visit provides. These are the persons who become and support us as members. Some 480,000 Associate Members are attracted to the Museum by its services to science and education and by the very tangible benefits that Museum membership brings them. The enormous literary and popular success of our nationally distributed magazine, *Natural History,* is an important element in attracting and keeping so many members from throughout the United States. For those who live closer and can participate more actively, we offer Participating and Donor memberships, bringing a



This ivory carving of "Kwannon of the Fish," a Buddhist diety in Japan associated with mercy and abundance, is part of the Drummond collection in the Gardner D. Stout Hall of Asian Peoples. A generous gift from the Henry Luce Foundation, Inc., made this and other photographs of the Museum's Asian collections possible.

second monthly periodical, *Rotunda,* which tells about day-to-day programs.

These more active classes of membership were almost doubled in numbers annually for the past three years, stimulated by the impressive series of special exhibitions, "Ice Age Art," "Pompeii AD 79," and "Gold of El Dorado." Membership income has grown more than 300 percent since 1970. Some 30 percent of the Museum's total income now comes from the support of members and from *Natural History*'s advertisers.

Even though the Museum is not a government agency, it has worked in close partnership with the City of New York since its founding 111 years ago, and has for many years enjoyed the support of the State and Federal governments and even of foreign governments.

The partnership with the City of New York established a pattern of museum-governmental relationships that spread from the American Museum of Natural History to hundreds of other cultural institutions nationwide. Its success in bringing the public and private resources of a community together in the interest of funding and supporting cultural institutions, while still retaining for the cultural institutions the programming independence they need, is truly remarkable.

Through a contract signed more than a century ago, New York City owns, maintains and improves the Museum's buildings, pays the cost of utilities directly, and provides the funds used to support custodial and maintenance personnel as well as some teaching personnel. While this support has been reduced in recent years because of municipal financial problems, total support from the City amounts to almost $4.5 million per year, including over $3 million in general funds.

New York State—through the actions of farsighted governors and legislators—has also been a leader in recognizing the significance of strong and vital cultural institutions. State support is channeled to museums and other cultural organizations through the New York State Council on the Arts, both for project support and general operating purposes. In recent years, State support has provided as much as 90 percent of the deficit in the Museum's operating budget.

The commitments of funds by the State and City reflect a continuing awareness on the part of the citizens and their elected representatives that cultural institutions are essential to the quality of life and the economic vitality that distinguish New York from the rest of the world. In returning to the cultural institutions some part of the revenues they attract, New York is making a commitment to its own future. The magnitude of this commitment is measurable: the support to their cultural institutions given by the other 49 states combined was less than that contributed by the State of New York, indeed, even less than that contributed by New York City alone!

Every taxpayer in the United States participates with the Museum in maintaining, improving, and assuring the accessibility as a national resource of the irreplaceable treasures that comprise our collections. Part of the cost of maintaining our 34 million specimens and artifacts is supported by the National Science Foundation. In addition, a large part of the scientific research conducted here receives support from NASA, and from the National Institutes of Health. The National Endowment for the Arts, the National Endowment for the Humanities and, more recently, the Institute for Museum Services are also important sources of support for exhibitions, educational programs, scholarly services, and matching challenge grants. Grants and contracts from agencies of the Federal government generally amount to over $1 million per year.

Recognition that healthy cultural institutions are vital to the quality of life in a community has persuaded corporations to contribute generously to the Museum. Their shareholders, their employees and their customers all benefit from strong and vital museums. As corporations they benefit through the perceptions by the public of the social awareness and responsibility they demonstrate by contributing to the financial strength of insitutions serving public interests.

The American Museum of Natural History is proud and pleased with the response of the corporate community to its programs. This year we received gifts from 337 corporations that included more than $600,000 toward general operating support and $310,000 in support of specially designated projects. We are particularly gratified that more than two dozen companies support programs of free admission for employees and their families, and an increasing number offer to their employees a matching gift opportunity.

This cast gold Sinu region pendant from the Museo del Oro in Bogota, Colombia, was part of the spectacular exhibition, "Gold of El Dorado: The Heritage of Colombia" which drew more than 377,000 visitors before going on national tour during 1980 and 1981. The exhibition was sponsored by Chemical Bank with support from the National Endowment for the Humanities and the Federal Council on the Arts and Humanities.

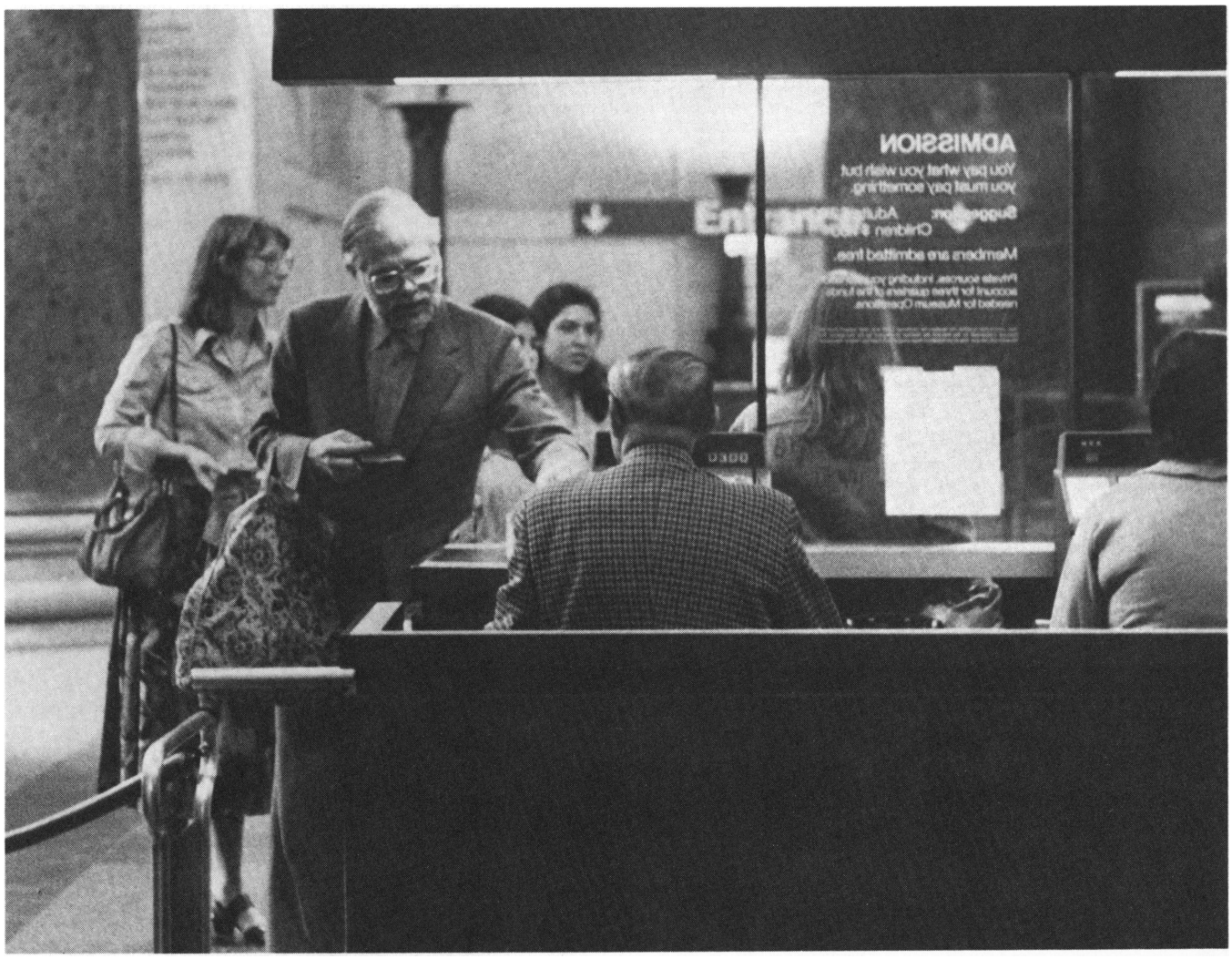
Many programs and projects at the Museum benefit from special grants made by individuals, private foundations and corporations, and in some cases bear the names of generous donors in recognition. Examples are the Hayden Planetarium, and within it the Guggenheim Space Theater, the Perkin Building and the Hall of the Sun (Billy Rose Foundation). In the Museum, substantial gifts made possible the Childs Frick Wing, the People Center (Mary Flagler Cary Charitable Trust), the Alexander M. White Natural Science Center and the soon-to-open Arthur Ross Hall of Meteorites. Programs such as the Margaret Mead Fund, the Participating Membership plan, the Hidden Cave archeological expedition, and the new laboratories and facilities in the Department of Mineral Sciences benefit from continuing special purpose gifts and grants.

The generosity of concerned and interested benefactors has helped to build and sustain our nation's non-profit institutions through the years. First and foremost among our individual donors are the trustees, whose commitment to the Museum makes itself evident in their participation and support of almost every element in our contributions and financing plans. This year, for example, when Columbia University's mineral collection became available, our trustees quickly obtained, through personal gifts and funds raised, $275,000 toward the purchase price.

Contributions from individuals and from family foundations have been a mainstay of Museum support from the beginning. In the past few years, 12,000 new contributors joined our family when they made special gifts in honor of Margaret Mead. And each year our Men's and Women's Committees reach out to their large circle of friends and colleagues to obtain gifts and involve them in enjoyable fund-raising benefits.

But whether they buy tickets to benefit parties, include the Museum among the beneficiaries of their estates, respond to direct mail appeals for gifts, or donate artifacts and specimens, our contributors demonstrate a strong sense of affiliation with the Museum and its work; they hold a common conviction that this great Museum deserves their individual support and help.

The Museum also earns income through the sale,



Visitors who enter the Museum and Hayden Planetarium will find an enormous variety of scientific, educational and entertainment activities taking place in the 22 interconnected buildings which cover almost 1.2 million square feet. A total of 2,487,761 persons visited the Museum and the Planetarium during the year.

rental, or use of its facilities and services, helping to compensate in part for the cost of developing and maintaining its resources. This year, for example, the Omega Watch Company introduced a unique new timepiece to the trade it serves, at a special program in the Planetarium; Gloria Vanderbilt Jeans used our front steps as a set for a television commercial; and Kudos Film Productions made scenes for a new Jack Lemmon film, "Tribute," in one of our galleries. Buyers of watches and jeans, and moviegoers may not know that they are helping to support the Museum, but we appreciate having those funds all the same.

We also earn income by providing unique traveling services through our Discovery Tour program, by offering courses and lecture series to the public, by licensing the use of our exhibits and specimens to others, by renting facilities of our field research stations, by offering special preview opportunities to new exhibitions, and in many other ways. These activities bear fruit in making long-range friends, each of whom will spread the word about the quality, significance and relevance of our work.

It is also essential for our financial well-being that we maintain good management and efficient fiscal control. Our partners in financial support must be convinced that we are a thriving, well-operated and successful institution. Effective cash management, cost consciousness and alertness to revenue producing opportunities are key elements in earning for us the confidence we need.

For much of its first hundred years, the American Museum followed an entirely different policy and philosophy regarding support, based on an assumption that Museum services should be free to its consumers. The Museum was perceived as being of great value to the community precisely because there were no charges for admission and services. The feeling was that this made the Museum eclectic, accessible and democratic.

The economic situation of past times justified this philosophy. From an endowment respectable in terms of its size, from the annual gifts of a few wealthy contributors, and from the operating funds allocated by the City of New York, the Museum was supported generously and adequately. There was no need to seek income from its users. But these traditional sources of funds, while still crucial elements in the Museum's financial planning, have not been able to keep pace with the needs of this thriving institution during the radically different economic world of the past decade or so.

In the social and economic climate of today, a philosophy that supports admissions, performances and services free to consumers is unwise, impractical and unjustifiable. Our constituents have demonstrated that they are willing and able to share at least part of the costs for the programs and services they use. I believe such a sharing—with the responsibilities and benefits it brings to both sides—is the wave of the future.

Thomas D. Nicholson,
Director

Department of Animal Behavior

From cockroaches to sea hares and from Siamese fighting fish to zebra finches, the Department conducted research on the social organization, behavior and life-space usage of many animals. Its work has contributed to the understanding on genetic, physiological, behavioral and ecological levels of the processes fundamental to evolution. Department members won a number of awards and fellowships, and several were elected to leadership positions in their specialty organizations.

In her expanded research with another species of sea hare (*Aplysia punctata*) in the waters off the Brittany coast, Curator Ethel Tobach and Cary Otsuka, a graduate student in biology at CCNY, found an interesting relationship between reproductive role and development. It had been thought that after these animals metamorphosed from the larval stage to the adult stage, they were immediately hermaphroditic, i.e. both sperm donor and sperm recipient. However, it appears that smaller sea hares act as sperm donors in this species, while larger animals act as recipients. This seems to be adaptive in view of the fact that during the spawning period there are many eggs hatching and larvae metamorphosing at different times.

Genetic Differences The pups of three strains of laboratory rats have been found to develop at significantly different rates. The genetic differences among these three strains also express themselves in coat color and storage pool disease, a disease in which blood clots are formed slowly or not at all. In a preliminary study, Dr. Tobach and her co-workers have found that clotting time differences may not be evident until sexual maturity. Another aspect of the study is the gathering of material on the relation beween behavior and coat color. The basis of rodent coat color is one of the most interesting areas for research because the genetic processes involved are extremely difficult to determine. The rat pups produced by the population genetic experiment are being studied behaviorally and physiologically to elucidate the genetic factors in these developmental phenomena. The syntheticic theory of evolution has emphasized the need to understand genetic processes in evolution. The rat, an animal whose history is long entwined with human history, is an excellent animal to use in investigating these issues.

The studies with the rodents *Acomys cahirinus* and *Acomys russatus* have been continued with specific emphasis on their adaptation to different temperatures. *A. cahirinus*, the common spiny mouse, is active during the night and inhabits all temperature zones in Israel, but is most commonly found in the temperate cooler areas. *A. russatus*, on the other hand, is active during the day and has become adapted to very high temperatures. This mouse, the golden spiny mouse, has been found in mountainous areas during the winter to have built nests whose temperature is well-regulated for protection against the cold. In an ongoing study it has been found that both species manipulate nesting materials differentially in colder and warmer ambient temperatures.

Siamese Fighting Fish Lester R. Aronson, Curator Emeritus, studied the cerebellum and aggressive behavior in the Siamese fighting fish, *Betta splendens*.

Although the traditional view of the cerebellum of vertebrates is that it controls locomotion and balance, evidence is accumulating that it has other, non-motor functions. Previous studies showed that in cichlid fishes removal of the entire body of the cerebellum causes only slight, transient motor disturbances, but it does affect certain non-motor functions such as avoidance learning and optomotor responding.

Research Associate Betty L. Faber continued her research with cockroaches with particular reference to social organization and use of life-space. Using the existing population in the greenhouse of the Museum, she is studying the American cockroach in its own "natural" habitat. In addition, she is comparing the social organization and behavior of the Trinidad and "hissing" Madagascar cockroaches.

Reproductive Hormones Cheryl F. Harding, Research Associate, has concentrated on determining which hormones are capable of eliciting reproductive behavior in male zebra finches (*Poephila guttata*). The research shows that several male *and* female hormones cause the males to sing, court, build a nest and defend it. The data support the hypothesis that many male behaviors are actually caused by female hormones, although the male gonads secrete testosterone, a male hormone. The brain actually converts it to a female hormone which then changes the birds' behavior. Some behaviors such as singing seem to be controlled by a combination of male and female hormones.

Research Associate Peter Moller has been investigating the role of electric organ discharges as they act in concert with other modalities to control proximity and to facilitate group cohesion among weakly electric fish (Mormyridae).

The electric organ discharge in mormyrid fish is species-typical. He is studying the importance of these characteristics in inter- and intra-specific recognition.

Lizard Chemoreception Research Associate Carol A. Simon's work on lizard chemoreception continues. A survey of the various behavioral uses of the tongue-Jacobson's organ has been completed for a variety of species. In depth study of one species, *Sceloporus jarrovi,* shows that the tongue-

Jacobson's organ system is used only to locate conspecifics and possibly to aid in territorial behavior.

She is also studying the effect of habitat structure on territory size. Field work began in June 1980, at the Southwestern Research Station. Almost all reviews of territorial behavior contain a discussion of the factors affecting territory size. A knowledge of these factors is crucial for understanding the spatial requirements of territorial animals. Such factors include food abundance, body size, sex, population density and habitat structure. The effects of habitat structure on territory size have rarely been examined for any animal. This field work examines the effect of perch sites, sun/shade ratios and cover density on territory size for a juvenile iguanid lizard.

Army Ants and Their Prey As part of continuing research on the social behavior of army ants, Howard R. Topoff, Research Associate, expanded studies to include interactions between army ants and their prey. In southeastern Arizona, the army ant *Neivamyrmex nigrescens* is a group predator that feeds on termites and other ant species. By utilizing a process of communication known as mass recruitment, army ants are able to quickly assemble thousands of individuals soon after locating an appropriate prey species' nest. In studies conducted during the past year, he found that many of the prey species have evolved behavioral adaptations for avoiding predation by army ants. For example, the ant species *Pheidole dentata* responds to the army ant raid by quickly removing its own brood from the nest and evacuating the area. A surprising field observation verified that colonies periodically emigrate to new nests, even in the absence of army ants. We are currently testing the hypothesis that these alternate nesting sites may allow a more efficient withdrawal by the *Pheidole* colony when attacked by *Neivamyrmex*.

For ants in the prey species *Camponotus* and *Pheidole*, Dr. Topoff and his students are studying how pheromones and tactile cues are used to detect their army ant predators.

H. Philip Zeigler, Research Associate, advanced his research on the relationship between the trigeminal nervous system and feeding behavior in the pigeon. His work has shown that the grasping response of the pigeon's beak is similar in many respects to that of the human hand—both make adjustments to the size of an object on a visual basis before it is touched.

Student Involvement The graduate program in Animal Behavior-Biopsychology in conjunction with the Biology Department of the City College and the Psychology Department of Hunter College of The City University of New York continues to train students. This year one candidate received his doctorate on the basis of work done under the sponsorship of H. Philip Zeigler, Research Associate, in the Department. A Readers Digest Fellowship was awarded to Ellen Torop of Hampshire College, who worked with Dr. Tobach, as did Susan Cislo, who was supported by a Merck Corporation fellowship.

Dr. Zeigler won a five-year Research Scientist Award from the National Institute of Mental Health. Dr. Tobach gave a series of seminars in the American Association for the Advancement of Science Chautauqua-Type Series, sponsored by the

Mary Lindsay, left, Osborn Elliott, right, and Mr. and Mrs. William F. May, attend a dinner sponsored by the Omega Watch Corporation at the Hayden Planetarium. Mrs. Lindsay; Mr. Elliott, dean of the Columbia University Graduate School of Journalism; and Mr. May, dean of the New York University Graduate School of Business Administration, are Museum Trustees. Corporate contributors, like Omega, often use the Museum and the Planetarium as unique settings for special events.

National Science Foundation and was honored by a Distinguished Publications Award from the Association for Women in Psychology.

Dr. Faber was elected president of the New York Entomological Society, and Helmut E. Adler, Research Associate, was elected co-chairman of the Psychology Section of the New York Academy of Sciences. He also serves as secretary of the Section of Experimental Psychology and Animal Behavior of the International Union of Biological Sciences.

Fellowships were also awarded to several Department members: Dr. Moller was a NATO fellow and a Del Duca Fellow; Dr. Topoff was elected fellow of the Explorers Club; and Dr. Zeigler was made a fellow of the Division of Physiological and Comparative Psychology of the American Psychological Association.

Scientific Publications:

*Gravelle, Karen** and Carol A. Simon
1980. Field observations on the use of the tongue-Jacobson's organ system in two iguanids, *Sceloporus jarrovi* and *Anolis trinitatis*. Copeia, 1980, no. 2, pp. 356-359.

*Grove, Patricia** and Peter Moller
1979. Electric fish as a tool for water quality assessment. Transaction of the American Fisheries Society, vol. 108, pp. 420-421.

Izower, Jack and Lester R. Aronson
1980 Effects of experience on optomotor perfomance on the cichlid fish *Aequidens latifrons*. Bull. of the Psychonomic Soc., vol. 15, no. 6, pp. 378-380.

Moller, Peter
See Grove and Moller above *and* Push and Moller below

*Moon, Richard D.** and H. Philip Zeigler
1979. Food preference in the pigeon (*Columba livia*). Physiology and Behavior, vol. 22, pp. 1171-1182.

*Push, Stephen** and Peter Moller
1979. Spatial aspects of electrolocation in the mormyrid fish *Gnathonemus petersii*. Jour. de Physiol. (Paris), vol. 75, pp. 355-357.

Simon, Carol A. and *George A. Middendorf**
1980. Spacing in juvenile (*Sceloporus jarrovi*). Copeia, 1980, no. 1, p. 141-146.

See also Gravelle and Simon above

Topoff, Howard and *Katherine Lawson**
1979. Orientation of the army ant *Neivamyrmex nigrescens*: integration of chemical and tactile information. Animal Behaviour, vol. 27, pp. 429-433.

Topoff, Howard and *John Mirenda**
1980. Army ants on the move: relation between food supply and emigration frequency. Science, vol. 207, pp. 1099-1100.

Abstracts and Popular Publications:

1979. Tobach, Ethel and *Betty Rosoff* (eds.) Genes and Gender: II. Gordian Press, New York, 160 pp.

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.

Department of Anthropology

Major exhibitions on "Gold of El Dorado: The Heritage of Columbia," "Feather Arts: Beauty, Wealth and Spirit from Five Continents," and "On Being Huichol," plus field work in the Indian Ocean, the Peruvian highlands, Patagonia and North America marked a very busy year for the Department, which also made major advances in reorganizing and restoring its collections. Work continued on the Gardner D. Stout Hall of Asian Peoples, which opens in mid-October, and several other permanent and temporary exhibitions covering a range of subjects from life in the Pacific Islands and America to ethnomusicology and Tibetan culture.

Major strides were made on reorganization of the anthropological collections. The African collection has been reorganized, cleaned and inventoried in anticipation of moving this important collection to the new 20,000 square foot storage facility on the fourth floor. A supervised collection and archive room was established to service visiting scholars, and revamping of the conservation and fumigation facilities is in progress. New policies established by the Department's Loan Committee improved security of specimens leaving the Museum for exhibition elsewhere.

Hidden Cave David Hurst Thomas, Chairman and Associate Curator, directed two major field projects during this year. The first was conducted at Hidden Cave, Nevada, during the summer of 1979. The deposits at Hidden Cave span the last 25,000 years, and archeological excavations to date have provided abundant artifactual and faunal remains. The American Museum will also excavate at Hidden Cave during the summer of 1980.

Dr. Thomas also directed excavations for two months on St. Catherines Island, Georgia. This long-term project has been sponsored for the past six years by the Edward John Noble Foundation. This year's effort concentrated on completing a 20 percent random sample of the island. One hundred forty new sites were located, and all of them have been partially excavated.

Dr. Thomas is completing analysis and publication of findings at Gatecliff Shelter, an archeological site which has been excavated by the American Museum for the past eight years. He is also editing a 60-volume series on the North American Indian.

Origin and Nature of the Chiefdom Robert L. Carneiro, Curator, completed a major manuscript on the origin and nature of the chiefdom, a form of polity intermediate between tribal society and the state. Work has also begun on a book dealing with

Leonore Drogin and Ignacio Fajardo dress a mannequin for the Hindu wedding diorama in the Gardner D. Stout Hall of Asian Peoples. Intense work went on through the year to complete the Museum's largest anthropological exhibition for its October opening.

cultural evolution, incorporating this research in an article discussing Herbert Spencer as an anthropologist. Dr. Carneiro has also been extensively involved with plans for the new South American Hall, and he has also supervised preparation of a temporary exhibit dealing with ethnomusicology of the world.

Stanley A. Freed, Curator, continued to collaborate with Ruth S. Freed, research associate, and professor of anthropology at Seton Hall University, in analyzing data collected in India during 1977-1978. The focus of their research has been the changing lifeway at Shanti Nagar, a northern Indian village which the Freeds first studied in 1958-1959. This diachronic study has provided valuable information on how urbanism influences traditional village life.

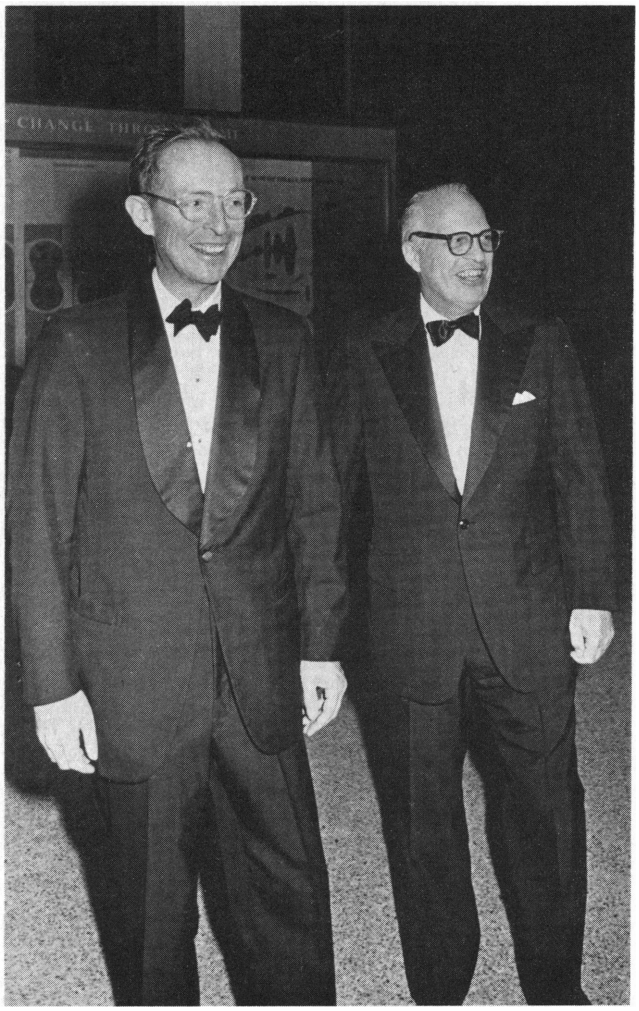
Nigerian Fieldwork Enid Schildkrout, Associate Curator, spent most of the year analyzing data from her previous fieldwork in Nigeria. She received additional grant support for her research from the Ford Foundation and the National Science Foundation. During this year, Dr. Schildkrout attended an International Labor Organization workshop in Geneva dealing with the employment of children and has also been actively involved in a major reorganization and inventory of the Museum's ethnographic African collections.

Ian Tattersall, Associate Curator, worked on a

comprehensive, book-length treatment on the primates of Madagascar. He also completed a paper on the ecology and behavior of the crab-eating macaque, *Macaca fascicularis*, and spent three months in the field in Mauritius, gathering additional data on these animals.

Craig Morris, Assistant Curator, continued with his analysis of data from Huanuco Pampa, an Inca city containing nearly 4,000 buildings located 12,000 feet high in the central Peru Andes. More than 300,000 potsherds were analyzed in 1979, the data computerized for analysis. Working in collaboration with scientists from the Florida State Museum, Dr. Morris has also studied some 50,000 bones from this site. Dr. Morris' work was discussed in the Public Broadcasting Service's "Odyssey" series, "The Incas."

"Gold of El Dorado" Dr. Morris served as scientific advisor for the "Gold of El Dorado: The Heritage of Columbia" exhibition and as the U.S. delegate to the International Conference, Criticas y Perspectivas de la Arquelogia Andina in Paracas, Peru.



Museum President Robert G. Goelet, left, and Donald C. Platten, chairman and director of Chemical Bank, attend the opening of the Gardner D. Stout Hall of Asian Peoples. Mr. Platten, a Museum Trustee, was named chairman of the Museum's Corporate Campaign.

Junius B. Bird, Curator Emeritus, analyzed the John Fell collection from Fell's cave and Estancia Brazo North in Patagonia, and made exploratory excavations at Tom Gould's Lagoon, in search of additional Paleo-Indian materials for this area.

Dr. Gordon Ekholm, Emeritus Curator of Anthropology, continued his curatorial duties, assisting visiting scholars and supervising loans relating to the Mesoamerican collections.

Harry L. Shapiro, Curator Emeritus, devoted considerable time this year to completing the biography of Earnest Hooton, to be included in a series by Columbia University Press.

Philip C. Gifford, Scientific Assistant, completed sorting and moving the Philippine ceramic collection and worked closely with the Department of Exhibition and Graphics in re-establishing the Margaret Mead Hall of Pacific Peoples.

Hall of Asian Peoples Walter A. Fairservis, Jr., Research Associate, continued to serve as the scientific advisor to the Gardner D. Stout Hall of Asian Peoples and completed a report on his excavations at Hierakonpolis. He also completed a study on the Harappan civilization with special emphasis on the Harappan script.

Carin Burrows, Associate, installed the cases on Tibetan religion and art in the Hall of Asian Peoples. Her work progressed on the temporary exhibit on Tibetan religion and art, with Laila Williamson assisting in the project. Basic research continues on the objects in the Museum's Tibetan collection, particularly the translation of inscriptions on the t'angkas.

Rhoda Metraux, Research Associate, organized Margaret Mead's papers and those of her collaborators and successors for the Museum's archives. Dr. Metraux also participated in a celebration in honor of Margaret Mead in Pere Village, Manus, in the Admiralty Islands, and carried out brief but intensive fieldwork on the Sepik River.

Renovation of Storage Barbara Conklin, Coordinator of the Curatorial Service Program, continued to supervise the major renovation of anthropological storage. The African ethnology collection is being inventoried and prepared for movement into new space. Work has also proceeded on several other collections, particularly stressing the stabilization of specimens. She supervised establishment of an archive and research room for visiting scholars.

Scientific Publications:

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1979. Fibers and spinning procedures in the Andean area. *In* Junius B. Bird Pre-Columbian textile conference, May 19 & 20, 1973, Textile Museum, Washington, D.C., pp. 13-17.

1979. New World production and the distribution of the backstrap loom. *In* Irene Emery roundtable on museum textiles; 1977 Proceedings: looms and their products. Textile Museum, Washington, D.C., pp. 115-126.

1979. The legacy of the stingless bee. Nat. Hist., vol. 88, no. 9, pp. 49-51.

Carneiro, Robert L.
1979. Julian Steward and the evolution of culture. Revs. in Anthrop., vol. 6, pp. 287-300.

1979. Leslie Alvin White. Internatl. Encyclopedia of the Soc. Sci., Biographical Supplement, The Free Press, New York, vol. 18, pp. 803-807.

1979. [Review of] Carib-speaking Indians: culture, society and language. Amer. Anthrop., vol. 81, pp. 666-667.

Freed, Stanley A. and Ruth S. Freed
1980. Origin of the Swastika. Nat. Hist., vol. 89, no. 1, pp. 68-75.

1980. Swastika: A new symbolic interpretation. Rice Univ. Studies, vol. 66, no. 1, pp. 87-105.

See also Freed and Freed below

Freed, Ruth S. and Stanley A. Freed
1980. Rites of passage in Shanti Nagar. Amer. Mus. Anthrop. Papers, vol. 56, pt. 3, pp. 323-554.

See also Freed and Freed above

Mead, Margaret
1979. Anthropological contributions to national policies during and immediately after World War II. *In* Walter Goldschmidt, ed. The uses of anthropology. Special publications of the Amer. Anthrop. Assoc., no. 11, Washington, D.C., pp. 145-157.

1979. Some personal views. Rhoda Metraux, ed. Walker & Co., New York, 268 pps.

Mead, Margaret and Rhoda Metraux
1980. On the viability of villages. *In* Priscilla Copeland Reining and Barbara Lenkerd, eds. Village viability in contemporary society. AAAS Selected Symposium, no. 34, Washington, D.C., pp. 19-32.

1980. Aspects of the present. Morrow & Co., New York, 319 pps.

Metraux, Rhoda and *Shari Segel*
1980. Margaret Mead: anthropologist of our time, a photographic essay. Studies of Visual Commun., Vol. VI (Spring), no. 1, pp. 4-14.

Morris, Craig
1979. L'étude archeologique de l'echange dans les Andes. Annales, vol. 33, nos. 5-6, pp. 936-948.

1979. [Review of] La Organizacion Economica del Estado Inca, John V. Murra. Amer. Anthrop., vol. 81, no. 4, pp. 922-924.

1980. Andean South America: village to empire. *In* Andrew Sherratt, ed., The Cambridge Encyclopedia of Archaeol., Cambridge Univ. Press, Cambridge and New York, pp. 391-397.

Schildkrout, Enid
1979. Women's work and children's work: variations among Moslems in Kano. *In* Sandra Wallman, ed. The anthropology of work. Assoc. of Soc. Anthrop., Monograph 19, Academic Press, London, pp. 69-85.

Shapiro, Harry L.
1979. [Review of] Early man in Kenya: people of the lake. Koobi Fora Research Project; the fossil hominids and an introduction of their context, 1968-1974, vol. 1, p. 376.

1980. [Introduction to] Monkey King: a celestial heritage. An introduction to Chinese culture through the performing arts, by Jo Humphrey. Chung-Cheng Art Gallery, Sun Yat Sen Hall, St. Johns Univ., Jamaica, New York, p. 9.

Tattersall, Ian
1979. Patterns of activity in the Mayotte lemur, *Lemur fulvus mayottensis*. Jour. Mammal., vol. 60, no. 2, p. 314-323.

Hamilton, Andrew, Ian Tattersall, *Robert Sussman*, and *John Buettner-Janusch*
1980. Chromosomes of Lemuriformes. VI. Comparative karyology of *Lemur fulvus*: A G-Banded karyotype of *Lemur fulvus* mayottensis, Schlegel, 1866. Internatl. Jour. Primatol., vol. 1, no. 1, pp. 83-96.

Thomas, David Hurst
1979. Some comments and impressions on visiting the National Museum of Ethnology. Gekkan Minpaku (Jour. of the Nat. Mus. of Ethnol., Osaka, Japan), vol. 3, no. 8, p. 1.

1980. The gruesome truth about statistics in archaeology. Amer. Antiquity, vol. 45, no. 3, pp. 344-345.

Thomas, David Hurst and *C. S. Larsen*
1979. The anthropology of St. Catherines Island: 2. The Refuge-Deptford mortuary complex. Amer. Mus. Anthrop. Papers, vol. 56, pt. 1, p. 1-180.

Astronomy and the American Museum—Hayden Planetarium

Through its courses for students and professionals, its well-known Sky Shows, its lecture programs and exhibitions, the Planetarium is one of the leading educational institutions in the country in the field of popular and applied astronomy. In recent years, the Richard S. Perkin Library, with its thousands of contemporary and historical texts, has become a well-known and well-used research and reference tool for both scholars and the public interested in the vast realm of astronomy and space.

The major event in the Planetarium is the world-famous Sky Show. In the past fiscal year 389,367 people attended the Sky Shows. Of these, 81,150 were members of school groups attending reserved school shows with their classes.

The Planetarium also continued to offer the Laserium program. This past fiscal year 105,961 visitors saw this cosmic light show. Attendance at all Planetarium events was somewhat curtailed during the spring because of the New York City transit strike.

The Planetarium offers an extensive series of courses in basic and advanced astronomy, navigation, meteorology, and aviation ground training for private, commercial, and instrument pilots. In the three terms of the fiscal year, 737 people enrolled in the courses, a substantial increase over last year. Several new courses and instructors were added to the program, and plans were made for an even more expanded program next year.

The two sales shops offer not only souvenir items, but are the Metropolitan Area's major source of astronomical references and equipment. This past year, gross sales in the shops were $136,567. Surpluses from their operations contribute substantially to Planetarium operating funds.

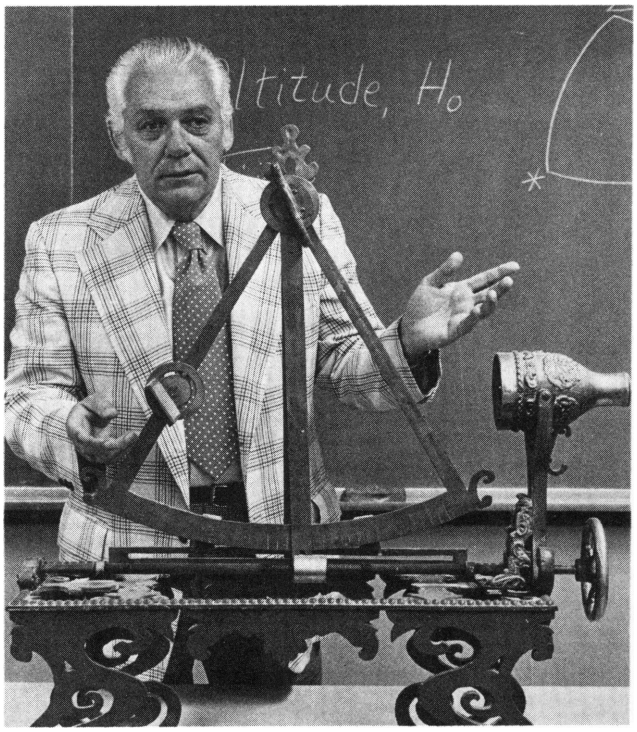
Exhibition Program This past year the famous Ahnighito meteorite—the world's largest on display—was removed from the Planetarium's blacklight hall and transported to the Museum, where it will be unveiled in the new Arthur Ross Hall of Meteorites in March, 1981. It was necessary to remove a section of the Planetarium's exterior wall to transport the 31-ton chunk of iron, and the event was greeted with much interest on the part of the media. The Planetarium continues to exhibit the Willamette meteorite, the largest ever found in the U.S.

Throughout the year the Planetarium used its "art wall" for an exhibit from the Smithsonian Institution of photos of the moon. The display was mounted during the summer to mark the tenth anniversary of the Apollo XI landing. A number of items of memorabilia from the early days of the U.S. space program were given to the Planetarium by Samuel J. Foosaner. In the fall, a Smithsonian exhibit of photographs of the earth taken from orbit was displayed, followed, over the Christmas season, by an exhibit of works by Helmut K. Wimmer, Art Supervisor. In the spring, the impressionistic art of Sonja Eisenberg, inspired by astronomical landscapes, was exhibited.

Planetarium Sky Shows In the summer, the Sky Show was "Last Nights of Pompeii," coinciding with the conclusion of POMPEII A.D. 79. "Colony in Space" was presented in the fall and winter, with a break between for the popular "Star of Wonder" Christmas program. From March until July, the Sky Show, entitled "The Beginning," dealt with current information on the origin of the universe.

The planetarium also presents, on request, special programs for other groups with specific needs. Many colleges and universities make use of the Planetarium's expertise in astronomy, and special programs have been presented for Museum members. Other special programs were presented for the Colony Club, the Federal Aviation Administration, the Omega Watch Corporation, *Omni* magazine, and the International Ladies Garment Workers Union. This latter group had a rather unusual requirement: special Sky Shows had to be developed for presentation in Spanish and Cantonese. In April, the Planetarium presented its yearly benefit evening, this year sponsored by radio station WBLS.

Staff Activities Mark R. Chartrand III, Chairman and Associate Astronomer, authored "Colony in Space" and was interviewed numerous times by the media on astronomical events during the year. Requests for information were especially heavy during the descent of Skylab. He also served in a National Aeronautics and Space Administration Science Working Group to plan and coordinate the scientific and information activities for the appearance of Halley's Comet in 1986.



Fred C. Hess, an instructor at the American Museum of Natural History-Hayden Planetarium, teaches a course in navigation. In addition to its wrap-around slide shows at the Guggenheim Space Theater, and its astronomy programs and cosmic laser light concerts in the Sky Theater, the Planetarium offers a wide variety of courses in navigation and astronomy.

Kenneth L. Franklin, Astronomer, gave numerous lectures, taught four evening courses, and was responsible for coordinating the Planetarium's art exhibit. In addition to his frequent appearances for the media, he led a tour of amateur astronomers to Kenya to view last February's solar eclipse. He continued to serve as astronomy editor of the *World Almanac,* and completed two years as Chairman of the Museums Council of New York City.

Allen Seltzer, Education Coordinator in charge of evening course and school programming, co-authored "The Beginning" and was responsible for much of the photographic work and for arranging various flight safety presentations for the Federal Aviation Administration.

Thomas A. Lesser, Senior Lecturer, produced the Sky Shows and coordinates activities in the Sky Theater. He co-authored "The Beginning" and produced most of the Planetarium's school and public performances.

Philip Harrington joined the staff as Intern in the fall. The Internship position is partially funded by a grant from the New York State Council on the Arts.

Perkin Library for Research The Richard S. Perkin Library, the Planetarium's research and reference resource for its staff and for the general public, during the past year handled more than a thousand

requests for assistance. In the spring, the Perkin Foundation generously renewed its funding. With expenses for professional references increasing even faster than the general inflation rate, such continuing generosity has enabled the library to maintain its high quality and remain current.

Abstracts and Popular Publications:

Branley, Franklyn M.

1980. [Review of] Mysterious Universe: A Handbook of Astronomical Anomalies, by William R. Corliss. *In* Science Books & Films, vol. XV, no. 4, p. 202.

[Review of] How Did We Find Out About Black Holes, by Isaac Asimov. *In* The Science Teacher, vol. 47, no. 4, p. 51.

[Review of] The Sun: Our Future Energy Source, by David K. McDaniels. *In* The Science Teacher, vol. 47, no. 4, p. 49.

1979. Age of Aquarius: You and Astrology, Thomas Y. Crowell Co., New York, 60 pp.

Columbia and Beyond—The Story of the Space Shuttle. Collins Publishing Co., Cleveland, 90 pp.

The Electromagnetic Spectrum—Key to the Universe. Exploring Our Universe Series, Thomas Y. Crowell Co., New York, 126 pp.

Chartrand, Mark R., III

1979. A Bit of Lunacy. Omni, vol. 1, July, pp. 18, 131.

[Review of] Space Art, *In* Sky and Telescope, Ron Miller, ed., vol. 58, no. 1, pp. 60, 62.

Planet Obsolescence. Omni, vol. 1, August, pp. 16, 137.

Nightlight. Omni, vol. 1, September, p. 24.

Jupiter Journey. Omni, vol. 2, October, p. 24.

An Amazing New Galaxy is Found. Science Digest Special Edition, Winter, 1979, pp. 66-71, 110.

The Shrinking Sun. Omni, vol. 2, November, p. 16.

The Reefs of Space. Omni, vol. 2, December, p. 26.

1980. Sky Fire. Omni, vol. 2, January, pp. 20, 121.

Star Clusters. Omni, vol. 2, February, pp. 20, 98.

[Review of] Galaxies: Structure and Evolution by R. J. Tayler and A. S. Everest. *In* Physics Today, vol. 33, February, p. 53.

Made in Space. Omni, vol. 2, March, pp. 20, 126.

[Review of] Observer's Handbook—1980, John R. Percy, ed., *In* Science 80, March/April, pp. 108, 109.

Cosmic Caldron. Omni, vol. 2, April, p. 139.

X Marks the Universe. Omni, vol. 2, May, p. 140.

Seeing Double. Omni, vol. 2, June, p. 123.

Franklin, Kenneth L.

1979. Astronomy and Calendar. *In* World Almanac, Newspaper Enterprise Association, pp. 756-792.

1980. Here Comes the Heavens' Most Notorious "Dirty Snowball." Science Digest, vol. 87, April, p. 30.

1979/80. Rising and Setting Times of the Sun, Moon, and Planets. The New York Times, daily.

Lesser, Thomas A.

1980. 1981—Year of the Dancing Planets. Constellation, Spring Equinox Issue, p. 2.

Department of Entomology

A new major butterfly collection, grants for curatorial improvements and a wide variety of research efforts and publications were highlights of the Department this year. Lee H. Herman, the first chairman appointed under the Museum's rotating chairman program, completed his seven-year term and was succeeded by Randall T. Schuh.

The Department completed a five-year grant from the National Science Foundation for curation of the collection. The $537,902 enabled the purchase of new equipment for housing the collection and the hiring of four people to help with major curatorial improvements on the Lepidoptera, Isoptera, and Arachnida collections.

A new grant from the National Science Foundation for $308,544 provides an assistant for the arachnid collection; 24 visiting specialists who will sort to genus various groups of Arachnida, Coleoptera, Diptera, Hemiptera, Homoptera, Hymenoptera, Lepidoptera, and Orthoptera; and additional equipment for housing the collection.

Largest Butterfly Collection Received

The 65,382 specimens of butterflies donated by Research Associate Cyril F. dos Passos probably represent the largest, most complete collection of North American butterflies ever accumulated by one person. The unrivalled collection is the largest

The Museum is often used as a backdrop for nonscientific activities ranging from the videotaping of soap operas to the shooting of movies. In this case, the project was a jeans commercial.

accession of these insects the Museum has received.

John C. Pallister, a Research Associate for many years, died on March 6. He added significantly to our programs over the years by publishing scientific and popular articles, collecting insects in exotic places, curating the collection and answering inquiries concerning insects. He will be remembered with affection and respect.

Lee H. Herman, Curator, submitted for publication a 358-page manuscript with 689 illustrations that revised the New World species of the staphylinid beetle subtribe Dolicaonina of the subfamily Paederinae. He described 61 new species and one new genus, redescribed 17 species, transferred 10 species to other genera, discussed the 14 Old World genera, and presented partially resolved cladograms for the New World species for the 17 genera of the subtribe.

In analyzing the phylogeny of the subtribe, Dr. Herman determined that each of the New World genera was related to different Old World genera. For the New World species, a number of monophyletic groups were recognized, but their interrelationships were unclear. More than 60 percent of the species are flightless and have reduced eyes. Although the study reports 78 species in the New World, they were collected at only 87 localities, thereby presenting the possibility that this subtribe has many more species yet to be discovered.

Picking up where he left off four years ago, Dr. Herman continued his monograph of the genus *Bledius.* In this, the third part of the study, he worked with the *emarginatus* and *annularis* groups. To date, illustrations and a key have been completed for about 30 species. The remaining species, all in the *annularis* complex, comprise a taxonomically difficult group with as many as 15 or 20 species.

Frederick H. Rindge, Curator, continued his long-range systematic studies of the moths of the family Geometridae, emphasizing the very large subfamily Ennominae. He is now working with the tribe Cingiliini. During the year he submitted for publication his revision of the genus *Somatolophia* that includes 12 species, six of which he described as new.

Dr. Rindge also began a revision of the genus *Meris,* which upon commencement of the study was not a monophyletic group. He considers a second genus necessary to ensure monophyly. About nine species will be included, with five in one genus and four in the other.

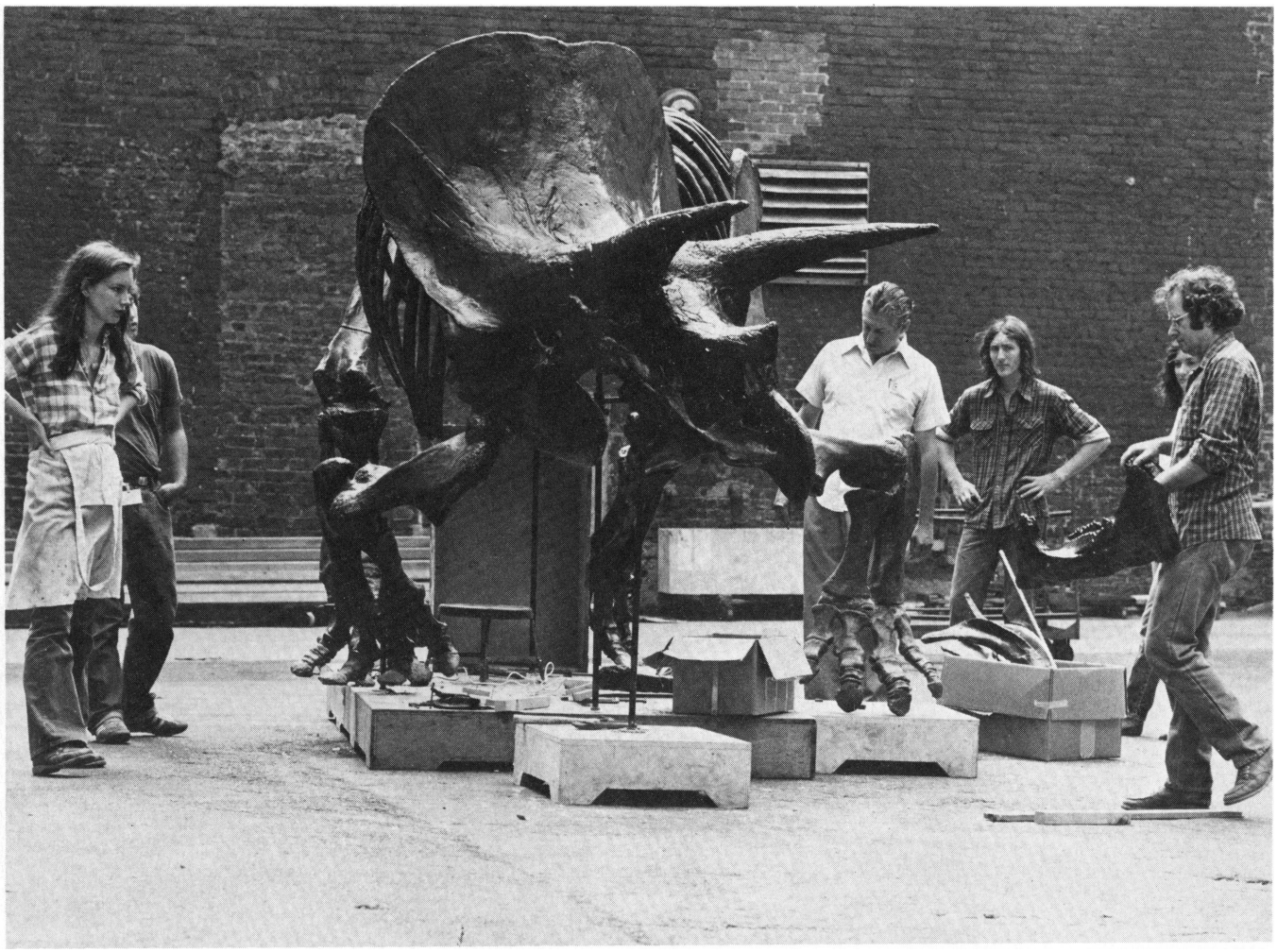
Bee Studies Pursued Jerome G. Rozen, Jr., Curator, initiated a study of the life history of *Megandrena* and *Ancylandrena* with the hope of illuminating their phylogenetic positions. During the spring, Dr. Rozen and his wife, with support from the National Geographic Society, undertook field studies in the deserts of California, southern Nevada and western Arizona. Although nesting sites of species of these genera were not found, considerable information was gathered concerning the foraging, mating behavior and flower preference of these bees. Another interesting project noted that four unrelated species of bees, in four different genera, all feed on the same desert plant, *Mentzelia tricuspis,* and all exhibit marked behavioral and anatomical adaptations, not found in their congeners, for gathering pollen from this unusual plant. Because the mating pairs are not easily disturbed, Dr. Rozen was able to view their mating and foraging behavior through a stereoscopic microscope, which permits studying the adaptational significance of specialized anatomical structures and behavioral patterns used in foraging.

"Kissing Bugs" After several years of work, Curator Pedro Wygodzinsky's and Research Associate Herman Lent's voluminous monograph on the world fauna of "Kissing Bugs" (Triatominae) appeared in print. Dr. Wygodzinsky's research on European Nicoletiidae also was published.

A paper by Dr. Wygodzinsky and Kathleen Schmidt, Scientific Assistant, on the Microcoryphia (machilids, rockjumpers) of the northeastern United States and parts of Canada was accepted for publication. Intensive field work led to the discovery of four species of machilids in the northeastern United States. Two of the species *(Trigoniophthalmus alternatus* and *Petrobius brevistylis)* were probably introduced from Europe in historical times with ballast, but the two other species are native and were described as new. *Machilis variabilis* Say, described from the eastern United States, is unidentifiable. Dr. Wygodzinsky collaborated with Research Associate Sixto Coscarón on an extensive paper on the South American black fly subgenera *Simulium (Psaroniocompsa)* and *Simulium (Inaequali),* a new subgenus.

Research on the Theory of Comparative Biology Norman I. Platnick, Associate Curator, conducted research on the theory of comparative biology and on the systematics of arachnids. He and Gareth J. Nelson, of the Department of Ichthyology, completed the manuscript of their book on the history, methods, and results of systematics and biogeography, which should appear within the coming year. Some of this work was presented at the 13th Annual Numerical Taxonomy Conference, held at Harvard University, to seminars at Texas Tech University, Ohio State University, and the California Academy of Sciences, and in the journals *Systematic Zoology, Bioscience,* and *Philosophy of Science.* Dr. Platnick also collaborated with Donn E. Rosen, Department of Ichthyology, on a chapter for a forthcoming book on the philosophy of Sir Karl Popper (1979 recipient of the Museum's Gold Medal Award for Distinguished Service to Science); the chapter will deal with evolutionary novelties and their role in Popper's thought.

Revisionary work on various groups of arachnids continued with the artistic assistance of Mohammed Umar Shadab, Scientific Assistant. A review of the phylogeny of the order Ricinulei, delivered by Dr. Platnick at the Eighth International Congress of



Martin Cassidy, right, and members of the Reproduction Section of the Department of Exhibition and Graphics, prepare a model of a triceratops. Staff members have prepared several dinosaur "kits" for other museums and cultural institutions and have received considerable press attention for their unusual work.

Arachnology in Vienna, resulted in the separation of the 40 New World species into two genera, one of which (found in Central and South America) may have its closest relatives in Africa. The spider genus *Cesonia* (Gnaphosidae) was revised, and was shown for the first time to contain a species group from the West Indies, members of which had been erroneously placed in four other genera.

Revision of American Purse-Web Spiders
Willis J. Gertsch, Curator Emeritus, collaborated with Dr. Platnick on a revision of the American purse-web spiders of the family Atypidae, a group of unusual tarantula-like spiders which spend their lives in narrow silken tubes, usually attached to the trunks of trees.

Randall T. Schuh, Associate Curator, spent six weeks collecting in Oregon and northern California, where he accumulated approximately 8,000 specimens of plant bugs for work that is planned on the Miridae fauna of western North America. Dr. Schuh completed cooperative projects on the Miridae with Thomas J. Henry, an entomologist with the Pennsylvania State Department of Agriculture and John D. Lattin, Professor of Entomology at Oregon State University. With John T. Polhemus, an authority on semiaquatic Hemiptera, he described a remarkable new leptopodomorphan from Ecuador and prepared a phylogenetic analysis of the suborders in which he applied computer techniques for establishing schemes of interrelationships and presented a critical discussion of the attributes of competing classificatory methods. Some of the results of this study were presented at the 13th Annual Numerical Taxonomy Conference and at the Annual Meeting of the Society of Systematic Zoology. In a review of a recent volume on morphology of true bugs, Dr. Schuh presented the first published cladistic analysis of the suborders of Hemiptera. He also continued work on the phyline plant bug fauna of the Indomalayan region and the western Pacific and completed his three-year term as Managing Editor of *Systematic Zoology.*

Scientific Publications:

Gertsch, Willis J. and Norman I. Platnick
1979. A revision of the spider family Mecicobothriidae (Araneae, Mygalomorphae). Amer. Mus. Novitates, no. 2687, pp. 1-32, figs. 1-91.

Herman, Lee H.
1979. Revision of *Stereocephalus* (Coleoptera, Staphylinidae, Paederinae). Amer. Mus. Novitates, no. 2683, pp. 1-13, figs. 1-47.

Henry, Thomas J. and Randall T. Schuh
1979. Redescription of *Beamerella* Knight and *Hambletoniola* Carvalho and included species (Hemiptera: Miridae) with a review of their relationships. Amer. Mus. Novitates, no. 2689, pp. 1-13.

Lent, Herman and Pedro Wygodzinsky
1979. Revision of the Triatominae (Hemiptera, Reduviidae) and their significance as vectors of Chagas' disease. Bull. Amer. Mus. Nat. Hist., vol. 163, pp. 127-520, 320 figs.

Platnick, Norman I.
1979. Contribution à l'étude de la faune terrestre des îles granitiques de l'archipel des Sechelles (Mission P. L. G. Benoit—J. J. Van Mol 1972). Rev. Zool. Africaine, vol. 93, pp. 461-466, figs. 1-15.

1979. [Review of] Arthropod phylogeny, edited by A. P. Gupta. Syst. Zool., vol. 28, pp. 246-249.

1979. A new *Symphytognatha* from New Guinea (Araneae, Symphytognathidae). Bull. British Arachnol. Soc., vol. 4, pp. 337-338, figs. 1-3.

1980. Philosophy and the transformation of cladistics. Syst. Zool., vol. 28, pp. 537-546, figs. 1, 2.

See also Gertsch and Platnick above

Platnick, Norman I. and Leslie F. Marcus
1979. The 12th annual numerical taxonomy conference. Syst. Zool., vol. 28, pp. 232-238.

Platnick, Norman I. and Mohammed Umar Shadab
1980. A revision of the North American spider genera *Nodocion, Litopyllus,* and *Synaphosus* (Araneae, Gnaphosidae). Amer. Mus. Novitates, no. 2691, pp. 1-26, figs. 1-52.

See also Nelson and Platnick, Dept. of Ichthyology

Schuh, Randall T.
1979. [Review of] Evolutionary trends of Heteroptera. Part II. Mouthpart structures and feeding strategies, by R. H. Cobben. Syst. Zool., vol. 28, pp. 653-656.

See also Henry and Schuh above

Shadab, Mohammed Umar

See Platnick and Shadab above

Wygodzinsky, Pedro
1979. A note on *Empicoris seorsus* Bergroth (Hemiptera, Reduviidae, Emesinae). New Zealand Jour. Zool., vol. 6, pp. 53-56, 2 figs.

1980. A survey of the Nicoletiinae of Europe (Nicoletiidae, Thysanura, Insecta). Amer. Mus. Novitates, no. 2695, pp. 1-24, 16 figs.

See also Lent and Wygodzinsky above

Carol Schleifer, scientific assistant in the Department of Ichthyology, aids Barry Chernoff, a graduate student in the fish division of the University of Michigan's Museum of Zoology, in studying fish specimens. The department's 400,000-specimen collection is used extensively for research by students and scientists outside the Museum as well as by Museum staff members.

Department of Herpetology

The three curators characteristically pursued a wide variety of research topics this year. Their field work ranged from within commuting distance of the Museum to Trinidad and Ecuador. Laboratory research involved studies of such varied animals as fingertip-sized frogs, stained to make their tiny bones visible, and lizards and snakes bred for genetic analysis. All the research of the Department involves the interdependent areas of systematics, ecology and evolutionary biology.

Biogeography and Ecology Richard G. Zweifel, Chairman and Curator, continued his studies of the amphibians and reptiles of New Guinea and completed three manuscripts: one, a general survey of the frogs of New Guinea, written with Michael J. Tyler, Senior Lecturer in Zoology at the University of Adelaide, South Australia; the second, a biogeographic study of the lizards and frogs of the Huon Peninsula of Papua New Guinea; the third describing a new species of frog.

Research on the amphibians and reptiles of St. Catherines Island, Georgia, conducted jointly with Curator Charles J. Cole, continued for the seventh year. The study, supported by the Edward John Noble Foundation, has two principal aspects: a general overview of the fauna, emphasizing comparisons with the faunas of the mainland and adjacent islands, and research on the population ecology of two closely related lizard species, skinks of the genus *Eumeces.* For the latter, more than 400 lizards have been marked and released, and many of them recaptured several times. Reliable data on growth, movements, and survival can be obtained only by such long-term studies. Dr. Zweifel continued similar long-term field research involving snakes and turtles at the Kalbfleisch Field Research Station.

Snake Genetics Inheritance in snakes is poorly understood because they are rarely easy to breed in captivity and they usually require at least two years to mature, necessitating long-term commitment to the research. Many years of breeding kingsnakes *(Lampropeltis getulus)* in the Herpetology laboratory are now leading to an understanding of how color patterns in these snakes are inherited. In addition to this study, Dr. Zweifel continued to collaborate with Herbert C. Dessauer, Research Associate, on the inheritance of blood proteins in the same snakes.

All-Female Lizards Dr. Cole's research was highlighted by a trip to Trinidad to collect samples of an all-female lizard, and by the publication of a report dealing with chromosome inheritance in parthenogenetic and hybrid lizards.

Lizards of the species *Gymnophthalmus underwoodi* were returned alive to the laboratory, where they have adapted well to captive conditions and produced young. The species promises to be a useful one for investigating hypotheses concerning the evolution of parthenogenesis (reproduction in the absence of males) in lizards.

The published report discusses the creation of a tetraploid hybrid lizard in the laboratory by crossing a triploid parthenogenetic female with a male of a diploid bisexual species. The outcome is consistent with hypotheses stating that some parthenogenetic species originate through hybridization and demonstrates that although the eggs of a parthenogenetic lizard are capable of developing without being fertilized, they nevertheless can be fertilized and produce viable young.

Other studies significantly advanced by Dr. Cole this year included research on the chromosomes, variation and systematics of fence lizards (genus *Sceloporus*), revision of the systematics of some species of black-headed snakes (genus *Tantilla*) in collaboration with Laurence M. Hardy, Professor of Biological Sciences, Louisiana State University, Shreveport, and the discovery of histological evidence for parthenogenetic reproduction in lizards (also with Dr. Hardy).

Poisonous Frogs and Toads In order to better understand the evolutionary origins of poisonous skin secretions in some amphibians, Charles W. Myers, Curator, collaborated with biochemists, cell biologists, and neurophysiologists at the National Institutes of Health, Beth Israel Hospital in Boston, and the University of Maryland School of Medicine. An electron microscope study published in *Tissue and Cell* revealed the fine structure of the granular or "poison" glands in the Dendrobatidae, a family including both toxic and nontoxic species of frogs. The authors concluded that the granular skin glands are shared primitive structures which probably serve, or served, an original function other than poison synthesis. But the glands were a convenient preadaptation for producing the diverse poisons that evolved separately in some groups of amphibians.

A paper appearing in *Science* presented the first hypothesis on the origin of toxicity in the Bufonidae, a family that includes the common toads. The toad poisons may have originated from skin compounds that regulate an enzyme involved in maintaining water and salt balance. Another paper published in *Science* explains how a sodium-channel regulatory site in nerve and muscle appears to have been minimally altered in poison-dart frogs, so that they are insensitive to their own toxin but not to similarly-acting experimental compounds, to which they are never exposed in nature.

Dr. Myers continued to invest considerable time in field work in the American tropics. He went to Ecuador in November, unraveling puzzling aspects of the distribution and variation of a species of poison frog. He was in Panama in March, studying

the ecological genetics of another poison frog, and spent April at a proposed dam site in western Panama, by invitation of the Gorgas Memorial Laboratory (Panama City). Here he contributed to an environmental-impact assessment of the projected lake to be formed, while furthering his own study of amphibians and reptiles of the Isthmus of Panama.

Curatorial Activity More than 4,700 specimens were added to the collection, and more than 4,900 were cataloged. In excess of 3,400 specimens were lent to or returned by researchers at other institutions in this country and abroad.

A five-year grant from the National Science Foundation that provided salaries for two Curatorial Assistants and for the purchase of collection storage equipment terminated. The grant permitted large numbers of backlogged specimens to be cataloged and made available for study; in addition, most of the Department's ancient earthenware storage crocks were replaced with stainless-steel tanks. The grant also enhanced services to scientists in other institutions.

Scientific Publications:

Cole, Charles J.
1979. Chromosome inheritance in parthenogenetic lizards and evolution of allopolyploidy in reptiles. Jour. Hered., vol. 70, no. 2, pp. 95-102.

1980. Newly attained polyploidy and/or clonal reproduction in animals: The brink of extinction, or threshold to new frontiers? *In* Lewis, Walter H., ed., Polyploidy: biological relevance. Basic Life Sciences, Plenum Press, New York and London, vol. 13, pp. 539-542.

Daly, John W., Charles W. Myers, *Jordan E. Warnick,* and *Edson X. Albuquerque*
1980. Levels of batrachotoxin and lack of sensitivity to its action in poison-dart frogs *(Phyllobates).* Science, vol. 208, pp. 1383-1385, fig. 1, table 1.

Flier, Jeffrey, Michael W. Edwards, John W. Daly, and Charles W. Myers
1980. Widespread occurrence in frogs and toads of skin compounds interacting with the ouabain site of Na^+, K^+-ATPase. Science, vol. 208, pp. 503-505, fig. 1, table 1.

Menzies, James I., Michael J. Tyler, and Richard G. Zweifel
1980. *Cophixalus* Boettger, 1892 (Amphibia, Salientia): Proposed designation of type species under the plenary powers. Z.N. (s.) 2298. Bull. Zool. Nomenclature, vol. 36, no. 4, pp. 231-235.

Myers, Charles W., and *John W. Daly*
1980. Taxonomy and ecology of *Dendrobates bombetes,* a new Andean poison frog with new skin toxins. Amer. Mus. Novitates, no. 2692, pp. 1-23, figs. 1-13, tables 1-5.
See also Daly, Myers, Warnick and Albuquerque *and* Flier, Edwards, Daly and Myers above *and* Neuwirth, Daly, Myers and Tice below

Neuwirth, Maria, John W. Daly, Charles W. Myers, and *Lois W. Tice*
1979. Morphology of the granular secretory glands in skin of poison-dart frogs (Dendrobatidae). Tissue Cell, vol. 11, no. 4, pp. 755-771, figs. 1-26.

Zweifel, Richard G.
1980. Aspects of the biology of a laboratory population of kingsnakes. *In* Murphy, James B., and Joseph T. Collins, eds., Reproductive biology and diseases of captive reptiles. Soc. Study Amphibian Dept. Contrib. in Herpetol., no. 1, pp. 141-152, figs. 1-8.
See also Menzies, Tyler and Zweifel above

Abstracts and Popular Publications:

Duellman, William E., and Charles W. Myers
1980. The Panamanian herpetofauna: Historical biogeography and patterns of distribution. *In* D'Arcy, William G., ed., Botany and natural history, a Symposium signalling the completion of the "Flora of Panama." Univ. Panama, April 14-17, Abstracts and Program, pp. 46-48.

Myers, Charles W.
1979. Poisonous frogs and assorted misadventures. Amer. Mus. Rotunda, vol. 3, no. 7, p. 4.

Department of Ichthyology

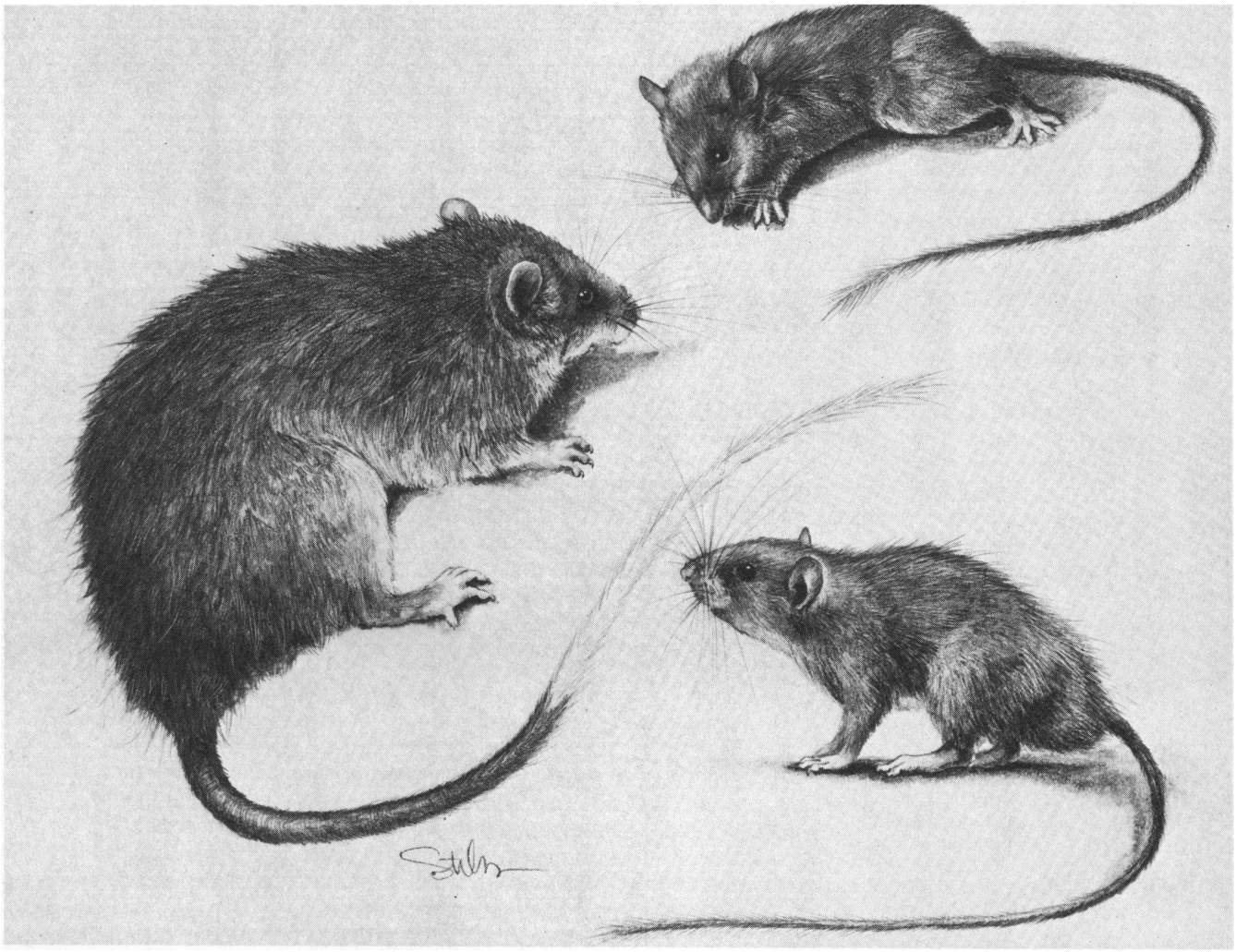
Good systematists have two characteristics: a commitment to the organisms they work on, and a willingness to explore and apply the most rigorous scientific methodology. Neither of these alone will produce good systematics. In this department, scientists, students and other researchers have daily access to an extensive and representative array of the world's fishes, and the opportunity to work together.

As more universities give up their systematics programs in favor of molecular biology, and as ecological institutes become more quantitative and systems-oriented, there are fewer institutions where training in systematics is available.

Members of the Department believe strongly in maintaining an active role in the training of future systematists. While teaching is not mandatory for curators, the Department has a unique outlook that enables it to offer a special kind of training based on daily association with extensive collections of animals and on a critical examination of current methodologies of systematics.

At present there are five doctoral candidates and two master's degree students in residence; five other students are finishing their master's degree under the supervision of Department curators. In addition, the curators serve on the academic committees of several other students.

53,000 Specimens Added to Collection During the year, the collection grew by an estimated 2,889 lots equaling some 53,000 specimens. More than 2,180 lots (40,000 specimens) were cataloged. Space problems have been ameliorated by the reorganization plan of Gareth J. Nelson, Curator, for



Research in Indonesia by Guy G. Musser, Archbold Curator in the Department of Mammology, has led to the discovery of two new species of rats (left and upper right) which live only on the island of Sulawesi. Dr. Musser has proposed that these two species and another rat be placed in a new genus. Official publication of his findings will appear shortly.

the mezzanine and first floor, increasing the usable space by about 25 percent. This has made it possible to fit the permanent fish collection in the mezzanine area, where conditions are more suitable for specimens, and has freed the first floor for extensive collections that await final processing.

Cataloging proceeded rapidly this year thanks to a grant from the Vetleson Foundation, which provided funds for a cataloger as well as for the purchase of an automatic typewriter. The latter has increased the cataloger's output by at least 30 percent. Nonetheless, the fish collection is still in need of additional space. A request to the National Science Foundation for a grant to renovate and expand various areas is in preparation.

Visitors and collaborators from 27 countries and other institutions made use of the collections and 408 lots of loans were processed.

Collection Maintenance Maintenance of the collection is a major responsibility, one that the present staff handles with the vital help of able volunteers who do everything from sorting collections to checking bibliographic citations. One of their most important contributions is to routinely check alcohol levels in the permanent collection. This painstaking task was complicated this year by the need to change the strength of the alcohol solution in each jar to improve preservation, an undertaking that is now about 20 percent complete.

Being a volunteer in the department gives a student the opportunity to experience the routine of working in a systematics collection and to become acquainted with many species of fishes. For some, this experience clearly reveals that their interests lie in fish systematics.

Curatorial Activities This year, Dr. Nelson spent much of his time editing the volume of papers presented at the symposium on vicariance biogeography held at the American Museum in May, 1979. He also completed a book on systematics written with Norman I. Platnick, of the Department of Entomology. Dr. Nelson also continued his studies of parrot fishes and plotosid catfishes with M. Norma Feinberg, Scientific Assistant, and initiated a major study of the systematics of anchovies (family Engraulidae).

James W. Atz, Curator, commenced an analytical review of the blind fishes and continued his work on a handbook on marine invertebrates as laboratory animals, as well as on a monograph of oral brooding in fishes.

C. Lavett Smith, Chairman and Curator, spent most of his time on the inland fishes of New York State. The first draft of this monograph is finished, but much literature remains to be reviewed and incorporated.

During the year Donn E. Rosen, Curator, continued his work on the fishes of northern Central America and southern Mexico. He also completed a major project on the relationships of the lungfishes to the tetrapods and another on the atheriniform fishes. The lungfish manuscript has been accepted for publication in the *Bulletin* and the atheriniform manuscript is in final preparation.

Dr. Rosen also completed a manuscript on the cladistic-biogeographic method for studying evolutionary mechanisms. In addition, he has resumed work on the interrelationships of percomorph fishes. He is serving as secretary of the American Society of Ichthyologists and Herpetologists and, with Dr. Nelson, as editor of the Biogeography Symposium volume.

Scientific Publications:

Atz, James W., *A. Epple and P.K.T. Pang*
1980. Comparative physiology, systematics, and the history of life, *In* Evolution of Vertebrate Endocrine Systems, P.K.T. Pang and A. Epple, eds. Graduate Studies, Texas Tech Univ., no. 21, pp. 7-15.

1980. [Foreword to] Hypophysation of Indian Major Carps, by S.L. Chondar. Satish Book Enterprise, Agra, pp. vii-viii.

*Dingerkus, Guido** (Sponsor: Donn E. Rosen)
1979. Chordate cytogenetics: an analysis of their phylogenetic implication with particular reference to fishes and the living coelacanth. Occas. Papers Calif. Acad. Sci., no. 134, pp. 111-127.

Nelson, Gareth J.
1979. [Review of] Sensory Biology of Sharks, Skates, and Rays, by E.S. Hodgson and R.F. Mathewson. Science, vol. 205, p. 387.

Nelson, Gareth J. and Norman I. Platnick
1980. A vicariance approach to historical biogeography. BioScience, vol. 30, no. 5, pp. 339-343.

1980. Multiple branching in cladograms: Two interpretations. Syst. Zool., vol. 29, no. 1, pp. 86-91.

See also Rosen, Nelson and Patterson below

*Parenti, Lynne R.** (Sponsor: Donn E. Rosen)
1979. [Review of] Essays in Plant Taxonomy, H.E. Street, ed. Syst. Zool., vol. 28, no. 2, pp. 243-246.

1980. A phylogenetic analysis of land plants. Biol. Jour. of the Linnean Soc., vol. 13, no. 3, pp. 225-242.

Patterson, Colin
See Rosen, Nelson and Patterson below

Rosen, Donn E., Gareth J. Nelson and Colin Patterson
1979. [Forward to] Phylogenetic Systematics, by W. Hennig. Second ed., Univ. of Illinois Press, Urbana, pp. vii-xii.

Smith, C. Lavett
1979. [Review of] McClane's Field Guide to Saltwater Fishes of North America and McClane's Field Guide to Freshwater Fishes of North America. Quart. Rev. Biol., vol. 54, p. 344.

Vari, Richard P.
1979. Anatomy, relationships and classification of the families Citharinidae and Distichodontidae. (Pisces, Characoidea). Bull. Brit. Mus. Nat. Hist. Zool. Ser., vol. 36, no. 5, pp. 261-344.

Department of Invertebrates

The Department's research concerns the systematics, ecology and evolution of all phyla of the animal kingdom and involves the integration of geology, paleontology and neontology to analyze the history of invertebrate life, which covers some 700 million years.

Recognition of the scholarly accomplishments of staff members culminated this year in the presentation of the Paleontological Society's Schuchert Award to Niles Eldredge, Curator, and in the award of the Paleontological Society's Medal, and the Raymond Cecil Moore Medal of the Society of Economic Paleontology and Mineralogy, to Norman D. Newell, Curator Emeritus, for distinguished achievements in paleontology.

Collection management continued to play a major role in the activities of the Department. Nearly 15,000 specimens were added to the collections, 64 loans were sent to researchers throughout the world, and 59 collection-related inquiries were handled. In addition, the Department hosted 209 visitors who studied specimens, and more than 1,000 Museum members were given the opportunity to see the collections in behind-the-scenes tours.

Staff members held appointments at the City University of New York and Columbia University, and served on dissertation committees at other universities in this country and abroad. They also gave lectures in connection with the Department of Education, participated in the Discovery Tour program, presented seminars and slide shows to amateur groups, and appeared on television programs as part of the Museum's publicity efforts.

Minerals in Worms Ernst Kirsteuer, Chairman and Curator, added a new aspect to his research on nemertean worms, initiating a study of the chemical composition of proboscis stylets in cooperation with George E. Harlow and Robert Klimentidis of the Department of Mineral Sciences. The data obtained demonstrate that these stylets consist of calcium phosphate which has been tentatively identified as apatite, a mineral rarely encountered in the cal-

careous deposits of invertebrates but very common in vertebrates.

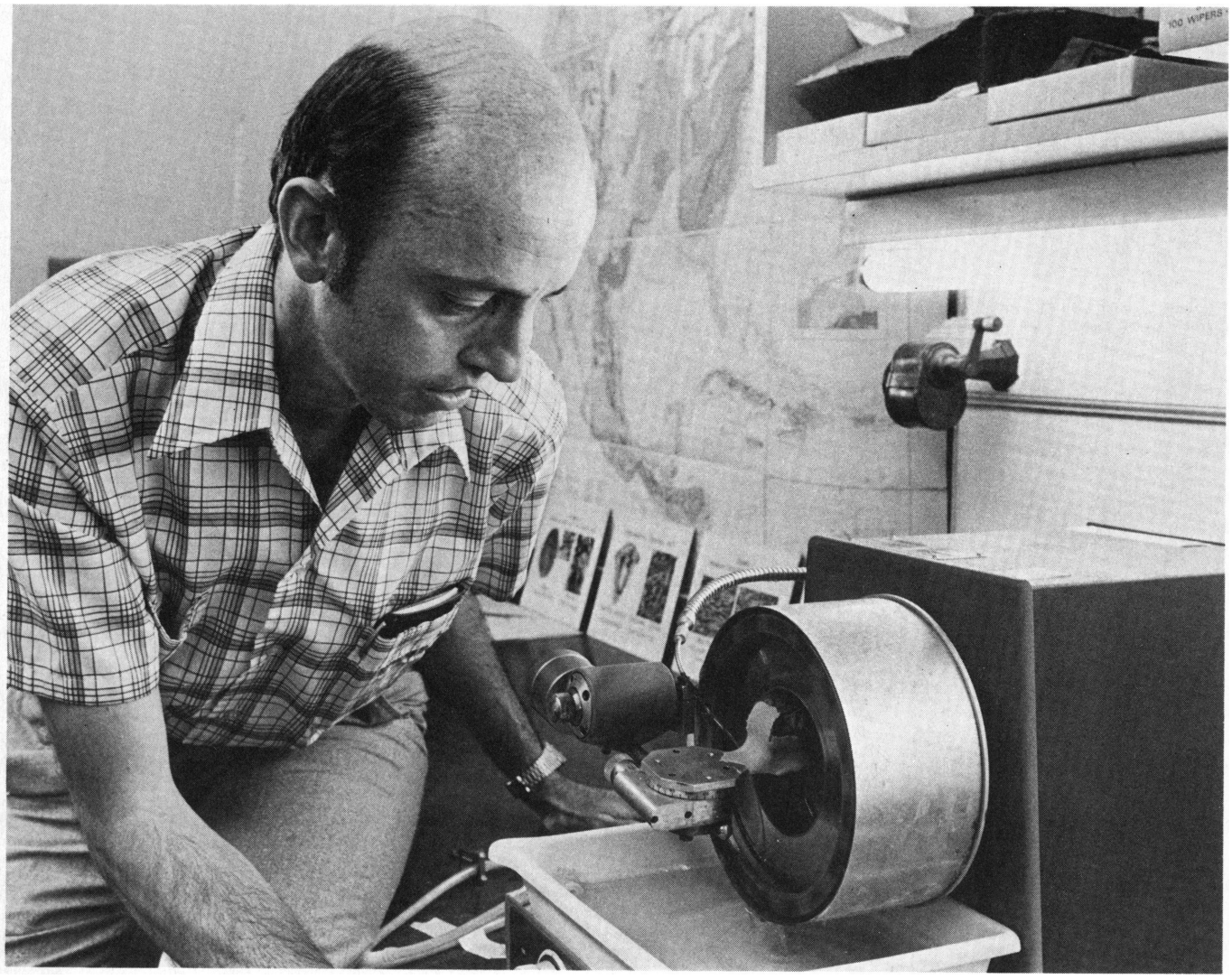
Dr. Kirsteuer also continued his work on the systematics of interstitial nemerteans.

New Deep Sea Limpet Roger L. Batten, Curator, completed his study of the shell microstructure of the deep sea Galapagos rift limpet. On the basis of an investigation of its internal anatomy, he suggested that the limpet is a member of a primitive group of gastropods, the Euomphalacea, otherwise known only from the Paleozoic. Dr. Batten's study showed the shell structure to be similar to that of an advanced mesogastropod limpet, indicating that the Galapagos limpet is convergent on the mesogastropod calyptraeid limpets. In addition, he completed a study of the shell structure of platyceratid gastropods of the upper Paleozoic of North America, using a newly-developed mosaic electron micrograph system. He also completed a major revision with coauthor R. H. Dott, Jr., of the "Evolution of the Earth;" this third edition will be published by the McGraw-Hill Book Company in November, 1980.

Archive for a Land Crab Dorothy E. Bliss, Curator, and Research Assistant Jane R. Boyer completed their summary of data on the control of limb regeneration in the land crab *Gecarcinus lateralis*. They also prepared the catalog of data on this crab extending back about 20 years; it will be placed in the Museum archives and should serve as a valuable reference source for carcinologists and other research investigators. February marked the official retirement of Dr. Bliss, who will remain active as Curator Emeritus.

Trilobites in Time and Space Niles Eldredge, promoted to Curator this year, completed a study of the systematics of the calmoniid trilobites of the Devonian *Scaphiocoelia* Zone of Bolivia; the work was performed in conjunction with Leonardo Branisa, Universidad Boliviana de San Andres, La Paz. The Calmoniidae comprise a family of trilobites endemic to Gondwana in the Devonian Period. Dr. Eldredge also began work on the next phase of this calmoniid project, a revision of all known (roughly 35) genera and subgenera of the family, and on the

Bruce N. Haugh, assistant curator in the Department of Invertebrates, uses a special diamond saw to cut a fossil specimen. The department's collection of some 8.5 million fossil invertebrates provides important resources for visiting scientists and students as well as for Museum staff members.



David J. Schwendeman, a senior principal preparator, uses a vacuum cleaner to coif a bison while Raymond de Lucia, the Museum's former chief preparator of exhibits, and Beth Sudekum, a preparator, clean plant life in the Bison Group diorama as part of exhibition refurbishing activities.

elaboration of a theory of relationships among them. The resulting pattern of interrelationships, and of the distributions of all known calmoniid species in space and time, is expected to provide raw data for testing macroevolutionary hypotheses pertaining to changes in diversity patterns within monophyletic groups through time.

Climate and Invertebrates William K. Emerson, Curator, reports considerable progress on several projects pertaining to molluscan systematics and paleo- and zoogeographical studies. The utilization of the Uranium-series method for dating late Pleistocene invertebrates was continued in cooperation with Teh-Lung Ku, University of Southern California. Dr. Emerson also initiated a study of dating Pleistocene fossils by the amino acid racemization technique with John F. Wehmiller, University of Delaware. Data on the relative ages of fossils determined by this method has permitted the interpretation of geochronological events during the late Pleistocene for a broad latitudinal range (35° N. to 24° N. latitude) of the California-Baja California continental borderland. In addition, he completed a study of invertebrate faunules of late Pleistocene age, with zoogeographic implications, from Turtle Bay, Baja California Sur, Mexico.

Paleobiology of Echinoderms Studies of extraordinary mineralized visceral organs in primitive fossil echinoderms are being conducted by Bruce N. Haugh, Assistant Curator. Three distinct groups have been delimited at the subphylum rank. As a result, for the first time, most of the 20 known classes of echinoderms can be assigned, on rigorous anatomical grounds, to one of them. The research also revealed many significant and previously unknown anatomical details about these animals and provided a sound basis for inferring their early evolutionary diversification.

Norman D. Newell, Curator Emeritus, and Donald W. Boyd, Research Associate, continued their work on the extinction and subsequent evolutionary rebound that occurred in the oceans at the end of

the Paleozoic Era, some 230 million years ago. Their field work again took them to Nevada and Utah, where there is an exceptional fossil record of this extinction episode. Evidence is gradually accumulating to support a conclusion that the world-wide extinction at this time was caused by environmental factors involving climate, habitat, and changes in the chemistry of the sea.

Computer Files of Fossils Julia Golden, Scientific Assistant, completed work on a new printed catalog of type fossil invertebrates. It was produced from the computer data base created during the five-year project supported by the National Science Foundation to curate the collection. Ms. Golden also collaborated with Leslie F. Marcus, Research Associate, and Judith DeName, Technician, on a report entitled "AMNH Invertebrate Fossil Collection Data Available Through SELGEM Created Computer Files," which she presented at the Annual Meeting of the Museum Computer Network in Washington, D.C.

Howard R. Feldman, Research Associate, advanced his work on the community ecology and systematics of Middle Devonian brachiopods from New York. He is expanding his study of the Onondaga Limestone and its equivalents along the eastern margin of the Appalachians, through western New York and into Ontario. In October, he collected brachiopods from the northern Sinai Peninsula and the Negev Desert. The data retrieved will aid in interpreting the Mesozoic stratigraphy of the area, and in defining in more detail the Ethiopian province boundary in the Middle East.

Symbiosis in Giant Protozoa John J. Lee, Research Associate, and his collaborators are studying the algal endosymbionts of larger foraminifera, which are the hosts for a large variety of algae, including chlorophytes, dinoflagellates, diatoms, red algae, and algal chloroplasts.

Linda Habas Mantel, Research Associate, initiated a series of studies on the effects of benzene and nahphalene, common constituents of oil-polluted waters, on growth, molting and salt balance in the blue crab, *Callinectes sapidus*.

Dr. Marcus continued his research on stable carbon isotopes and diet in living and extinct animals, and his computer studies of changes in the shape of the earth through time.

Behavior of Crabs Lawrence W. Powers, Research Associate, continued his work on the ecology, evolution and social behavior of semiterrestrial crabs, relying primarily on cinematographic techniques to document and analyze social interactions of crabs in salt marshes.

George A. Schultz, Research Associate, studied terrestrial isopod crustaceans from Borneo, Colombia, Peru and the Southwestern Research Station in Arizona. With continued support from NSF, Horace W. Stunkard, Research Associate, carried on his investigation of parasitic worms, cestodes and digenetic trematodes. These animals have complicated life-cycles, with three successive stages in different host-species.

Micropaleontology Press John A. Van Couvering, Editor, and Martin Janal, Norman Hillman, and Ruth Manoff, Associate Editors, reported another productive year, with the publication of the 80th volume of the "Catalogue of Foraminifera," the 43rd volume of the "Catalogue of Ostracoda" (450 pages each), the eighth volume (in 12 monthly issues) of the "Bibliography and Index of Micropaleontology," and five issues of the scientific journal *Micropaleontology*. Volumes 5 and 6 of the "Catalogue of Planktonic Foraminifera" and Special Paper Number 3 of "Marine Plankton and Sediments" were also completed.

Dr. Van Couvering investigated Miocene mammal sites in the deserts of Israel and Egypt, and collected samples for radiometric dating of hominoid-bearing Miocene strata in western Kenya. He joined William A. Berggren, Research Associate, in planning an international field conference on the early Pleistocene in marine and continental deposits of the southwestern U.S. The two also published a major review of the paleontology and dating of Ice Age deposits around the world.

Dr. Van Couvering and Harold L. Cousminer, Research Associate, looked for evidence of a fundamental, long-term periodicity of 9.5 million years in climate, glaciation and sea-level change for the past 150 million years beginning at the start of the Cretaceous Period.

Scientific Publications:

Batten, Roger Lyman
1979. Permian Gastropods from Perak, Malaysia, Part 2. The trochids, patellids and neritids. Amer. Mus. Novitates, no. 2685, pp. 1-26, figs. 1-33.

Berggren, William A. and John A. Van Couvering
1979. Quaternary. *In* Robison, R. A., and C. Teichert, eds., Treatise on Invertebrate Paleontology, Part A, Introduction. Geol. Soc. America, Boulder, pp. A505-A543.

Bernor, Raymond L., Heinz Tobien, and John A. Van Couvering
1979. The mammalian biostratigraphy of Maragheh. Ann. Geol. Pays Helen., Hors Ser., 1979, no. 1, pp. 91-100.

Bliss, Dorothy E.
1979. From sea to tree: saga of a land crab. Amer. Zool., vol. 19, no. 2, pp. 385-410, figs. 1-18, table 1.
See also Hopkins, Bliss, Sheehan and Boyer below.

Boss, Kenneth J., and Morris K. Jacobson
1980. Soviet contributions to malacology in 1978. The Veliger, vol. 22, no. 4, pp. 393-399.

Boyd, Donald W., and Norman D. Newell
1979. Permian Pelecypods from Tunisia. Amer. Mus. Novitates, no. 2686, pp. 1-22, figs. 1-23, tables 1-3.

Coccetti, Gregory and John J. Lee
1979. Potential effects of energy related activities on the

seasonal trajectories of epiphytic marine diatoms. Hydrobiol., vol. 67, pp. 51-80.

Eldredge, Niles and *Allen R. Ormiston*
1979. Biogeography of Silurian and Devonian trilobites of the Malvinokaffric Realm. *In* Gray, J. and A. J. Boucot, eds., Historical Biogeography, Plate Tectonics and the Changing Environment. Oregon State Univ. Press, Corvallis, pp. 147-167.

Eldredge, Niles and *Joel Cracraft*
1980. Phylogenetic patterns and the evolutionary process. Method and Theory in Comparative Biology. Columbia Univ. Press, New York, 349 pp.

Emerson, William K.
1980. Invertebrate faunules of late Pleistocene age, with zoogeographic implications, from Turtle Bay, Baja California Sur, Mexico. The Nautilus, vol. 92, no. 2, pp. 67-89.
See also Wehmiller and Emerson *and* Zinsmeister and Emerson below

Feldman, Howard R.
1980. Level-bottom brachiopod communities in the Middle Devonian of New York. Lethaia, vol. 13, no. 1, pp. 27-46.

Hopkins, Penny M., Dorothy E. Bliss, *Stefanie W. Sheehan,* and *Jane R. Boyer*
1979. Limb growth-controlling factors in the crab *Gecarcinus lateralis,* with special reference to the limb growth-inhibiting factor. Gen. Comp. Endocrinol., vol. 39, pp. 192-207, figs. 1-6, tables 1-3.

Lee, John J.
1979. Informational energy flow as an aspect of protozoan nutrition. Jour. Protozool., vol. 27, no. 1, pp. 5-9.
1980. Nutrition and physiology of Foraminifera. *In* Levandowsky, M. and S. H. Hutner, eds., Biochemistry and Physiology of Protozoa. Academic Press, New York, vol. 3, pp. 43-64.
1980. A conceptual model of marine detrital decomposition and the organisms associated with the process. *In* Droop, M. and H. Jannasch, eds., Advances in aquatic microbiology, Academic Press, London, vol. 2, pp. 257-292.

Lee, John J., *Marie E. McEnery* and *Judith R. Garrison*
1980. Experimental studies of larger Foraminifera and their symbionts from the Gulf of Elat on the Red Sea, Jour. Foraminif. Res., vol. 10, no. 1, pp. 31-47.

Lee, John J., *Marie E. McEnery, Eileen G. Kahn and Frederick L. Schuster*
1979. Symbiosis and the evolution of larger Foraminifera. Micropaleontology, vol. 25, no. 2, pp. 118-140, pls. 1-7.

Lee, John J., *Marie E. McEnery, Moshe Shilo,* and *Zev Reiss*
1979. Isolation and cultivation of diatom symbionts from larger Foraminifera (Protozoa). Nature, vol. 280, no. 5717, pp. 57-58.

Lee, John J., *Charles W. Reimer,* and *Marie E. McEnery*
1980. The identification of diatoms isolated as endosymbionts from larger Foraminifera from the Gulf of Elat (Red Sea) and the description of two new species, *Fragilaria shiloi* sp. nov. and *Navicula reissii* sp. nov. Bot. Marina, vol. 23, pp. 41-48, pls. 1-3.
See also Coccetti and Lee above

Mantel, Linda H.
1979. Terrestrial invertebrates other than insects. *In* Maloiy, G. M. O., ed., Comparative Physiology of Osmotic Regulations in Animals. Academic Press, London, vol. 1, pp. 175-218.

Marcus, Leslie F.
See Neff and Marcus *and* Newman, Cinquemani, Pardi and Marcus *and* Newman, Marcus, Pardi, Paccione and Tomecek below
See also Platnick and Marcus, Dept. of Entomology

Neff, Nancy A. and Leslie F. Marcus
1980. A manual of multivariate methods for systematics. Privately published, New York. 243 pp.

Newman, Walter S., Leonard J. Cinquemani, Richard R. Pardi, and Leslie F. Marcus
1980. Holocene delevelling of the United States' east coast. *In* Mörner, N.A., ed., Earth Rheology, Isostacy and Eustasy. John Wiley and Sons, New York, pp. 449-463.

Newman, Walter S., Leslie F. Marcus, *Richard R. Pardi, Joseph A. Paccione,* and *Stephen M. Tomecek.*
1980. Eustasy and deformation of the geoid. 1000-6000 Radiocarbon years BP. Ibid., pp. 555-567.

Newell, Norman D.
See Boyd and Newell above

Omura, Akio, William K. Emerson, and *Teh-Lung Ku*
1979. Uranium-series ages of echinoids and corals from the upper Pleistocene Magdalena Terrace, Baja California Sur, Mexico. The Nautilus, vol. 93, no. 4, pp. 184-189.

Schultz, George A.
1979. *Mesosignum antarcticum*, new species, the first record of the genus from the deep sea south of the Antarctic Convergence (Isopoda: Janirioidea). Proc. Biol. Soc. Washington, vol. 92, no. 2, pp. 328-332.
1979. Aspects of the evolution and origin of deep-sea isopod crustaceans. Sarsia, vol. 64, no. 1-2, pp. 77-83.
1979. Louisiana and Panama Canal locations and ecology of *Munna* (*Pangamunna* nov. subgn.) *reynoldsi* Frankenberg & Menzies (Isopoda, Asellota). Proc. Biol. Soc. Washington, vol. 92, no. 3, pp. 577-579.
1979. Two species of isopod crustaceans (Anthurid and Exocorallanid) from the stomach of the pearlfish *Carapus bermudensis* from Bimini, Bahamas. Crustaceana, vol. 37, no. 2, p. 224.
1979. Two new species of isopod crustaceans in families new to Antarctica (Desmosomatidae and Ischnomesidae). *Ibid.*, vol. 37, no. 2, pp. 133-144.

Stunkard, Horace W.
1979. The morphology, life-history, and taxonomic relations of *Odhneria odhneri* Travassos, 1921 (Digenea: Microphallidae). Biol. Bull., vol. 156, pp. 234-245, figs. 1-9.
1980. The morphology, life-history, and taxonomic relations of *Lepocreadium areolatum* (Linton, 1900) Stunkard, 1969 (Trematoda: Digenea). Biol. Bull., vol. 158, pp. 154-163, figs. 1-11.

Van Couvering, John A.
1978. Research note: status of Late Cenozoic boundaries. Geology, vol. 6, p. 169.
See also Berggren and Van Couvering *and* Bernor, Tobien and Van Couvering above

Wehmiller, John F., and William K. Emerson
1980. Calibration of amino acid racemization in late Pleistocene mollusks: Results from Magdalena Bay, Baja California Sur, Mexico, with dating applications and paleoclimatic implications. The Nautilus, vol. 94, no. 1, pp. 31-36.

Eric Delson, research associate in the Department of Vertebrate Paleontology, discusses specimens in the department's collection with a member of a Chinese scientific delegation. The delegation spent 10 days working with their Museum counterparts and studying the Museum's extensive collections as part of a six-week tour of cultural and scientific institutions in this country. (Photo by: Emile Bocian)

Zinsmeister, William J., and William K. Emerson
1979. The role of passive dispersal in the distribution of hemipelagic invertebrates, with examples from the tropical Pacific Ocean. The Veliger, vol. 22, no. 1, pp. 32-40.

Abstracts and Popular Publications:

Bell, Bruce M. and Bruce N. Haugh
1979. Echinoderm symmetry, classification and phylogeny. Geol. Soc. Amer., Abstr. with Program, vol. 11, no. 7, p. 386.

Eldredge, Niles
1979. Letter from the Field (on evolutionary theory). Rotunda, vol. 3, no. 10, p. 5.
1979. [Review of] Evolutionary Biology, by Douglas Futuyma. Syst. Zool., vol. 28, pp. 651-653.

Emerson, William K.
See Saunders and Emerson below

Feldman, Howard R.
1980. Trophic structure and niche-substrate relations of Middle Devonian benthic marine communities (Abstract). Geol. Soc. of Amer., Northeastern Sect. Meeting, vol. 12, no. 2, pp. 34-35.

Haugh, Bruce N.
1980. Echinodermata. McGraw-Hill Yearbook of Science and Technology. McGraw-Hill Book Co., pp. 155-158.
See also Bell and Haugh above

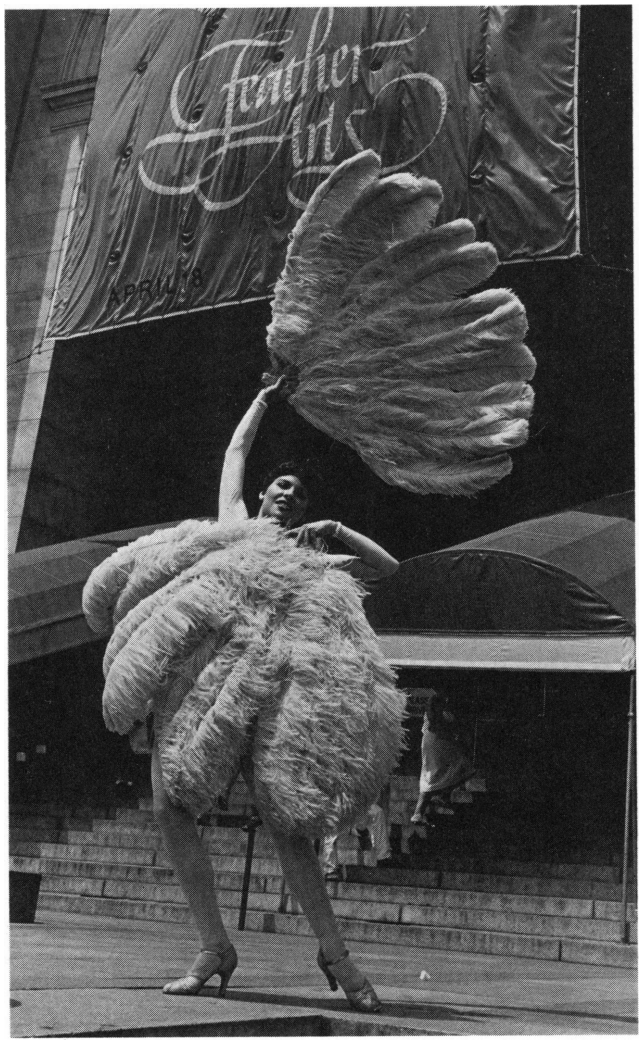
Horenstein, Sidney S.
1979. New York City Notes on Natural History, nos. 12, 13. Thirteen pages each.
1979. New York's Waterborne Stones, Seaport, vol. 13, no. 2, pp. 4-10.
1979. New York City 1,000,000,000 B.C. Rotunda, vol. 3, no. 9, p. 6.
1980. Looking Around Manhattan—A Geologist Explores the Island's Edges. Seaport, vol. 14, no. 1, pp. 8-15.
1980. New York City Notes on Natural History, nos. 14, 15. Thirteen pages each.

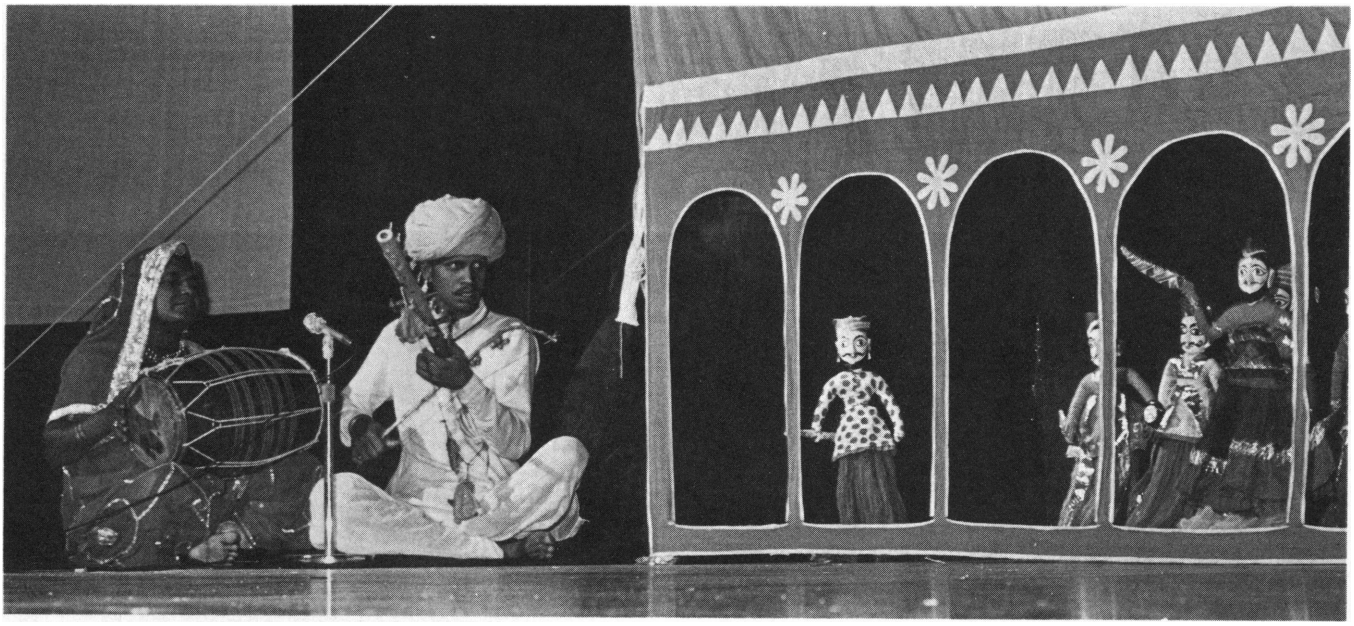
Mantel, Linda H. and *Simon H. P. Maddrell*
1979. Electrical properties of a salt-transporting tissue, the anterior midgut of the bloodsucking bug *Dipetalogaster maximus* (Abstract). Amer. Zool., vol. 19, p. 945.

Old, William E., Jr.
1979. Bivalves that live in clams. Hawaiian Shell News, no. 229, p. 3.

Saunders, Graham D., and William K. Emerson
1979. Spotters Guide to Shells, an Introduction to Seashells of the World. Mayflower Books, Inc., New York, 64 pp.

Dana Moore, of "Sugar Babies," a Broadway musical, helped promote "Feather Arts" with her rendition of a fan dance made famous by Sally Rand. The Museum borrowed two of Miss Rand's ostrich feather fans from the Chicago Historical Society to publicize the exhibition.





Musicians play as marionettes dance during one of 10 special shows by a troupe of indian puppeteers in the auditorium. The performances by the puppeteers, who were making their first American tour and only New York appearance, are examples of the varied performing arts activities presented each year by the Department of Education.

Department of Mammalogy

The Department has played a leading role in fostering more effective and widespread use of collections among its own curators and scientists from other institutions. With more than 250,000 specimens, the collection ranks as one of the world's largest and has been used for a wide variety of research projects ranging from zoogeography to the faunal relationships of the world's bats. Staff members also do extensive field work in the United States and abroad.

As of the Spring, 318 loans made up of 4,275 specimens were out of the Department; 88 loans were made and 83 were returned during the fiscal year. Loans were made to institutions in 20 states and three foreign nations. Visitors to the Department included 49 professional scientists and 80 students from 24 states and seven foreign countries.

Renovation of 4,000 square feet of space with the support of the National Science Foundation is nearly complete. The movement into the area of large tanned skins, specimens in liquid preservative, and dried skins and skeletal material has begun and will continue for at least a year. When it is done, the 10,000 specimens involved will be better organized and more accessible.

Accessibility of Collections Currently, fewer than two percent of our specimens are inaccessible to the scientific community as a result of lack of processing or because they are being kept for special study. A larger percentage, which is in the general collection, needs curatorial rearrangement and record revision.

The departmental office was moved, reorganized, and consolidated in a room nearer the center of activity.

Research in the Department reflects the diverse interests of the staff members and the continuity of many of these interests from year to year.

Studies on the ecology of raccoons by Sydney Anderson, Chairman and Curator, and his associates on St. Catherines Island, Georgia, continued. They completed a three-month survey of the beaches to learn how foraging raccoons interact with nesting sea turtles. A report on the time and place of raccoon activity, based on earlier studies using radio telemetry, was completed with Edwin Hudson, a consulting psychologist. A summary of raccoon biology was published by Dr. Anderson and Joerg-Henner Lotze, a graduate student in The City University of New York. Dr. Anderson also had published the results of a field experiment on learning in raccoons with Jane Dalgish, a student at the City University.

Mammals of Bolivia A faunal survey of the mammals of Bolivia was reactivated and some 550 specimens were obtained by Gregg Schmidt of the New Mexico Department of Game and Fish, and a student, Donna Cole, of New Mexico, and Dr. and Mrs. Anderson. The American Museum already has more Bolivian specimens than any other museum in the world. But the size of the country, the fantastic diversity of mammals and of their habitats, as well as the limited collecting done up to now, emphasize the opportunities for significant discoveries. The Bolivian National Office of Planning and Coordination and the Bolivian National Academy of Sciences have encouraged such research. If ade-

quate support can be obtained, an active program of annual expeditions and study in the Museum will be undertaken over the next three to five years.

Richard G. Van Gelder, Curator, continued research on general problems of classification and nomenclature. He worked on parts of five orders of mammals for a comprehensive list of species of world mammals being prepared by the Association of Systematics Collections.

The systematics, zoogeography, and faunal relationships of bats throughout the world continue to intrigue Karl F. Koopman, Curator. Dr. Koopman has conducted research on bats from four continents this year: Australia (as well as New Guinea and Sulawesi), Africa, South America, and North America. He revised the bat section of the comprehensive list of world mammals, and he and Dr. Anderson analyzed bat distributions in North and South America to test the hypothesis that the species belonging to more diverse faunas have smaller geographic ranges. The test demonstrated that the hypothesis is not generally applicable.

Murid Rodents Guy G. Musser, Archbold Curator, continued his work with Indo-Australian murid rodents, begun with three years of field work in Indonesia. He has discovered that this unusually diverse fauna has many rats, previously unknown to science, which are providing new insights into the interrelationships of the group. He also did research on the bats of Sulawesi with Dr. Koopman.

Sarah George, a student at Kansas State College at Hays served as a Curatorial Research Intern and worked on shrews. In addition, 14 volunteers worked with the Department in a variety of tasks: Ted Danforth, Jr., Scott Gallant, Brett Gerard, Adam Goodfriend, Randy Landsman, Ming Lee, Della Nelson, Elizabeth Plowman, M. Prospero, Russell Robbins, Laura Sojak, Donna Striffler, Chris Sullivan, and Adam Tyson.

Scientific Publications:

Anderson, Sydney
1980. A mammalogist's view of current mammal damage control trends. *In* Proc. Fourth Great Plains Damage Control Workshop, F. R. Henderson, ed. Kansas State Univ. Coop. Ext. Serv., Manhattan, Kansas, pp. 59-64.

See also Dalgish and Anderson below

Dalgish, Jane and Sydney Anderson
1979. A field experiment on learning by raccoons. Jour. Mammal., vol. 60, no. 3, pp. 620-622.

Horner, B. Elizabeth and Richard G. Van Gelder
1979. [Obituary of] Hobart Merritt Van Deusen—1910–1976. Jour. Mammal., vol. 60, no. 4, pp. 859-860.

Karl F. Koopman, curator in the Department of Mammalogy, examines a bat in a department laboratory. Koopman's work on the biogeography of these mammals — he has conducted studies in many parts of the world — is one of the many special features of a department whose collection of 250,000 specimens is the second largest in the world.

Koopman, Karl F.
1979. Zoogeography of mammals from islands off the northeastern coast of New Guinea. Amer. Mus. Novitates, no. 2590, pp. 1-17.

Koopman, Karl F. and *Giles L. MacIntyre*
1980. Phylogenetic analysis of chiropteran dentition. *In* Proc. Fifth Internatl. Bat Res. Conf., D. E. Wilson and A. L. Gardner, eds., Texas Tech Press, Lubbock, pp. 279-288.

Musser, Guy G., and *S. Chiu*
1979. Notes on taxonomy of *Rattus andersoni* and *R. excelsior* murids endemic to Western China. Jour. Mammal., vol. 60, no. 3, pp. 581-592, figs. 1-2.

Musser, Guy G., *J. T. Marshall, Jr.,* and Boeadi
1979. Definition and contents of the Sundiac genus *Maxomys* (Rodentia, Muridae). Jour. Mammal., vol. 60, no. 3, pp. 592-606, fig. 1.

Van Gelder, Richard G.
1979. Comments on a request of a declaration modifying Article 1 so as to exclude names proposed for domestic animals from zoological nomenclature, Z. N. 1935. Bull. Zool. Nomenclature, Vol. 36, no. 1, pp. 5-9.

1979. Mongooses on mainland North America. Wildlife Soc. Bull., vol. 7, no. 3, pp. 197-198.

See also *Horner* and Van Gelder above

Abstracts and Popular Publications:

Van Gelder, Richard G.
1980. [Review of] An American Bestiary, by Mary Sayre Haverstock. Curator, vol. 22, no. 1, pp. 42-44.

1980. Malaria safari. Nat. Hist., vol. 89, no. 5, pp. 10, 12, 14, 16, 18.

Department of Mineral Sciences

The collections are at the center of activities in the Department. They have been arduously acquired, bought, collected, traded, protected, and catalogued since the beginnings of the Museum, and represent an irreplaceable treasury of samples of every variety. They form the prime basis for research by members of the Department. From time to time, curators go out into the field to carry out their work. During this spring, for example, the Chairman made an important research trip to the isolated island of Zabargad in the Red Sea off the coast of Egypt. Here he obtained some outstanding samples of the gemstone peridot, formed at great depths within the earth, and conducted one of the first modern-day surveys of the geology of the island.

In the long history of the mineral collection, this year will be recorded as one of the most important. The Columbia University Collection of approximately 40,000 mineral specimens was acquired and is being added to the Museum's 50,000 specimen collection. It is by far the largest acquisition ever obtained. The Columbia collection was started in the 1850's, saw great periods of growth in the late 1800's and early 1900's, and became one of the finest collections assembled in the U.S. One of its great values is its diversity and scope, representing as it does many poorly known localities in North America and Europe which today are often inaccessible.

The University will still have direct access to the collection for research purposes, a reflection of the excellent working relationship the Museum and Columbia have maintained over the years.

The efforts of the administration, trustees and friends of the Museum in acquiring the collection are greatly appreciated.

500 New Minerals Received There was other important activity involving the mineral collection this year. For example, the Department received some 500 new minerals as gifts valued at about $400,000. It also exchanged some 1,000 minerals and 1,000 micromounts valued at about $250,000, and purchased approximately 250 new minerals. In addition, many highly notable specimens were added to the collection. They include a nine-inch long legrandite from Mexico, one of the finest mineral specimens in the world; the finest Kongsberg (Norway) wire silver specimen in any U.S. museum; the finest metatorbernite crystal group (from Zaire) in the world; an outstanding collection of beryl crystals from Pala, California; heliodor and aquamarine crystals from Brazil; an excellent silver group from Houghton, Michigan; a sapphire crystal from Sri Lanka, possibly the finest extant natural crystal; a six-carat diamond ring; five moonstone intaglios; a fine collection of beryl crystals; a kunzite crystal from Afghanistan, over 12 inches long; a euclase crystal group from Rhodesia with crystals over two inches long; and an excellent thomsonite crystal group from Prospect Park, N.J.

A major suite of over 90 minerals from the gem

Trustees Lansing Lamont, left, and William Beinecke joined 15 other persons in an effort to reach the North Pole in the spring of 1980. Weather conditions prevented them from completing their objective but not from planting the Museum's flag 358 miles south of the pole.

pegmatites of San Diego County, California, was acquired, making the Department's collection one of the leading ones for this important American gem locality. The Department now also has the most comprehensive collection of minerals from Afghanistan. Specimens from both these collections were put on display in the new special exhibits area which has been created in the Guggenheim Hall of Minerals for recent acquisitions and other materials.

A large number of specimens were loaned out during the year. Some went to the Smithsonian Institution; the Roberson Center of Arts and Sciences; the Hall of Science in Flushing, N.Y.; the Department of Environmental Health, Mt. Sinai School of Medicine, N.Y.; and the Mid-Hudson Valley Gem and Mineral Society. A wide variety of meteorite specimens were loaned or used for research in about 20 different institutions.

"It's Gold" The scientific content and materials for the special exhibition "It's Gold" were supplied by George E. Harlow, Assistant Curator. This exhibit, a companion to "Gold of El Dorado," contained a collection of the finest gold specimens ever displayed, as well as presentations on the geochemistry, mineralogy and occurrence of gold, and the history of its uses.

An exhibit of American gemstones prepared by the American Gem Society was presented in the Guggenheim Hall of Minerals in December and January. It included 32 pieces, each presented in an original setting designed by Aldo Cepullo. A new case to display the important Newmont azurite and gold specimens and the nine-inch long legrandite specimen, was also inaugurated.

Preparations are now under way for the opening of the new Arthur Ross Hall of Meteorites in the spring of 1981. Its scientific content will be provided by Martin Prinz, Chairman, and its theme will be meteorites and their relationship to the origin and history of planets.

Educational Activities Drs. Prinz and Harlow participated in a gifted children's program at Fordham University, and at the Explorer's Club. Dr. Prinz did extensive work with the media on volcanology during the time of the Mount St. Helens eruptions. Dr. Harlow taught a course on rocks and minerals, and Joseph Rothstein, Associate, taught a course on gems for the Museum's adult evening lecture series. Joseph J. Peters, Scientific Assistant, served as President of the New York Mineralogical Club and gave numerous talks there and to a large number of mineral clubs and shows. A large corps of volunteers, mostly college students, is helping the Department catalog the Columbia mineral collection and inventory the existing collection.

Research Program The Department carries out an extensive research program, often coordinated with scientists at other institutions in the U.S. and abroad. The largest program, a NASA supported project, is on meteorite and planetary research and is headed by Dr. Prinz, with the full-time assistance of Jeremy S. Delaney, Postdoctoral Fellow.

Another major area of research concerns the mineralogy of substances which some medical researchers suspect may be carcinogenic. This research program is headed by Dr. Harlow. Robert Klimentidis, Technical Specialist, has been making an extensive study of the amphibole mineral anthophyllite with Arthur M. Langer, Research Associate, with the Department of Environmental Sciences of the Mt. Sinai School of Medicine.

Achondritic meteorites are those rocks that are present at or near the surface of a planet after it has formed. From them, it is possible to learn about the interiors of the planets; from more primitive meteorites, known as chondritic meteorites, it is possible to learn the origin of the planets. Pieces of achondritic meteorites are mixed with iron meteorite in a group called mesosiderites; this group is one of the Department's major research subjects.

Drs. Prinz, Delaney and C. E. Nehru, Research Associate, discovered this year that pieces of basalt in the mesosiderites are richer in two minor minerals, tridymite and merrillite (a phosphate), than in any other basalts known in planets. Dr. Delaney also led a study to try to understand the relationship between olivine clasts (broken pieces) in mesosiderites and howardites (regolithic or soil-like rocks, but with very little metal). He found that the main differences are probably due to the fact that mesosiderites formed, at least in their latest stage, in a more oxygen-depleted environment than the howardites. The question as to whether they could form on the same planet was not resolved.

Clouding in Minerals Dr. Harlow studied clouding in minerals for clues to the history of the rocks in which they are present; such "clouds" are the result of very fine inclusions of other minerals and give a dusty effect. He found a wide variety of minerals inside pyroxene and plagioclase, and was able to determine the metamorphic conditions at which they were "sweated out."

Dr. Prinz and his co-workers named a small but puzzling group of meteorites "Winonaites." The group appears to be a rare link between chondrites and achondrites and are very similar to silicate material found in a group of iron meteorites, called IAB, which have been considered chondritic. Dr. Prinz suggests that they are closer to being achondritic, and therefore that the interpretation of their significance is vastly changed.

Medical Mineralogy Understanding the relationships of asbestiform to non-asbestiform amphibole minerals is one of the goals of a major research program being led by Dr. Harlow. Meanwhile, Mr. Klimentidis is carrying out a large project on the mineral anthophyllite, which has fibrous and non-fibrous aspects. Similar work is under way on the minerals amosite (asbestiform) and grunerite

(non-asbestiform). Specimens of "mountain wood" and "mountain leather," which are complex mats of fine fibrous amphibole minerals, are also being studied to determine their nature. This project requires use of the new transmission electron microscope available to Museum staff at Mt. Sinai School of Medicine.

A joint project with the Mt. Sinai School of Medicine on the mineral garnierite has been initiated. Nickel workers have been developing certain kinds of cancer, more than the normal population. Whereas previous research has concentrated on aspects of nickel and its compounds, the current study is examining specimens of rocks in their entirety and has found extensive intergrowth of nickel compounds with chrysotile-like fibers.

A project to study the health effects of Mount St. Helens volcanic ash is also being started with Mt. Sinai School of Medicine. The first task will be to carefully characterize the nature of the ash particles, through extensive use of the transmission electron microscope

Egyptian Field Trip The gemstone peridot is a variety of the common mineral olivine. It occurs in a type of rock which originates at great depths and is of special interest to Dr. Prinz.

One of the best sources for the finest peridot crystals is the island of Zabargad, off the coast of Egypt in the Red Sea, yet few people have ever been there. The only scientific study of the general geology was published in 1923 and was based on only a few days of superficial reconnaissance.

In March, Dr. Prinz went to this uninhabited island with Gero Kurat and Gerhardt Niedermayer of the Vienna Natural History Museum. They found that the island consists of three ultramafic massifs which came up from the great depths of the Red Sea floor. The scientists spent seven eventful days on the island collecting samples of the rock types; they expect to carry out research on the samples over the next two years.

A new potassium-calcium-thorium silicate has been found mixed with a mineral called charoite in the mineral-rich Kola Peninsula of the U.S.S.R. Dr. Harlow is describing this new mineral, and has already found that the locality is new for the rare mineral dalyite (a potassium-zirconium silicate).

Richard Bedell, a graduate student who worked in the Department, carried out a project on sulfide minerals in ultramafic nodules, discovering that the sulfides formed from early immiscible melts. He presented his findings at the American Geophysical Union meetings in Toronto.

Scientific Publications:

Delaney, J. S., *R. L. Bedell,* G. E. Harlow, C. E. Nehru, R. Klimentidis and M. Prinz
1980. Pyroxene overgrowth textures: Evidence for rapid cooling from high temperatures in mesosiderites. Lunar and Planetary Science XI, Houston, Texas, pp. 204-206.

Delaney, J. S., *R. L. Bedell,* R. Klimentidis, C. E. Nehru and M. Prinz
1980. Olivine clasts in mesosiderites and howardites: Clues to the nature of an achondrite parent body. *Ibid.,* pp. 207-209.

Fodor, R. V., K. Keil, M. Prinz, *M.-S. Ma, A. V. Murali* and *R. A. Schmitt*
1980. Clast-laden melt-rock fragment in the Adams County, Colorado H5 chondrite. Meteoritics, vol. 15, pp. 41-62.

Harlow, G. E.
1980. Low orthopyroxene: Achondritic abundance and planetary significance. Lunar and Planetary Science XI, Houston, Texas, pp. 396-397.

Harlow, G. E. and R. Klimentidis
1980. Clouding of pyroxenes and plagioclases in eucrites: Implications for post-crystallization processing. *Ibid.,* pp. 398-400.
See also Delaney, Bedell, Harlow, Nehru, Klimentidis, and Prinz above *and* Prinz, Nehru, Delaney, Harlow and Bedell below

Klimentidis, Robert
See Delaney, Bedell, Harlow, Nehru, Klimentidis and Prinz *and* Delaney, Bedell, Klimentidis, Nehru and Prinz *and* Harlow and Klimentidis above

Nehru, C. E., M. Prinz, J. S. Delaney, G. E. Harlow and *S. Frishman*
1980. Gabbroic and basaltic clasts in mesosiderites: Unique achondritic tridymite-phosphate-rich, two-pyroxene rock types. *Ibid.,* pp. 803-805.
See also Delaney, Bedell, Harlow, Nehru, Klimentidis and Prinz *and* Delaney, Bedell, Klimentidis, Nehru and Prinz above *and* Prinz, Nehru, Delaney, Harlow and Bedell below

Prinz, M.
1979. [Review of] Proceedings of the Second International Kimberlite Conference, F. R. Boyd and H. O. A. Meyer, eds., Science, vol. 205, pp. 683-684.

Prinz, M., C. E. Nehru, J. S. Delaney, G. E. Harlow and *R. L. Bedell*
1980. ALHA 77219: A new Antarctic mesosiderite and a comparison with other mesosiderites and related achondrites. Lunar and Planetary Science XI, Houston, Texas, pp. 899-901.

Prinz, M., *D. G. Waggoner,* and *P. J. Hamilton*
1980. Winonaites: A primitive achondritic group related to silicate inclusions in IAB irons. *Ibid.,* pp. 902-904.
See also Delaney, Bedell, Harlow, Nehru, Klimentidis and Prinz *and* Delaney, Bedell, Klimentidis, Nehru and Prinz *and* Fodor, Keil, Prinz, Ma, Murali and Schmitt *and* Nehru, Prinz, Delaney, Harlow and Frishman above *and* Watters and Prinz below

Watters, T. R. and M. Prinz
1979. Aubrites: Their origin and relationship to E chondrites. Geochimica et Cosmochimica Acta, Supplement No. 10, Proceedings Tenth Lunar Planetary Science Conference, vol. 1, pp. 1073-1093.
1980. Mt. Egerton and the aubrite parent body. Lunar and Planetary Science XI, Houston, Texas, pp. 1225-1227.

Abstracts and Popular Publications:

Nehru, C. E., M. Prinz and *S. M. Zucker*
1979. Brachina: Origin, melt inclusions and relationship to Chassigny. Meteoritics, vol. 14, pp. 493-494.

Prinz, M.
See Nehru, Prinz and Zucker above

Department of Ornithology

This department's reputation is derived from its unparalleled collections, extensive services for the scientific community and general public and scholarly research. Hundreds of new specimens were accessioned during the year, including many from Brazil and Venezuela. Department members conducted field work on four continents and also served as co-leaders on the Museum's Discovery Tours to Egypt and the Middle East.

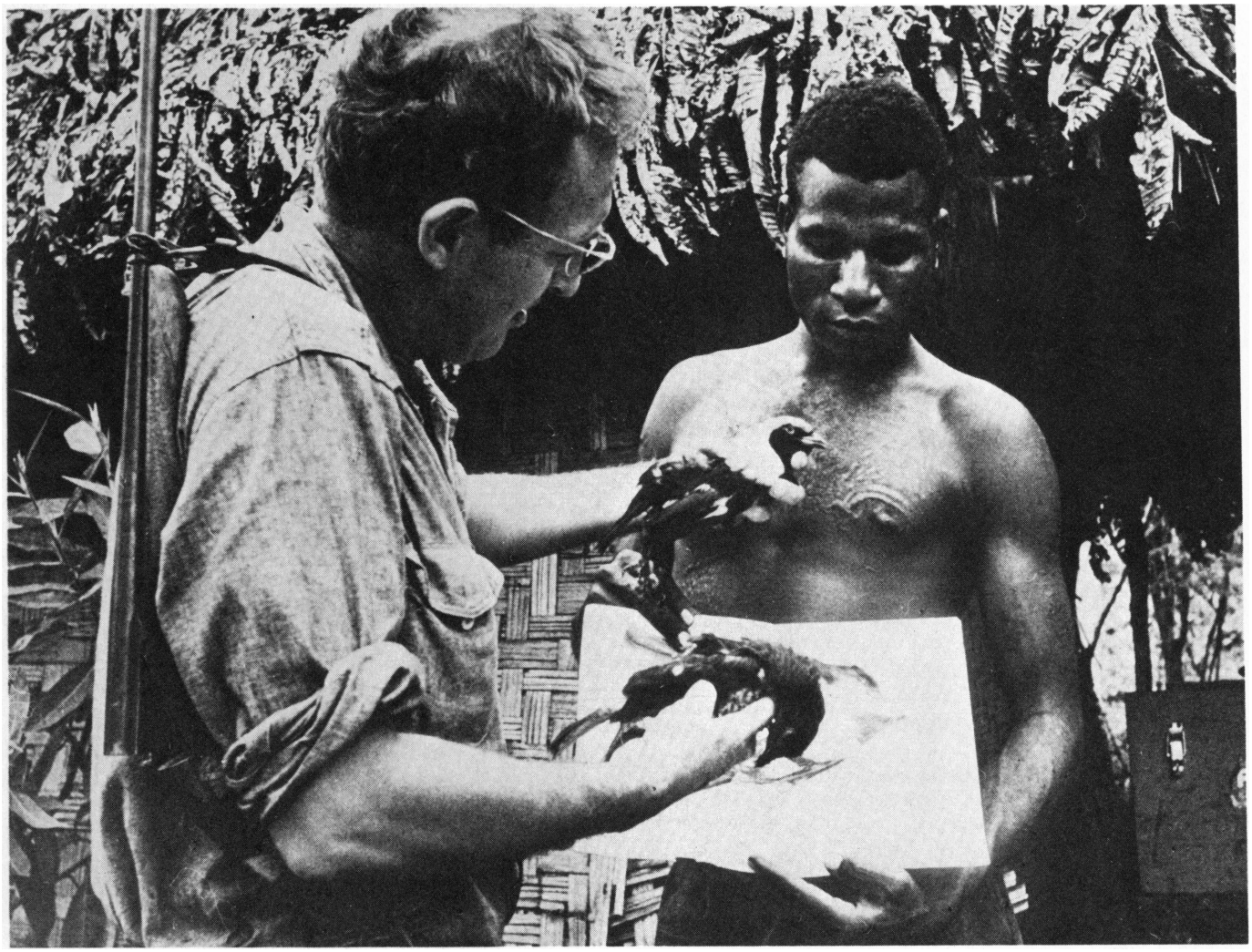
Wesley E. Lanyon, Chairman and Lamont Curator of Birds, conducted laboratory and field studies of near relatives of the flycatcher genus *Myiarchus.* He spent five weeks in Surinam, and obtained the first sound recordings of the little known Pale-bellied Mourner, *Rhytipterna immunda.* Information gathered on the breeding chronology of this and other mourners will make it possible to locate their nests, unknown to science, on a return trip next year.

20-Year Study Completed A 20-year study was completed by Dr. Lanyon and his students at the Kalbfleisch Field Research Station on Long Island. Special attention was given to the sequence in which breeding birds became established in fallow farmland, explanations for interspecific differences, and the influences of an increase in age of the abandoned fields upon the diversity and density of breeding birds.

Dr. Lanyon's research into the evolutionary relationships of chickadees *(Parus)* continued, with observations of captive breeding stock. Hope of results from the hybridization of sibling species in captivity was spurred by the first successful breeding of chickadees in the Department's aviaries.

Curator Lestor L. Short devoted most of the year to extensive field studies of hybridization in rosella parrots *(Platycercus),* sittellas *(Daphoenositta)* and pardalotes *(Pardalotus)* in Australia, where he was

The late E. Thomas Gilliard, a curator in the Department of Ornithology, was an internationally recognized authority on New Guinea birds. Forty-four of his photographs were included in the exhibition, "Papua New Guinea: A Feather in the Cap." His photos are only a small sample of the approximately 500,000 cataloged black and white pictures and more than 60,000 cataloged color transparencies owned by the Museum.



Actors Jack Lemmon, right, and Robbie Benson, pause during the filming of scenes from the motion picture "Tribute" in the Museum. Allowing commercial organizations to use Museum facilities is an important income source.

a Visiting Fellow at the Australian National University in Canberra. He discovered the first known natural situation of five-way hybridization in birds among distinct forms of sittellas in Queensland, and documented two hybrid zones between species of rosella parrots. Most difficult to unravel were relationships among "species" of pardalotes. By carefully recording voices and studying pair relationships, he found greater vocal variation within than between "species," and considerable interbreeding.

Field studies of barbets and honeyguides continued in Kenya, where Dr. Short and Jennifer Horne, research associate for the National Museums of Kenya, found the first indications of interbreeding between two putative species of barbet *(Trachyphonus usambiro* and *T. darnaudii).*

Speciation in Andean Birds François Vuilleumier, Curator, continued his research on speciation in Andean birds. Phenomena such as habitat shifts, distributional patchiness, reproductive rates, territorial behavior, niche width, food specialization, and social behavior were correlated with various classes of speciation patterns in a variety of South American birds.

Dr. Vuilleumier began work on ecomorphological convergences in birds of Mediterranean climates and habitats of France, California, and Chile in collaboration with Jacques Blondel of France. They are seeking to answer the question: if there are resemblances between Mediterranean-climate birds living on different continents, to what extent are they due to phylogeny or to convergent evolution?

Dean Amadon, Lamont Curator Emeritus, conducted field work at the Archbold Biological Station and pursued his principal research interests, the systematics and evolution of birds of prey. Scientific Assistant John Bull did field work in Surinam. Scientific Assistant Mary LeCroy collaborated with Research Associate Jared M. Diamond in studies of *Myzomela* honeyeaters, which have apparently evolved character displacement in size within historic times following their joint invasion of Long Island off New Guinea.

Visual Mimicry Dr. Diamond spent several months in New Guinea and Australia to study those species involved in the classical avian example of

visual mimicry described by Alfred R. Wallace a century ago. He encountered a rich montane avifauna in the Gauttier Mountains in West Irian, which ornithologists have long regarded as perhaps the most important unexplored gap in New Guinea. Research Associate Robert W. Dickerman conducted taxonomic studies of the avifauna of the Pacific lowlands of Guatemala, and collaborated with Research Associate William Phelps, Jr., in the preparation of manuscripts resulting from their ornithological survey along the Venezuelan-Brazilian border. Eugene Eisenmann, Research Associate, spent several weeks in Argentina in the fall of 1979 where he presided at some of the sessions of the First Ibero-American Ornithological Congress and conducted field and museum studies. Research Associate James C. Greenway, Jr., continued his bibliographic and specimen research that will lead to publication of part three of a list of the Department's type specimens. G. Stuart Keith, Research Associate, pursued his studies on the birds of the Malagasy Region.

In accordance with the Museum's policy of rotating chairmanships, Dr. Lanyon stepped down as Chairman of the Department after a seven year term, and Dr. Lester L. Short was appointed to succeed him. Two new Associates, Ruth DeLynn and John Farrand, were appointed to the staff.

Feather Arts The Department collaborated with the Department of Exhibitions and Graphics on several temporary exhibits: "Feather Arts: Beauty, Wealth and Spirit from Five Continents," a traveling exhibit organized by the Field Museum of Natural History in Chicago that explores the uses of feathers in human culture; "Papua New Guinea: A Feather in the Cap," featuring photographs of the intricate headdresses worn by the people of New Guinea; and an exhibit on the general biology of the California Condor and the efforts currently being made to save this endangered species.

The Department administers the Frank M. Chapman Memorial Fund—the world's most important source of financial support for ornithological research. This year, 93 awards, totaling $43,000 were made. As a result of the fund's fellowship program, the Department profited from the residency of Robert C. Eckhardt, of the University of Maine, who was awarded an Elsie Binger Naumberg Fellowship. When not in the West Indies studying the foraging ecology of flycatchers, Dr. Eckhardt was making use of our collections and computer resources.

Among more than 300 visitors this year was Tso-Hsin Cheng of the Peking Institute of Zoology, Peoples Republic of China. Dr. Cheng delivered a lecture on the birds of China and their conservation, and researched our collection of Chinese birds.

Scientific Publications:

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1979. Family Philepittidae. *In* Traylor, Melvin A. Jr., ed., Check-list of birds of the world. Mus. of Comp. Zool., Cambridge, Mass., vol. 8, pp. 330-331.

1980. [Review of] Population Ecology of Raptors, by Ian Newton. Auk, vol. 97, pp. 428-429.

Banks, R. C. and Robert W. Dickerman
1979. Mexican nesting records from the American Bittern. Western Birds, vol. 9, p. 130.

Diamond, Jared M.
1979. Community Structure: Is it random, or is it shaped by species differences and competition? *In* Anderson, R. N. and Turner, B. D., eds., Population dynamics, Blackwell, Oxford, pp. 165-181.

1979. Population dynamics and competition in land bird communities. Fortschr. Zool., vol. 25, pp. 389-402.

1980. Patchy distributions of tropical birds. *In* Soulé, M. and Wilcox, B., eds., Conservation Biology, Sinauer, Sunderland, Mass., pp. 57-74.

Diamond, Jared M. and Mary LeCroy
1979. Birds of Karkar and Bagabag Islands, New Guinea. Bull. Amer. Mus. Nat. Hist., vol. 164, pp. 469-531.

Eisenmann, Eugene and *E. O. Willis*
1979. A revised list of birds of Barro Colorado Island, Panama. Smiths. Contrib. Zool. no. 291, pp. 1-31.

Keith, Stuart
1979. [Review of] Systematics of smaller Asian night birds based on voice, by Joe T. Marshall. Ornithological Monographs no. 25, American Ornithologists' Union. Wilson Bull., vol. 91, pp. 356-357.

Keith, Stuart and *John Gooders*
1980. Collins Bird Guide—A New Guide to the Birds of Britain and Europe, Chanticleer Press, New York, 767 pp.

LeCroy, Mary
1979. [Review of] Birds of my Kalam country, by Ian Saem Majnep and Ralph Bulmer. Auk, vol. 96, p. 440.

1979. [Review of] Upland birds of northeastern New Guinea, by Bruce McP. Beehler. Auk, vol. 96, p. 644.

1979. [Review of] Birds in Papua New Guinea, by Brian J. Coates, Auk, vol. 96, p. 644.

1980. [Review of] Birds of Paradise and Bower Birds, by W. T. Cooper and J. M. Forshaw. Nat. Hist., vol. 89, pp. 94-96.

See also Diamond and LeCroy above.

Short, Lester L.
1980. Asian woodpecker studies. Natl. Geogr. Soc. Res. Repts., 1971 projects.

Short, Lester L. and *Jennifer F. M. Horne*
1979. [Review of] The birds of East Africa. Vol. 1, Ploceidae-1. Auk, vol. 96, p. 634.

1979. Vocal displays and some interactions of Kenyan honeyguides (Indicatoridae) with barbets (Capitonidae). Amer. Mus. Novitates, no. 2684, 19 pp.

Vuilleumier, François
1979. La niche de certains modelisateurs: paramètres d'un monde réal ou d'un univers fictif? La Terre et la Vie, vol. 33, pp. 375-423.

1979. [Review of] Food webs and niche space, by J. E. Cohen. La Terre et la Vie, vol. 33, pp. 522-523.

1979. [Review of] Geographic variation in social behavior and in adaptations to competition among Andean birds, by M. Moynihan. Auk, vol. 96, pp. 825-827.

1979. Comparación y evolución de las comunidades de aves de parámo y puna. *In* Salgado-labouriau, M. L., ed., El medio ambiente páramo. Ediciones Centro de Estudios Avanzados, Caracas, Venezuela, pp. 181-205.

Vuilleumier, François and *Daniel Simberloff*
1980. Ecology versus history as determinants of patchy and insular distributions in high Andean birds. *In* M. K. Hecht, W. C. Steere, and B. Wallace, eds., Evolutionary Biology, Plenum Publ. Co., vol. 12, pp. 235-379.

Abstracts and Popular Publications:

Bull, John and *Edith Bull*
1979. Wildlife along the Nile. Circular written for AMNH Discovery Tours.

1979. A huge migration of robins. Linnean Newsletter, vol. 33, no. 9, p.2.

1980. Wildlife in the Middle East. Circular written for AMNH Discovery Tours.

1980. Notes on a Ring-billed Gull. Linnean Newsletter, vol. 34, no. 1, p. 3.

Mary LeCroy / see Peckover and LeCroy below

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1979. National animals. Birds of paradise. Dept. of Lands, Surveys and Environment, Div. of Wildlife, Konedobu, Papua New Guinea, 15 pp.

Department of Vertebrate Paleontology

The comprehensive nature of the Department's vertebrate fossil collections guarantees a vigorous program of loans, exchanges and consultations for scientific and exhibition purposes on a world-wide scale. Significant activities this year included the visit of a Chinese scientific delegation; the loaning of a special exhibit that helped spark plans for a New Mexico natural history museum; and considerable research that resulted in many scientific publications, abstracts and articles in popular journals.

This year more than 100 visiting paleontologists used the collections, and more than 800 specimens were loaned to investigators in this country and abroad. Further measure of the collection's importance is indicated by the special exhibit of New Mexico fossil vertebrates loaned to the Museum of Northern Arizona for a traveling exhibit in New Mexico. This exhibit, supported primarily by the Department's unparalleled collections from that state, was instrumental in demonstrating the potential value of establishing a state-supported Museum of Natural History in New Mexico.

Chinese Visitors The Department's long-standing involvement in the study of fossil vertebrates from China and Mongolia was emphasized by the 10-day visit to the Museum in May by four paleomammalogists and four paleoanthropologists from the Institute of Vertebrate Paleontology and Paleoanthropology, Academia Sinica, Peoples Republic of China. Led by Chow Minchen and Wu Ru-Kang, the delegation studied parts of the Asian and American collections pertinent to their own research and discussed the results of their exciting new discoveries in China. Exchanges and joint work were planned and hopes for a rebirth of Sino-American cooperation in these fields are bright. Funds supporting this historic visit were arranged by Research Associate Eric Delson, the City University of New York, the Museum and a number of agencies devoted to paleoanthropology. The Chinese delegation visited six other American institutions before returning to Peking.

Carnivore Studies Richard H. Tedford, Chairman and Curator, continued his research on the history of the Carnivora, including a phylogenetic overview of this order of mammals with graduate students Nancy Neff of CUNY and John Flynn of Columbia University, as a contribution to the departmental revision of the classification of the Mammalia under the editorship of Frick Curator Malcolm C. McKenna. Dr. Tedford and Frick Associate Curator Beryl E. Taylor continued their monographic study of the phylogeny of the Canidae. Research on the history of the living canid fauna is completed and a manuscript is in the final phase of preparation. Other carnivore studies in the department include Ms. Neff's thesis work on cat phylogeny, and the work of Research Associates Robert M. Hunt on amphicyonid carnivores and Leonard Radinsky on the evolution of cranial morphology in sabertooth felids and other carnivores.

Early History of Mammals In addition to his continuing work on the classification of the Mammalia with Drs. Tedford, Karl F. Koopman, Guy G. Musser and Susan Koelle Bell of the Museum, Dr. McKenna prepared a number of studies on the early history of mammals and their ecology. The discovery of a diverse fauna of fossil mammals and cold-avoiding reptiles, such as crocodiles and turtles above the Arctic Circle on Ellesmere Island, Canada, led to the conclusion that although 50 million years ago the island site was at its present latitude, sea and land temperatures favored a warmth-loving fauna and flora despite the Arctic winter when it was dark for substantial periods. Currently accepted climatic models predicting much lower average temperatures at the time (Eocene) are not supported by inferences from the probable life habits of the fossil biota.

Dr. McKenna continued or completed work on the primitive insectivores *Pararyctes* and *Centetodon* (with J. A. Lillegraven, University of Wyoming), Eocene multituberculates (with L. Krishtalka, Carnegie Museum), and initiated a study with National Science Foundation Postdoctoral Fellow

Sidney E. Horenstein, scientific assistant in the Department of Invertebrates, examines fossil specimens brought by visitors during Identification Day. Staff members provided information for the public about skeletons, fossils, rocks, shells and artifacts.

Michael Novacek (San Diego State University) on the oldest known cranium of a lipotyphlan insectivore. Dr. Novacek finishes a year in residence in the department, conducting a variety of anatomical and systematic studies of insectivoran mammals and bats. Dr. McKenna also supervised the research of Columbia University graduate students, including the studies by John Flynn integrating paleomagnetic stratigraphy and biostratigraphy of the Eocene deposits in Wyoming and California, Donald Prothero on the Oligocene in Nebraska and Wyoming, and Steven Barghoorn on the Miocene in New Mexico.

Relationships Among Even-Toed Ungulates Mr. Taylor's long involvement with the systematics of the Artiodactyla has led him into studies of camels, "horned camels" (protoceratids), horned ruminants, and in the last year, to the hornless ruminants, which include the living musk-deer and chevrotains of Africa and Asia and a host of fossil allies. This latter work, in collaboration with S. David Webb (University of Florida) has led to new ideas about the relationships among all of these major groups of "even-toed" ungulates that will stimulate more research in this field.

Phylogeny of Horned Turtles Curator Eugene S. Gaffney continued his pursuit of the enigmatic horned turtle, *Meiolania*, of the Australian region. Collections of this animal in Australia were studied for a forthcoming monograph on its osteology that should provide insight as to the relationships of *Meiolania* with other turtles. Dr. Gaffney was honored with a visiting curatorship at the Australian Museum, Sydney, that enabled further museum study in Australia as well as field work on the Lord Howe Island deposits that have produced the most important remains of horned turtles.

Anatomy of Sharks Assistant Curator John G. Maisey is searching the anatomy of living and fossil sharks for clues as to their interrelationships and broader affinities with other jawed vertebrates. The anatomy of the extinct hybodontid sharks was reviewed based in part on preparation of specimens

using a new acid (thioglycollic) technique that attacks the ironstone crusts that enclose otherwise well preserved specimens. A great deal of new information concerning the cranial anatomy of these animals has been gained in this way. Other studies by Dr. Maisey include a long-term project on the morphology of the fin spines of Paleozoic sharks and a consideration of the modes of jaw suspension in sharks as clues to the evolution of fossil and living sharks.

Curators Emeriti We sadly report the death in August, 1979, of Curator Emeritus Theodore Galusha at Chadron, Nebraska, near his home. At the time of his death he was engaged in research in the field in Arizona, Nebraska and New Mexico, and on the large Ice Age cats from the collections he helped to make for the Museum during his 45-year career in paleontology.

Active retirement marked the year for Curator Emeritus Morris F. Skinner who, with volunteer F. Walker Johnson, continued their work on the Neogene stratigraphy; Curator Emeritus Edwin H. Colbert continued his Triassic reptile studies; Curator Emeritus Bobb Schaeffer continued his work on Triassic fishes and examined the braincase of fossil sharks; and George G. Simpson undertook a number of projects ranging from writing a textbook in general biology to examining the methodology of historical biology and the history of South American vertebrates.

Scientific Publications:

Baird, Donald
1979. The dome-headed dinosaur *Tylosteus ornatus* Leidy, 1872, (Reptilia: Ornithischia: Pachycephalosauridae). Notulae Naturae, vol. 456, pp. 1-11.

Baird, Donald and *John R. Horner*
1979. Cretaceous dinosaurs of North Carolina. Brimleyana, vol. 2, pp. 1-28.

Clemens, W. A., J. A. Lillegraven, E. H. Lindsay and George Gaylord Simpson
1979. Where, when, and what—A survey of known Mesozoic mammal distribution. *In* Lillegraven, J. A. *et al.*, eds., Mesozoic Mammals, Berkeley, Univ. of California Press, pp. 7-58.

Colbert, Edwin H.
1979. Proto-lizards from the Triassic of Antarctica. Antarctic Jour. of U.S., vol. 13, pp. 20-21.

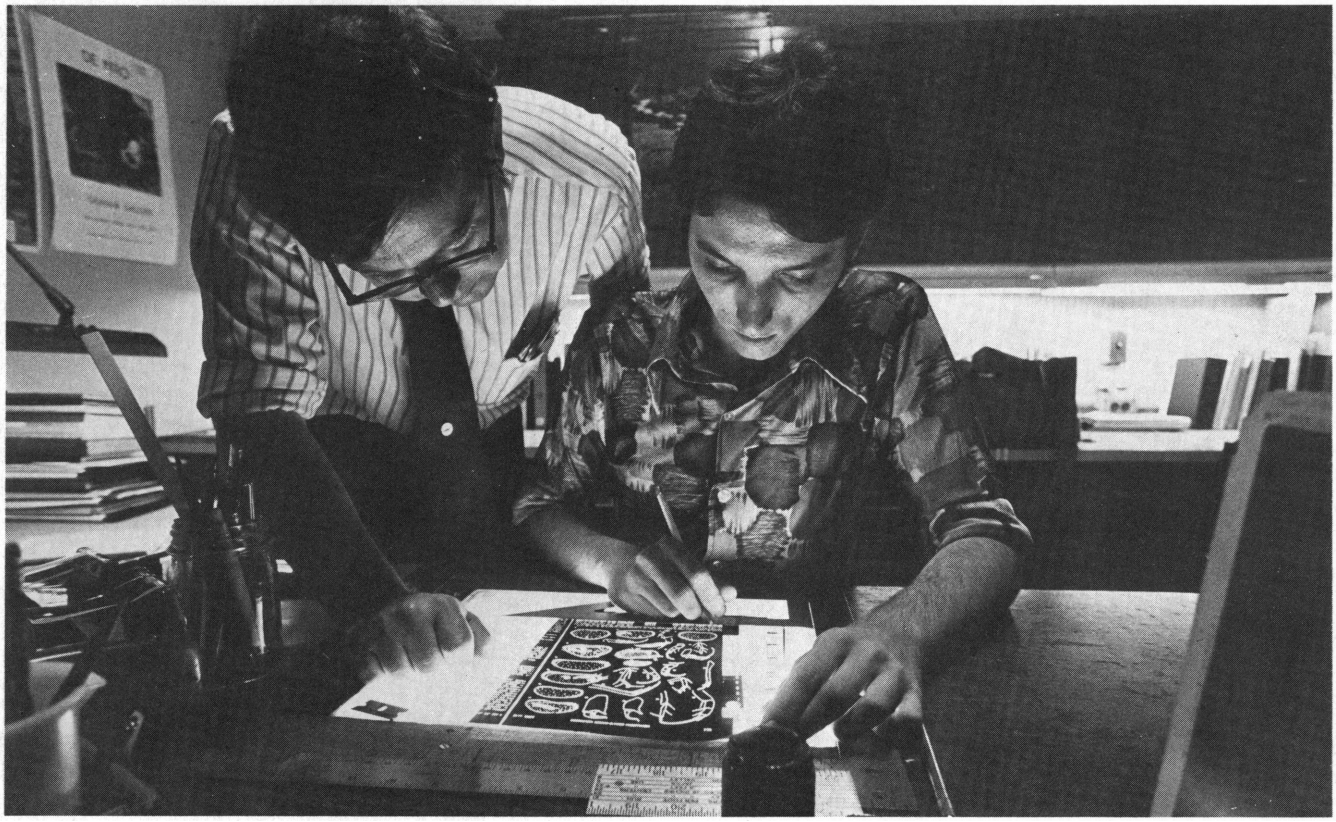
1979. Gondwana vertebrates. Fourth Internatl. Gondwana Symposium, Calcutta, 1977, pp. 135-143.

Delson, Eric
1979. *Prohylobates* (Primates) from the early Miocene of Libya: A new species and its implications for cercopithecid origins. Geobios (Lyon), vol. 12, pp. 725-733.

1980. Fossil macaques, phyletic relationships and a scenario of deployment. *In* Lindburg, E. G., ed., The macaque: Studies in behavior, ecology and evolution. Van Nostrand Reinhold Co., vol. 7, New York, pp. 10-30.

Dick, J. R. F. and John G. Maisey
1980. The Scottish lower Carboniferous shark *Onychoselache traquairi*. Palaeont., vol. 23, pt. 2, pp. 363-374.

Norman S. Hillman, associate editor, left, and Charles Di Bisceglie, museum technician, prepare one of many scientific volumes published each year by the Micropaleontology Press. In addition to publishing the journal* Micropaleontology, *the Press prepares scientific catalogues and bibliographies.



Gaffney, Eugene S.
1979. An introduction to the logic of phylogenetic reconstruction. *In* Cracraft, J. and N. Eldredge, eds., Phylogenetic analysis and paleontology. Columbia Univ. Press, New York, pp. 79-111.

1979. Description of a large trionychid turtle shell from the Eocene Bridger Formation of Wyoming. Contr. Geol., vol. 17, no. 1, pp. 53-57.

1979. Fossil chelid turtles of Australia. Amer. Mus. Novitates, no. 2681, pp. 1-23.

1979. Comparative cranial morphology of recent and fossil turtles. Bull. Amer. Mus. Nat. Hist., vol. 164, art. 2, pp. 65-376.

Gaffney, Eugene S. and *Alan Bartholomai*
1979. Fossil trionychids of Australia. Jour. Paleont., vol. 53, no. 6, pp. 1354-1360.

Gaffney, Eugene S. and Malcolm C. McKenna
1979. A late Permian captorhinid from Rhodesia. Amer. Mus. Novitates, no. 2688, pp. 1-15.

Hecht, Max K., *W. Steere* and *B. Wallace* (eds.)
1980. Evolutionary biology, vol. 12. Plenum Press Corp., New York, 300 pp.

Hunt, Robert M. and *W. W. Korth*
1980. The auditory region of Dermoptera relative to morphology and function in other living mammals. Jour. Morphol., vol. 164, no. 2, pp. 167-211.

MacFadden, Bruce J., *N. M. Johnson* and *N. D. Opdyke*
1979. Magnetic polarity stratigraphy of the Mio-Pliocene mammal-bearing Big Sandy Formation of western Arizona. Earth and Planetary Sci. Letters, vol. 44, no. 3, pp. 349-364.

MacFadden, Bruce J.
1980. Rafting mammals or drifting islands? Biogeography of the Greater Antillean insectivores *Nasophontes* and *Solenodon*. Jour. Biogeogr., vol. 7, no. 1, pp. 11-22.

1980. An early Miocene land mammal (Oreodonta) from a marine limestone in northern Florida. Jour. Paleont., vol. 54, no. 1, pp. 93-101.

1980. Eocene perissodactyls from the type section of the Tepee Trail Formation of northwestern Wyoming. Contr. Geol., vol. 18, no. 2, pp. 135-143.

MacFadden, Bruce J. and *M. E. Nelson*
1980. Miocene three-toed horse from the Salt Lake Group of southeastern Idaho. Trans. Kansas Acad. Sci., vol. 83, no. 1, pp. 20-25.

MacFadden, Bruce J. and *J. S. Waldrop*
1980. *Nannippus phlegon* (Mammalia, Equidae) from the Pliocene (Blancan) of Florida. Bull. Fla. State Museum, Biol. Sci., vol. 25, no. 1, pp. 1-37.

Maisey, John G.
1979. Finspine morphogenesis in squalid and heterodontid sharks. Zool. Jour. Linnean Soc., vol. 66, pp. 161-183.

McKenna, Malcolm C.
1980. Remaining evidence of Oligocene rocks previously present across the Bighorn Basin, Wyoming. Papers on Paleont., Mus. Paleont., Univ. Michigan, no. 24, pp. 143-146.

See also Gaffney, McKenna above

Ostrom, John H. and *Robert L. Carroll*
1979. Reptilia. *In* Fairbridge, R. and Jablonski, D., eds., Encyclopedia of Paleontology. Dowden, Hutchinson and Ross, Stroudsburg, Pa., pp. 705-720.

Ostrom, John H., *J. L. Bada*, *S. P. Clark* and *K. K. Turekian*
1979. Dating fossil bone from cave deposits by means of amino acid racemization rates. *In* Oehser, Paul H., ed., Natl. Geogr. Soc. Res. Reports, 1970 Projects.

Ostrom, John H.
1980. Evidence for endothermy in dinosaurs. *In* Thomas, D. K. and Olson, E. C., eds., A cold look at the warm-blooded dinosaurs. AAAS Special Volume, Westview Press, Boulder, Colorado, pp. 15-54.

Radinsky, Leonard B.
1980. Endocasts of amphicyonid carnivores. Amer. Mus. Novitates, no. 2694, pp. 1-11.

Simpson, George Gaylord
1979. A new genus of late Tertiary penguins from Langebaanweg, South Africa. Ann. S. African Mus., vol. 78, pp. 1-9.

1979. Tertiary penguin from the Duinefontein site, Cape Province, South Africa. Ann. S. African Mus., vol. 79, pp. 1-7.

1979. Earth history at the century mark of the U.S. Geological Survey. Proc. Natl. Acad. Sci., vol. 76, pp. 4208-4211.

Smith, D. L., B. J. MacFadden and *T. R. Bauer*
1980. Preliminary investigation of the paleomagnetism of Florida Cenozoic carbonates. Southeastern Geol., vol. 22, pp. 58-69.

Tarsitano, S. and Max K. Hecht
1980. The reptilian relationships of *Archaeopteryx*. Linnean Soc. Zool. Jour., vol. 69, pp. 149-182.

Abstracts and Popular Publications

Colbert, Edwin H.
1979. The enigma of Sivatherium. Plateau, vol. 51, p. 32.

1980. Ancient animals of the Petrified Forest. Plateau, vol. 51, pp. 24-29.

1980. Evolution of the vertebrates. 3rd edition. E. P. Dutton, Co., New York, 481 pp.

Emerson, S. and Leonard Radinsky.
1979. A new look at old sabertooths. Amer. Zool., vol. 19, p. 1011.

Emry, Robert J.
1980. [Review of] Evolution of African mammals. Maglio, V. J. and H. B. S. Cooke (eds.), *In* Jour. Paleont., vol. 54, pp. 267-270.

Gingerich, P. D., and Malcolm C. McKenna
1980. Mammalian paleontology in China. News Bull., Soc. Vert. Paleont., no. 118, pp. 42-44.

McKenna, Malcolm C.
1980. Mammals in the age of dinosaurs. [Review of] Mesozoic Mammals. Lillegraven, J. A., Z. Kielan-Jaworowska, W. A. Clemens (eds.). *In* Science, vol. 208, no. 4445, pp. 718-719.

1980. Notes from a Patagonian journal. Rotunda, vol. 4, no. 3, p. 5.

1980. Getting going again in 1947. The Alf Museum Jour., vol. 1, no. 2.

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Ostrom, John H.
1979. Dinosaurs: Mysteries of their ecology, behavior and extinction. Anima 3, no. 72, pp. 5-52.

1979. Discussion on "Bird Flight: How did it begin?" Amer. Sci., vol. 67, no. 3.

1980. Mystery of *Archaeopteryx*. Anima 3, no. 84, pp. 5-23.

Radinsky, Leonard B.
1979. The fossil record of primate brain evolution. 49th James Arthur Lecture, Amer. Mus. Nat. Hist., 27 pp.

Simpson, George Gaylord
1979. Novoe nebo, novaya zemlya, noviy chelovek. ("New heaven, new earth, new man," in Russian). Priroda, no. 5, pp. 36-43.

1980. Splendid isolation: The curious history of South American mammals. Yale Univ. Press, New York & London, 266 pp.

Tedford, Richard H.
1979. North American marine-nonmarine correlations based on fossil mammals. Geol. Soc. Amer., vol. 11, no. 7, p. 527.

Archbold Biological Station

The Archbold Biological Station, established in 1941 near the southern end of the Lake Wales region of south central Florida, provides scientists with an opportunity to study many plants and animals on the rare and endangered species lists. Forty-four plants and 18 animals on such lists can be found here. The station features a wide variety of habitat types, ranging from wet bay forests to arid woodlands and scrub associations. Supported through the Museum by Archbold Expeditions Inc., the Station includes a well-equipped laboratory, library, reference collections, animal rooms and a greenhouse. In addition to conducting scientific investigations, staff members of the Station frequently serve on advisory committees or act as consultants to governmental agencies.

The primary function of the Station is research, although it is also involved in biological training of undergraduate and graduate students, and in environmental education at the elementary, high school, and adult levels. In addition, through research, consultation, and service on advisory boards and committees of various governmental agencies and conservation organizations, the Station staff actively participates in efforts to solve some of Florida's pressing environmental problems.

The major focus of the research of the Station staff and affiliates is on the ecology of the plants and animals of southern Florida. Strong emphasis in these studies is given to long-term monitoring of selected species and communities.

Kestrel Behavior Resident Director James N. Layne conducted an intensive study of the annual behavioral cycle and ecology of the last surviving pair and a single unmated adult of the southeastern kestrel on the Station. Little is known of the ecology and behavior of this subspecies, which is listed as threatened. Dr. Layne also investigated the habits of wintering northern kestrels in south-central Florida, with special emphasis on factors responsible for sex differences in habitat preferences. He was assisted by Barry D. Podell, a physician from Long Island, N.Y., and Richard Waechter, Professor of Biology at Indiana University of Pennsylvania. He also continued a broad program of studies of the local distribution, habitat relationships, movements, activity cycles, and population ecology of mammals and other vertebrate species on the Station with the help of scientific assistants Chester E. Winegarner and Fred E. Lohrer. Dr. Layne received an appointment as Adjunct Professor of Biological Sciences at Florida Atlantic University.

Fred E. Lohrer, Scientific Assistant, continued his research, begun in 1972, on the breeding biology and population dynamics of the screech owl.

Bobcat Studies Chester E. Winegarner, Scientific Assistant, made further observations on the behavior of a semi-tame, free-ranging bobcat that he has been studying for several years. He obtained detailed information on mother-kitten relationships and made movies of feeding and grooming activities.

Warren G. Abrahamson, Research Associate, monitored the effects of burning on Station habitats. His studies are providing detailed documentation of the time taken for various plant communities on the Station to recover from winter fires and the adaptations of individual species to burning.

Glen E. Woolfenden, Research Associate, and his co-worker, John Fitzpatrick of the Field Museum of Natural History in Chicago, made further progress on a monograph on the demography and social organization of the Station's Florida scrub jay population.

Thomas Eisner, Research Associate, explored several aspects of the behavioral utilization by insects of chemical substances acquired through their diet. He was able to demonstrate that the caterpillar of the small pyralid moth, *Laetilia coccidivora,* which feeds on cochineal insects, uses the anthraquinone (carminic acid) that it ingests with the cochineal insect as a defense against predators.

Ann F. Johnson was appointed Archbold Postdoctoral Research Fellow in plant ecology in September. One of the studies she initiated concerned the demography of rosemary, *Ceratiola ericoides.* This needle-leaved evergreen shrub of the crowberry family (Empetraceae) is one of the most characteristic species of the scrub habitats of the Station. Dr. Johnson made detailed measurements of age-density relationships, seed production, and sources of seed dispersal and mortality in 26 sites and also studied the relationship of rosemary to other species in the same habitat. One of her findings, in this first detailed investigation of the species, is that the plant cannot occupy areas with a fire cycle of less than 10 years because seed production does not begin until the plants are 10

years of age and does not reach maximum levels until the plant is 20 to 30 years old.

Bird Survey Erma J. Fisk, a volunteer researcher, conducted an intensive bird netting and banding survey of the major habitats of the Station to obtain further information on bird species composition and populations during the winter and spring.

Del D. Guenther, of the University of South Florida, completed his master's study of winter-spring movements and activity of the bobcat, *Lynx rufus,* on the Station and environs, and Douglas A. Wassmer, also of the University of South Florida, began his master's research on additional aspects of the ecology and behavior of bobcats.

Studies conducted by undergraduate volunteer research participants included movements, activity cycles, and social behavior of cottontail rabbits by Cathy W. Harris, of Cornell University; lizard ecology by Bill Sheehan, of the University of California at Santa Barbara; and seasonal shifts in mockingbird territories by Sylvia Halkin, of Harvard University.

Visitors Twenty-seven visiting investigators accompanied by 14 associates or assistants worked at the Station during the year. Thirty-nine groups, totaling 922 persons, also visited. These included field trips scheduled as part of the annual meetings of the American Society of Zoologists and Association of Southeastern Biologists. The Organization of Biological Field Stations held its annual meeting at the Station. Also registered were 310 individual visitors.

Scientific Publications:

Abrahamson, Warren G.
1979. A comment on vegetative and seed reproduction in plants. Evolution, vol. 33, pp. 517-519.

1980. Demography and vegetative reproduction. *In* O.T. Solbrig, ed. Demography and evolution of plant populations. Blackwell Scientific Publications Ltd., Oxford, England, pp. 89-106.

**Brach, V.* (Sponsor: James N. Layne)
1979. Species diversity and distributional relationships of pseudoscorpions from slash pine (*Pinus elliotti* Eng.) in Florida (Arachnida: Pseudoscorpionida). Bull. So. Calif. Acad. Sci., vol. 78, pp. 32-39.

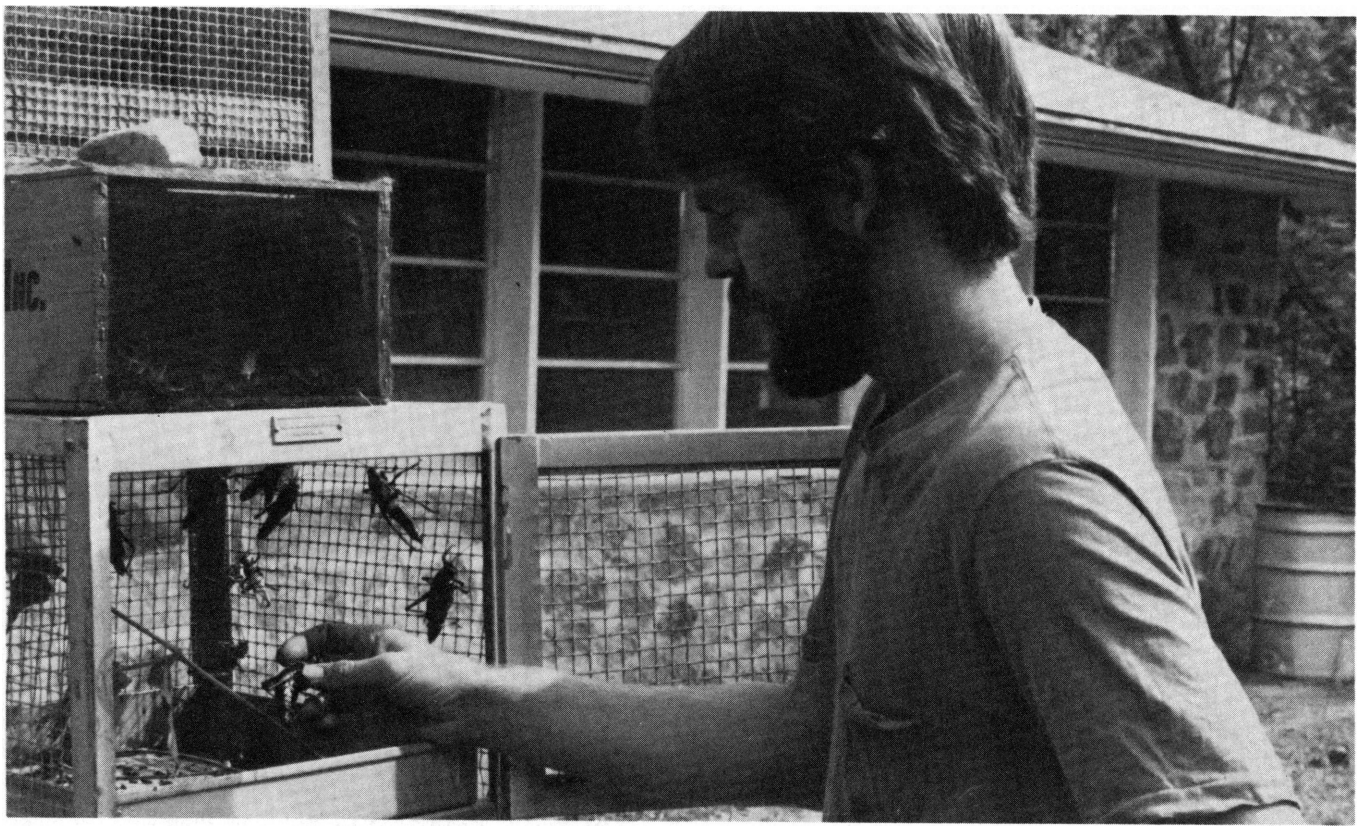
Crouch, P. A., and S. P. Vander Kloet
1980. Variation in seed characters in populations of *Vaccinium/Cyanococcus* (the blueberries) in relation to latitude. Can. Jour. Bot., vol. 58, pp. 84-90.

Eisner, Thomas, and *D. Aneshansley*
1979. Bombardier beetles. New York's Food and Life Sciences, vol. 12, pp. 9-12.

See also Goetz, Wiemer, Haynes, Meinwald and Eisner *and* Meinwald, Wiemer and Eisner below

Goetz, M., D. F. Wiemer, Le R. W. Haynes, J. Meinwald and T. Eisner
1979. Lucibufagines, Partie III. Oxo-11-et oxo-12-bufalines, stéroïdes défensifs des lampyres *Photinus ignitus* et *P. marginellus* (Coleoptera: Lampyridae). Helvitica Chimica Acta, vol. 62, pp. 1396-1400.

Doug Whitman, a graduate student in entomology at the University of California at Berkeley, studies lubber grasshoppers at the Museum's Southwestern Research Station at Portal, Arizona. The station, one of three such Museum research satellites, provides an opportunity for scientists and students to study topics ranging from the social organizations of birds to the geology of mountains.



Holton, B., Jr., and Ann F. Johnson
1979. Dune scrub communities and their correlation with environmental factors at Point Reyes National Seashore, California. Jour. Biogeogr., vol. 6, pp. 317-328.

Layne, James N.
1980. Trends in numbers of American Kestrels on roadside counts in southcentral Florida from 1968 to 1976. Fla. Field Nat., vol. 8, pp. 1-10.

Lohrer, Fred E.
1980. Eastern coachwhip predation on nestling blue jays. Fla. Field Nat., vol. 8, pp. 28-29.

**Masters, W. M.* (Sponsor: Thomas Eisner)
1979. Insect disturbance stridulation: its defensive role. Behav. Ecol. Sociobiol., vol. 5, pp. 187-200.

1980. Insect disturbance stridulation: characterization of airborne and vibrational components of the sound. Jour. Comp. Physiol.-A, vol. 135, pp. 259-268.

Meinwald, J., D. F. Wiemer and T. Eisner
1979. Lucibufagins. 2. Esters of 12-Oxo-2β, 5β, 11α—trihydroxybufalin, the major defensive steroids of the firefly *Photinus puralis* (Coleoptera: Lampyridae). Jour. Amer. Chem. Soc., vol. 101, pp. 3055-3060.

Abstracts and Popular Publications:

Eisner, Thomas
1979. Insect spray: only some do it hot. Science News, vol. 116, p. 83.

Lohrer, Fred E.
1979. Florida birds in the periodical literature, 1978. Fla. Field Nat., vol. 7, pp. 39-40.

1979. [Review of] Transactions of the North American osprey research conference, John C. Ogden, ed. Fla. Field Nat., vol. 7, p. 35.

1979. [Review of] Birds of Grady County, Florida, by Herbert L. Stoddard, Sr. Fla. Field Nat., vol. 7, pp. 35-36.

1979. [Review of] Papers of the symposium on the eastern population of the greater sandhill crane, Robert D. Feldt, compiler. Fla. Field Nat., vol. 7, p. 36.

1979. [Review of] Florida frog calls by Richard A. Bradley. Fla. Field Nat., vol. 7, pp. 36-37.

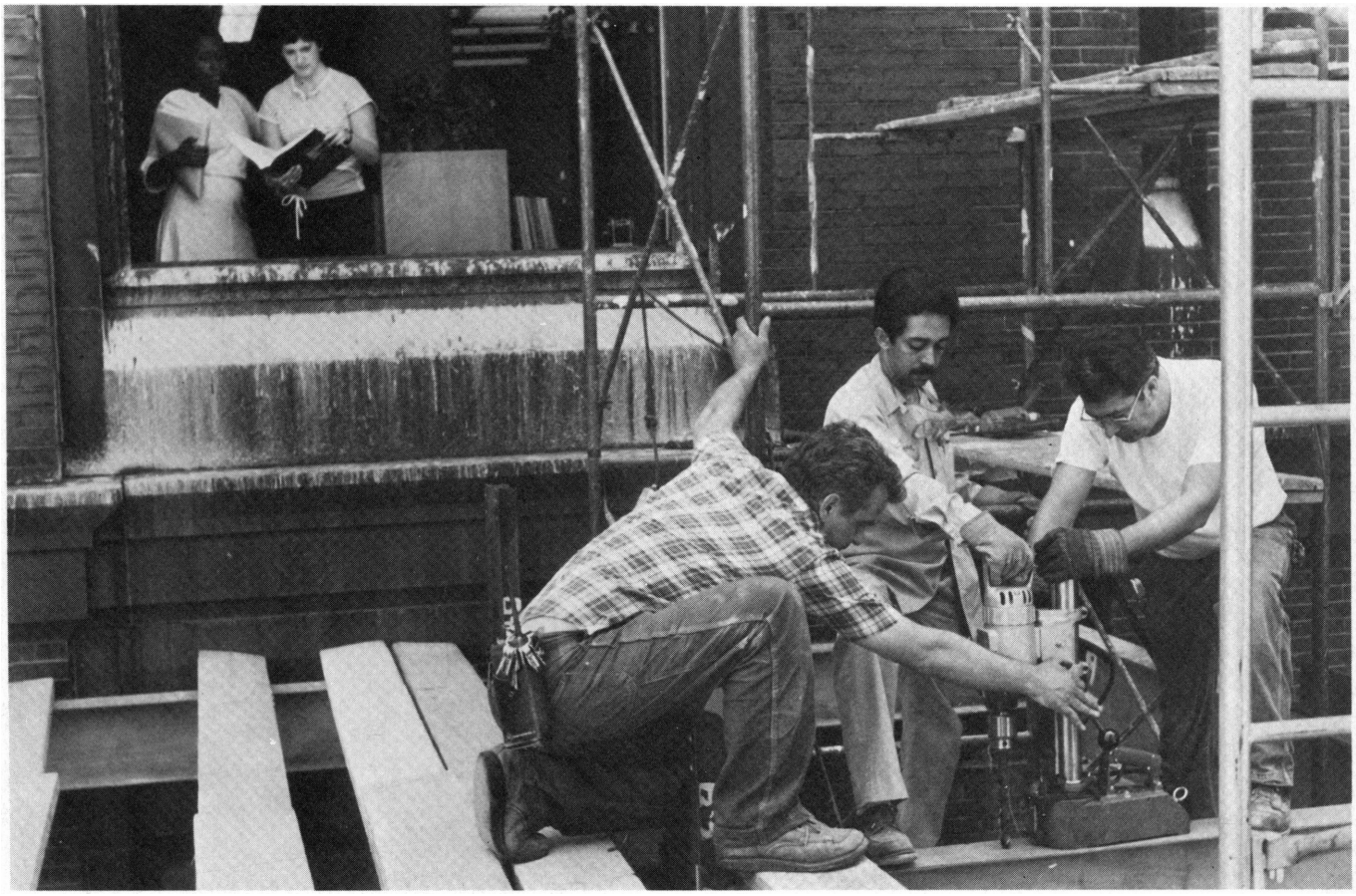
1979. [Review of] Colonial bird use and plant succession on dredged material islands in Florida. Vol. 1: Sea and wading bird colonies, by Ralph W. Schreiber and Elizabeth A. Schreiber. Fla. Field Nat., vol. 7, p. 37.

1979. [Review of] Fish and wildlife inventory of the seven-county region included in the central Florida phosphate industry areawide environmental impact study, by James N. Layne, Jerre A. Stallcup, Glen E. Woolfenden, Melinda N. McCauley and David J. Worley. Fla. Field Nat., vol. 7, pp. 37-38.

**McKitrick, M. C.* (Sponsor: James N. Layne)
1979. Territory size and density of Bachman's sparrow in southcentral Florida. Fla. Field Nat., vol. 7, pp. 33-34.

Woolfenden, Glen E.
1979. [Review of] Parental behavior of birds, by R. Silver. Auk, vol. 96:215-216.

Members of the Museum's Department of Construction and Maintenance — Carl Hilgers, left, Fernando Rivera, center, and Al Sigler — build a bridge to improve access between the Library and the Photographic Collection. The bridge will serve as the roof of a room being constructed below, which will provide additional space for the Department of Education.



Great Gull Island

Located at the east end of Long Island Sound, Great Gull Island provides an opportunity for Museum staff members and students to study the terns that nest there.

This past year more than 1,500 nest sites of the Common Tern were marked with numbered plastic tent stakes contributed by the Linnean Society of New York. The acquisition of a small vessel enabled us to start an off-island banding program on three islands west of Gull Island, as well as on islands along the Connecticut shore.

Independent studies were carried out by Malcolm Coulter, Chapman Fellow in the Department of Ornithology; Alison Nash, a graduate student in the Department of Psychology at Stony Brook; and David Duffy, a graduate student at Princeton University.

Twenty-five observation towers were completed by Matthew Male, an undergraduate student at Southern Connecticut State College. Nesting concentrations of common terns will be mapped from the towers during the 1980 season.

Helen Hays showed filmmaker Michael Male's film *Ternwatch* 15 times during the fall and winter to numerous nature centers, Audubon Society groups, and biology clubs at colleges and universities in New York, Massachusetts and Canada.

Scientific Publications:

Hays, Helen
1980. The liberated Spotted. Anima, vol. 5, no. 86, pp. 26-30.

Southwestern Research Station

The Southwestern Research Station, in the Chiricahua Mountains of southeastern Arizona, marked its 25th year of activity, hosting 121 scientists and their associates who worked on an extensive range of projects made possible, in part, by the Station's excellent location, outstanding facilities and vast research potential. During the year, the first known sexual pheromone in grasshoppers was discovered by a researcher from the University of California, Berkeley. Other investigators researched the geology of the volcanic field in nearby San Bernardino Valley, the differences in feeding behavior between two species of local lizards, habitat selection in hummingbirds and maternal home-range inheritance by juvenile kangaroo rats.

On May 12, the Station completed its 25th year of operation. Over the years its visitorship has increased to about 1,100 a year.

The facilities have increased from a log cabin, three one-room cottages and the two-bedroom main house to 14 units capable of housing 50 people, an enlarged log cabin for the Resident Director; an enlarged main house for guest recreation, dining, laundry and lounging; and a laboratory, animal room and shop/storage room. The laboratory now houses a fairly complete scientific library on the biology and geology of the Southwest.

The Station's plant and animal collections have grown large and are almost complete. Both a regular and mini-herbarium are maintained. Almost complete collections of arachnids and mollusks are available, as well as an insect collection with about 12,000 specimens which is continually being enlarged. In addition, an excellent collection of geological material is available for comparative studies. Scientific equipment at the Station includes Mettler balances, a compound phase microscope and stereo microscopes, constant temperature cabinets and water baths, a Warburg apparatus, a sonograph and special optical equipment.

Attendance Increases These additions have paralleled large increases in the numbers of Station guests as well as scientists and naturalists. Attendance has remained high the past few years despite inflation, recession, gas prices and gas shortage scares. The guests this year represented 65 different scientific institutions. Among the year's guests were some from Australia, England, the Netherlands and Germany.

Weekly summer seminars, popular talks to 47 tour groups and classes, and a mailing of 1,100 newsletters keep the public aware of the Station.

Eighteen scientific papers by visiting scientists who carried out research at the Station were published this year. They covered a wide variety of subjects, reflecting the range of animals and habitats available for study in the vicinity of the Station.

Among this year's researchers, Douglas Whitman, Division of Entomology and Parasitology, University of California at Berkeley, studied the behavior, phenology and ecology of the Lubber grasshopper and discovered the first sexual pheromone in grasshoppers. Pamela Kempton, Southern Methodist University, Dallas, worked on the Geronimo volcanic field located in the San Bernardino Valley of southern Arizona. She mapped the distribution of basalts and collected an extensive number of xenoliths and megacrysts.

Lizard Behavior Karen Gravelle, Hunter College, The City University of New York, put freshly captured lizards *(Sceloporus jarrovi)* into an outdoor enclosure to determine whether they could detect the presence of members of the same species solely on the basis of chemical deposits. In May and June there was no such evidence, but during the breeding months of September and October, males were able to discriminate between deposits left by adult males and those left by adult females; they

also appeared to differentiate between the deposits of adult and immature females. Deposits of adult females were responded to by a higher rate of tongue extruding and pelvic rubbing.

Robin Andrews, Virginia Polytechnic Institute and State University, Blacksburg, studied the feeding success of an active searcher, the whiptail lizard *(Chemidophorus exsanguis),* and a sit-and-wait forager fence lizard *(Sceloporus jarrovi)* in North Fork Canyon.

She found that whiptails tended to eat larger prey and a greater diversity of prey types than fence lizards, a result consistent with theoretical predictions. However, despite major differences in foraging behavior, the gross energy intake of the two species was similar.

Brent LaMon, of Hunter College, worked on antipredation behaviors in three carpenter ant species of the genus *Camponotus*. Preliminary evidence concerning the role of olfactory cues suggests that the odor of army ants must be combined with movement to evoke defensive behavior. Robert Droual, of Hunter College, studied the emigratory behavior of *Pheidole hyatti* as a defense against the army ant *Neivamyrmex nigrescens*.

Scientific Publications

Roth, Vincent D. and *Wynne Brown*
1980. Arthropoda: Insecta and Arthropoda: Arachnida. *In* Brusca, Richard C., ed., Common Intertidal Invertebrates of the Gulf of California. Univ. of Arizona Press, Tucson, pp. 326-346 and 347-355.

Department of Education

Programs and activities sponsored by this Department serve adults as well as children, and professionals as well as the lay public. Through courses, lecture series, workshops, study tours, single visit programs, special events and outreach programming, the Department contacts the public directly. Education also operates the Alexander M. White Natural Science Center, the People Center and the Discovery Room. Combined public attendance in these functions exceeds 300,000 annually.

During the school year pupils in organized groups come to the Museum in extraordinary numbers. More than 160,000 pupils visited with their teachers during 1979–80, and more than 45,000 of them had the benefit of instruction from professional staff. These figures do not take into account additional thousands of young people who visit the Museum after attending a program in the Hayden Planetarium, nor do they take into account the tens of thousands of young people who attend the Museum during summer when school reservations are not required, or who visit on weekends throughout the year.

Scheduled Program Instruction One-time visit programs in natural science and anthropology, including those held in the Alexander M. White Natural Science Center, accounted for most of the scheduled program instruction. However, of the 45,000 young people who received such instruction, more than 6,000 had participated in multiple visit programs. Of these, some 5,000 took mini-courses which brought them to the Museum for several consecutive visits. This year, in a new program for intermediate school students, more than 500 pupils were given double-length programs in science.

Some 3,700 youngsters were taught at the Museum in the Slide Lecture program offered for schools in New York City. Topics in this program include anthropology as well as natural science. An equal number of pupils benefitted from an ecology program presented at schools two mornings a week by a Department staff member.

During the special exhibition, "Gold of El Dorado: The Heritage of Columbia," about 400 school classes were given special tours of the exhibition conducted by staff or trained teaching volunteers. Special exhibitions appear to produce a heightened response from high schools. The proportion of secondary students visiting the Museum increased noticeably during the "Gold of El Dorado" as it did with POMPEII A.D. 79 last year.

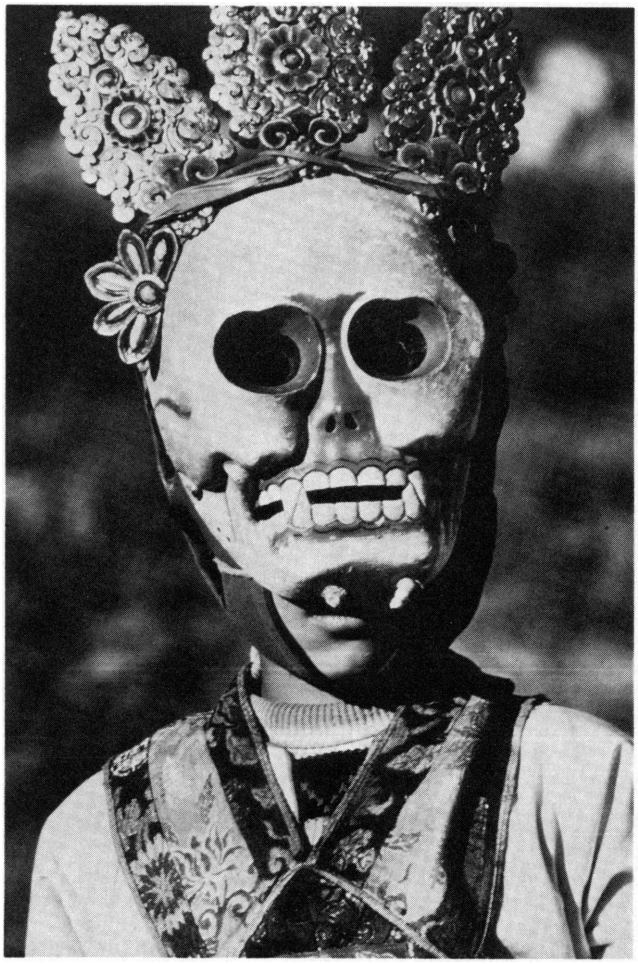
The tens of thousands of school children whose teachers arranged visits for them, and the several thousand persons who register independently for courses for adults or young people, all must be processed through the reservations office, a vital part of the Department.

Displays on Loan The Department's exhibits division continued its service of delivering small loan displays to schools in Manhattan and the Bronx. More than 1,150 exhibits or exhibit kits were made available to schools.

The Junior High School Natural Science Project this year provided a select group of 20 pupils the opportunity to study science at the Museum two afternoons a week through the school year. This program, funded by the International Paper Foundation and carried out in cooperation with several school districts, is designed to encourage young people from the inner-city to consider careers in science. The impact of the project doubled this year with the formation of two science clubs composed of pupils who were considered for inclusion in the project but who were unable to be part of it. Students in the science clubs received training modeled on the Natural Science Project curriculum.

Teaching Volunteers In the Department, teaching volunteers work primarily with classes that visit the Museum independently each day. Up to 75

classes a day are admitted under supervision of their own teachers and chaperones. While these groups must make advance reservations, they receive no formal program instruction. Teaching volunteers find this large audience particularly responsive to their presence. In the Hall of the Biology of Birds, working with specimens from our teaching collection, volunteers this year brought this exhibition vividly to life for an estimated 35,000 pupils. The Hall of South Asiatic Mammals as well as the dinosaur halls also serve as prime locations for teaching volunteers.



The Royal Dancers and Musicians from the Kingdom of Bhutan performed at the Museum in cooperation with the Asia Society's Performing Arts Program. The event was one of many activities sponsored by the Membership Office to promote interest in the Museum. (Photo credit: Asia Society Performing Arts Program)

Special Events One of the most important special events this year occurred in June, when 10 free public performances by a troupe of puppeteers from India drew nearly 7,000 persons to the auditorium. Large audiences were equally enthusiastic about other free auditorium events earlier in the year including performances by the Alvin Ailey Repertory Ensemble, the Chuck Davis Dance Company, the graduating dance class of the High School of Performing Arts, a concert by the Metropolitan Singers – Greek Choral Society, the Dinizulu Dance troupe and the La Rocque Bey Dance Company. These and other free public events, which brought a combined attendance of more than 50,000, were made possible principally by gifts from the Helena Rubinstein Foundation, the Vincent Astor Foundation and Evelyn Sharp.

Identification Day once again provided hundreds of people of all ages with the opportunity to bring their own artifacts and specimens to be identified by Museum experts.

Film programs are adding an increasingly important dimension of educational activity at the Museum. The annual Margaret Mead Film Festival weekend in September brought several thousand visitors. The Mead Festival continues as a living tribute to the distinguished anthropologist whose concern with public understanding of visual anthropology gave the Festival its original impetus in 1977. In December, a Family Film Festival with films selected to appeal to young people, brought some 3,000 persons to the auditorium over three days. Other film weekends during the year attracted many hundreds of others.

Lama Norhla performed songs and chants and played Tibetan trumpets in a July program that was one of the many events on Asian culture presented during the year. The concert was organized by the Society for the Study of Myth and Tradition. (Photo credit: Society for the Study of Myth and Tradition)

A Moroccan marketplace, photographed during a Museum Discovery Tour, is an example of one corner of the world explored by Museum-sponsored trips led by staff members. The tours, which combine vacations and learning, offer an opportunity to continue one's education.

Adult Programs Evening lecture series in the fall and spring provided a range of opportunities for adults. From an intimate classroom experience in which mushrooms and ferns were studied, to a large auditorium course on ancient Mayan cities, the Museum's scientific subjects were explored by more than 2,200 registrants.

Courses for teachers were filled to capacity with nearly 370 teachers from schools in New York City, most electing to co-register with the City College of the City of New York so they could receive credit for the Museum courses. Subjects ranged from the wildlife of New York to weaving in different parts of the world.

An all-day public symposium on the archeology of New York City, and an afternoon program of ethnographic research films proved so successful that more symposiums on academic subjects will be scheduled for next year. A shortened season of weekly slide lectures and gallery talks continues to draw a modest but faithful following with a combined attendance of 1,100.

Outreach Programming Outreach programming, which encompasses many kinds of activities, ranging from lectures for adults at the Museum to children's classes held in other parts of the city, share the goals of attracting new audiences and expanding the population the Museum serves.

A number of Caribbean-related activities were held in the auditorium, including a drama in Spanish for adults and a bilingual musical for children as part of Puerto Rico Discovery Week. Outreach to school districts in the South Bronx and Brooklyn was an important component of Caribbean activities this year. One district in the South Bronx made available an entire floor in an unused school building for a score of Museum workshops on the history and cultures of

Caribbean peoples. A similar workshop series took place in Brooklyn, where several empty classrooms were utilized. The Department's outreach programs this year were made possible principally by a grant from the William Randolph Hearst Foundation.

African-American programming included a celebration during Black History Month, with lectures and films. More than 5,000 attended these activities. In addition, evening lectures for adults and free children's workshops covered subjects ranging from the family in ancient Nubia to West African children's songs and games.

Interpretative Facilities Eight weekend celebrations of traditional customs and arts of the peoples of Japan and India were held in the People Center; combined attendance exceeded 18,000 persons; support came from the Henry Nias Foundation. The People Center, like the nearby Natural Science Center, attracts between 1,000 and 2,000 visitors each weekend from October through June. The Discovery Room, a smaller facility for younger children, reaches fewer, but equally enthusiastic visitors.

This report would not be complete without acknowledging the contribution of Honorary Associate Farida A. Wiley. Well into her tenth decade of life, she sets an example for all by pursuing her adjunct teaching duties for the Department with consistent verve. This year, nearly 700 persons accompanied her on her early morning nature walks in Central Park and on other naturalist ventures.

Department of Exhibition and Graphics

The Department initiated several comprehensive exhibitions including one, "Gold of El Dorado: The Heritage of Colombia," which will travel to three other museums across the country. The Department's major project during the year, the Gardner D. Stout Hall of Asian Peoples, the largest permanent anthropological exhibition in the Museum's history, was scheduled to open in mid-October, 1980.

"Gold of El Dorado" was the department's major effort during the year. This special exhibition was organized by its curator Craig Morris and was planned and designed by consultant designer Ralph Appelbaum. It was designed in such a way as to permit it to be dismantled and reinstalled in several other museums on its American tour—the Field Museum in Chicago, the California Academy of Sciences in San Francisco and the New Orleans Museum of Art. Mounting this stunning show, which was viewed by 377,515 visitors, involved virtually everyone in the Department.

A companion exhibition, "It's Gold," was staged in a specially-built room in the Roosevelt Memorial Hall. The exhibition, which was seen by 136,455 persons, presented the role of gold in today's economy and technology, and showed methods of mining and refining the metal.

Other special exhibitions included "Scientific Illustrations" in Akeley Gallery, "Art of Being Huichol" in Gallery 77 and "Feather Arts" in Gallery 3. Exhibits of the Month, partly funded by the Arthur Ross Foundation, included "Southwest Textiles," "Papua New Guinea: A Feather in the Cap," "Manhattan Building Stones," Photo Contest winners from *Natural History* magazine and the holiday origami tree.

A maintenance program continues in the Akeley Memorial Hall of African Mammals where habitat groups are being cleaned and refurbished, supported by the Joseph Cullman Fund. The Department's reproduction section has produced molds of all the bones of the Triceratops skeleton in our Hall of Late Dinosaurs and replicas are being cast and assembled for sale to several other museums.

Previous major exhibitions created by the department have been on tours throughout the country. "Peru's Golden Treasures" finishes up its tour of nine institutions this year. "Ice Age Art" already has been seen in San Francisco and Dallas and was scheduled for a Boston showing in late 1980. Preliminary design and planning is underway for a new Hall of South American Peoples, completion of which is seen as four or five years away.

Library

The Library, as one staff member put it, was prepared to enter the 21st century ahead of schedule by modernizing through automation. It has initiated several new programs in data collection and retrieval, and has made efforts to streamline activities at one of the world's finest natural science collections. The library offers services not only to the scientific community but also to the general public.

The Library's contribution to international scholarship was again recognized when the U.S. Department of Health, Education and Welfare awarded a $479,984 grant for two years for the acquisition of retrospective materials and for the Library's participation in a national bibliographic network, the Ohio College Library Center (OCLC). The grant provided funds for two computer terminals and a line printer which link the Library with the national network to give access to the records and holdings of 2,200 university and research libraries. All newly acquired materials are now catalogued via the computer and the Library's holdings are entered into the national data base.

Work carried out under a previous HEW grant for $250,000 was successfully completed in October. The 17,000 title serial collection was recatalogued and entered into an automated data base; and $95,000 worth of retrospective books, serials, and microforms were acquired. Under the grant, 1,773 books, 574 serial issues and nine reels of microfilm were added to the collection.

An important program was instituted this year: "Recent Publications in Natural History," a quarterly bibliographic listing in *Curator* of publications received in the Library, with at least one book fully reviewed and all publications listed by broad subject categories and annotated when necessary. Mary E. Genett, the Acquisitions Librarian, is the editor of "Recent Publications."

Collections Expanded The Technical Services section added 1,381 books (not including grant supported acquisitions), 29 new serial titles and 19,200 serial issues to the collections. It distributed 70,964 scientific publications and generated $6,702 in one-time sales revenue, an increase of 9 percent; bound 1,869 volumes and, with the assistance of the Reference Services section, filed 23,200 catalog cards.

The Photographic Collection received a $10,000 grant from the New York State Council on the Arts to aid in converting highly combustible nitrate negatives to safety film and has converted 3,450 negatives. The Photographic Collection's work load and intake of revenue has increased substantially although there were staff shortages throughout the year. Some $57,500 in income was generated, and 2,493 reference questions were answered, 1,197 orders for prints and slides were filled, 700 images were cataloged, and 717 images were preserved. In addition, the Photographic Collection provided many of the photographs for the 80th anniversary issue of *Natural History* magazine and to the "NOVA" and "Odyssey" series on PBS-TV. In May, the Archives of the Museum was placed under the management of the Library and has become the responsibility of the Photographic Collection Librarian.

The number of public users of the Reference Services section dropped in 1979, reflecting the declining college enrollment, but use by Museum staff increased by 15 percent. The Section served a total of 6,954 users, circulated 40,450 items to the Museum staff, delivered 7,522 volumes to users in the reading room, answered 4,840 reference questions, filled 2,624 interlibrary loan requests from other libraries, and filled 413 staff requests by borrowing from other libraries.

Exhibitions Two exhibitions from the Rare Book Room, "Museum Photography: Rarities from the Photographic Collection" and "Shells: A History of Exploration" were mounted in the Library Gallery. A small exhibition, "Museum Scrapbook," was opened at the entrance to the Library.

Chief Librarian Nina J. Root, right, discusses the Museum's research collection with Sylva Baker, head librarian of the Academy of Natural Sciences in Philadelphia. The Museum's 335,000 volume collection–135,000 monographs and 200,000 periodicals–is an important resource for scientists and laymen. The library contains the most comprehensive natural history collection on the continent.

The Review Project continued the weeding of the Anthropology section; 670 titles were withdrawn and 100 titles were transferred to the Rare Book Room. This year the sale of duplicate or out-of-scope material brought a net income of $2,545. Titian Ramsey Peale's portfolio of sketches and drawings, his self-portrait and Captain William Hudson's manuscript logbook on the ship "Peacock" were loaned to the inaugural exhibit "Romantic America" of the Tampa Museum and the portrait of Audubon to Humana, Louisville, Kentucky.

Gifts of books and microfilm were received from Museum staff: Norman Platnick; Charles Myers; Richard Zweifel; Sydney Anderson; Lee Ash; Gareth Nelson; Ian Tattersall; Dorothy Bliss; Rhoda Metraux; Enid Schildkrout; and John Farrand. Authors and editors who contributed copies of their books include Herman Lent, Kenhelm W. Stott Jr., Paulo E. Vanzolini, Kenneth L. Gosner, Luise Margolies, Pascal James Imperato, and Edward Cavell. Other donors of books include Fred Werner, John G. Samson, Marius Sznajderman, Anthony Pizzati, Isaac Asimov, New York Botanical Garden, Engineering Societies Library, New York Historical Society, the Tampa Museum, and the Brooklyn Academy of Medicine/Downstate Medical Research Library. Gifts of slides and photographs were received from the Thames Science Center of Carl Akeley materials, and Edward F. McCartan. Mr. Cleveland Dodge donated an Audubon copper plate of the American Turkey, and gifts of money were received from Cyril dos Passos ($350) and Mrs. Alfred L. Loomis, Jr. ($3,000).

Staff Activities Nina J. Root, Chairwoman, continued her outreach efforts on behalf of the Library by presenting a paper, "The Role of Libraries

in Museums," at the American Association of Museums annual meeting. In addition, she served on the Grolier Club Membership and Exhibition Committees; chaired the American Library Association Library/Binders Relation Committee and the METRO Task Force on Time Management; and attended the International Federation of Library Associations annual meeting in Copenhagen, and the American Library Association annual and mid-winter meetings. Within the Museum, she researched, designed and mounted the exhibit, "Shells: A History of Exploration," with the assistance of William K. Everson and William E. Old, Jr. of the Department of Invertebrates. She also instituted and oversaw the design of "Recent Publications in Natural History."

Pamela B. Haas, Assistant Librarian for Archives and Photographic Collection, was elected vice-chair/chair elect of the Special Libraries Association, N.Y. Museum, Arts, and Humanities Group. She has just completed a book on behalf of the Museum for Arno Press based on a collection of 19th Century photographs of Edward Dossetter, and researched, designed and mounted the exhibit "Museum Photography." Miriam Tam, Assistant Librarian for Technical Services, managed the HEW grant.

Mary Genett, Acquisitions Librarian, edited "Recent Publications in Natural History," and also mounted an exhibit of photographs, "A Museum Scrapbook."

Diana Shih, Cataloging Librarian, implemented the installation of computerized cataloging via OCLC.

Publications:

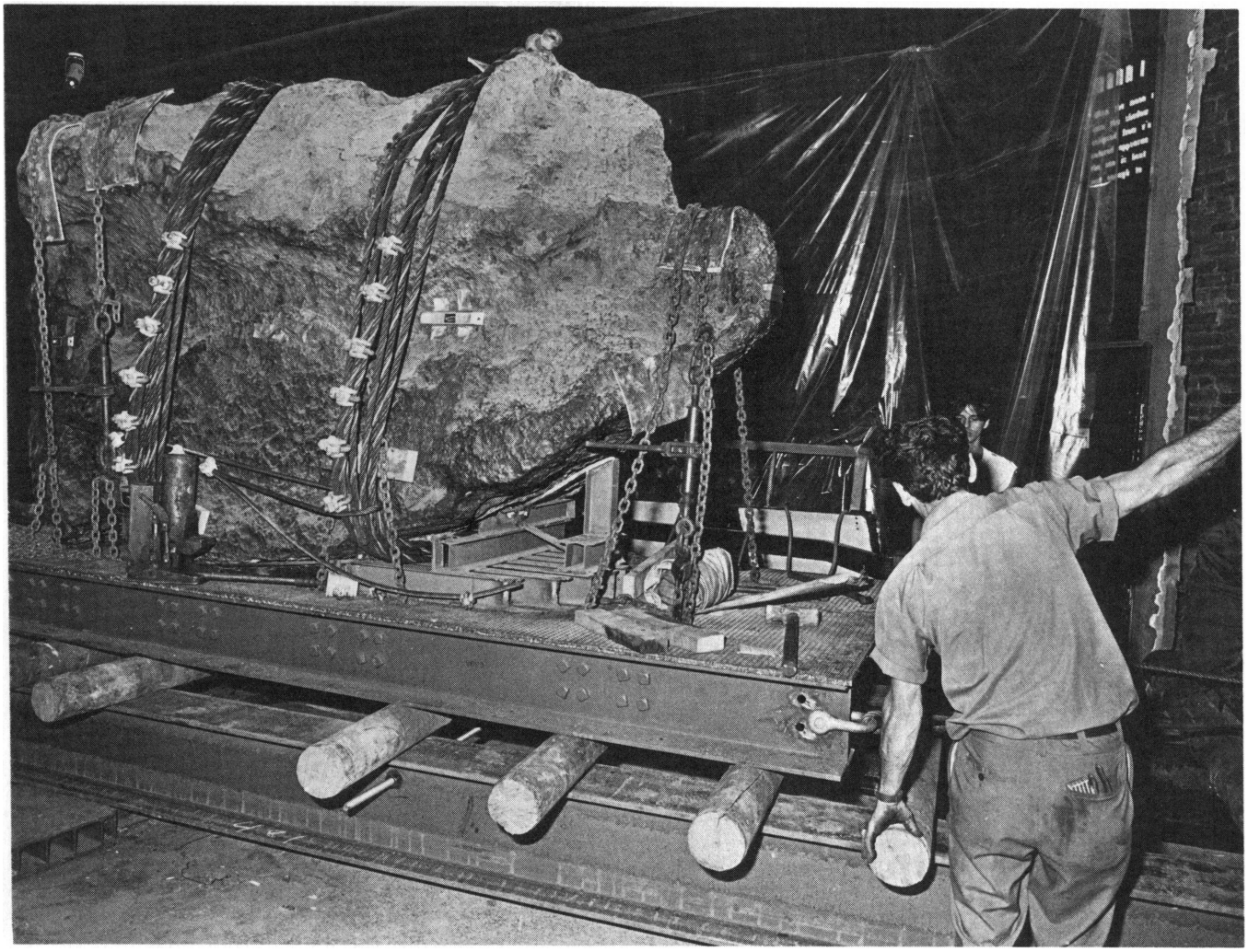
Genett, Mary
1979. Recent Publications received by the American Museum of Natural History Library. *Curator*, vol. 22, no. 1, pp. 41-78.

Haas, Pamela B.
1979. Understanding Copyright 1979. American Society of Picture Professionals Newsletter, vol. II, no. 4, pp. 4-5.

1980. Museum of Modern Art: Movie Stills Archive. American Society of Picture Professionals Newsletter, vol. 12, no. 1, p.8.

Root, Nina J.
1980. The Library of the American Museum of Natural History. Jour. for the Bibliog. of Nat. Hist., vol. 9, no. 4, pp. 587-591.

The 31-ton meteorite Ahnighito — the largest in the world — has been moved from the Hayden Planetarium to the new Arthur Ross Hall of Meteorites which will open in April. The Museum has planned a national symposium on meteorites to coincide with the Hall's opening. Subjects will range from planetary history to the prospects of asteroid towing.



Publications

Curator

"Recent Publications in Natural History," compiled and edited by Mary Gennett, Department of Library Services, was introduced as a continuing feature in *Curator.* Each future number with this feature will include a review of one or more books and a list of new scholarly publications reviewed in the natural sciences, including zoology, anthropology, the mineral sciences, animal behavior, ecology, travel and expedition, museology, biography, history of natural science, and related subjects. Since first presented in Volume 22, Number 1, the new feature has grown in scope and coverage, requiring a change in format beginning with Volume 22, Number 3, to reduce the number of published pages it requires.

The following new members of the Editorial Board were appointed: James W. Atz, Curator of the Museum's Department of Ichthyology; Richard J. Koke, Curator of The New York Historical Society; Merribell Parsons, Chairman for Education of the Metropolitan Museum of Art, and Richard G. Van Gelder, Curator of the Museum's Department of Mammalogy.

Scientific Publications

The office of Scientific Publications published six articles in the *Bulletin,* totaling 831 pages, 18 numbers in *American Museum Novitates,* totaling 362 pages, and three parts in *Anthropological Papers,* totaling 555 pages—a combined total 1,748 printed pages for the fiscal year.

Ten numbers in *American Museum Novitates* and nine articles for the *Bulletin* are currently in press.

Administration

Construction and Maintenance The Office of Construction and Maintenance coordinated the design by outside architects of three major capital projects totaling almost $2 million. The projects, funded by the New York City capital budget under the supervision of the Department of General Services, will bring important physical improvements to the Museum.

The largest of the three projects is Phase III of the exterior rehabilitation of the Museum complex. The project includes a new roof for Section 1, the Museum's first building, constructed more than 100 years ago. The second project will bring automation to the Museum's four Roosevelt Memorial Building elevators and the elevator in the School Service Building. Automation will allow for the simultaneous operation of all elevators during peak load periods, speeding and easing the flow of visitors through the Museum.

Double Decking The third major project provides for double decking the fourth floor of Section 8, creating vastly improved storage facilities for the anthropological collections.

During the year, the Construction and Maintenance forces of the Museum provided support services for construction on the Gardner D. Stout Hall of Asian Peoples, the Arthur Ross Hall of Meteorites, and the reconstruction of the Margaret Mead Hall of Pacific Peoples.

A major accomplishment in connection with the section on meteorites—one that attracted a great deal of public notice and media coverage—was the movement of the 31-ton meteorite "Ahnighito" from the first floor of the Planetarium, around the block to its new location on the first floor of Section 6 of the Museum. That very delicate trucking operation was coordinated by Walter F. Koenig, Manager of Construction and Maintenance.

Mr. Koenig also designed the major changes in the layout of the General Accounting offices that will improve efficiency as well as the appearance of the office space.

Improved Visibility Using new glass handling equipment designed by Carl Hilgers, foreman of the Sheet Metal Shop, a crew of workers supported through the Comprehensive Employment and Training Act (CETA) made excellent progress in removing and cleaning the inside glass surfaces of the exhibit cases in the Museum's major exhibition halls. Improvement of the overall appearance of these halls as well as in the visibility of the exhibited materials themselves was a major accomplishment in maintenance of exhibition spaces.

Office of the Controller During the current year, the Controller's Office conducted a survey of the accounts payable system. It reviewed current practices and procedures to determine whether to convert to a computerized accounts payable system serviced by an outside bureau.

An in-depth review of the insurance program resulted in changes in the type of risks covered and the amount of insurance provided. The changes were made in keeping with current risk management philosophy and inflationary replacement costs.

Museum Shop The volume of sales in the Museum Shop topped $1 million for the first time in its history. The special satellite shop constructed in Gallery 3 for Pompeii AD 79 proved successful and was renovated as a permanent sales area in time for the opening of the "Gold of El Dorado." It handled Museum Shop sales in connection with "Feather Arts" and will be used for future special exhibitions planned for

Gallery 3.

The Museum Shop assumed responsibility for the management of the catalog sales operation and more than doubled the volume of sales—its strikingly handsome catalog receiving an award for graphic excellence from the printing industry.

Martin Tekulsky, the shop's marketing manager, and his staff selected a special group of items for sale in connection with the opening of the Gardner D. Stout Hall of Asian Peoples. The items include beautiful objects associated with the various cultures represented in this new major exhibition hall.

Personnel The department expanded the successful Flexible Working Hours Program (Flex-Time) to include all departments of the Museum save two, which will make the transition during the next fiscal year. In conjunction with the expansion, new hardware with programming capacity was provided to all participating departments at no additional cost to the Museum.

During the year, the department processed 37 promotions, nine transfers, and the placement of 225 new employees who were recruited from among approximately 1,600 applicants interviewed by the department staff. Geraldine M. Smith, Manager of the Personnel Department and Coordinator of the Museum's Safety Committee, processed more than 70 departmental requests for safety inspections and monitored the required corrective action. The department helped participating Museum departments place 55 persons through the New York City Urban Corps Program. The program, funded through the Federal Work Study Program, established under the Higher Education Act of 1965, provides on-the-job training for college students and helps the Museum meet its service commitments at no additional budgetary cost.

Building Services Devising security measures for the new Hall of Asian Peoples was a major concern of Building Services Manager Charles L. Miles and his staff during the past year. The latter continue to participate in seminars related to security, cleaning methods, and management of security and cleaning personnel.

During the year, a new public address system was installed under city capital budget funding, making it possible for announcements to reach all parts of the Museum.

On a pilot basis, the department implemented a new method of hiring attendant-guards. A group of 15 attendant-guards was hired en masse, enabling the department to concentrate its efforts on training in a group setting. It is anticipated that this new method of group hiring and training will result in a better trained and a more smoothly functioning guard force.

General Services After 40 years of association with the Museum, Joseph R. Saulina, retired as manager of General Services at the end of 1979. He was succeeded by James Koo.

Development and Communications

Each year new and higher support levels are required to meet rising costs of day-to-day Museum operations and the multifaceted programs that uniquely mark this institution as a great national center for research and education in the natural sciences.

By charter this is a private museum, which relies in large part on private sector support. Sources of support range from individuals, corporations and foundations, to members, who now number close to 500,000 nationwide. The annual effort to raise needed funds involves the administration, Trustees, volunteer committees, and the staffs of development, public affairs, *Natural History* and membership.

During the past year, unrestricted income from private sources reached $1,589,000. Restricted or special fund income added $1,668,000 for a total of $3,257,000. Government grants for specific research projects came to $1,012,000. In addition, the Museum received gifts-in-kind valued at $1,500,000.

Development Spurred by major Museum projects such as acquisition of the Columbia Minerals Collection, the Arthur Ross Hall of Meteorites, and the Margaret Mead Fund, Trustees and Trustee-generated contributions totaled $1,105,200 during 1979–80.

The past year also marked another milestone in corporate support with a 30 percent increase in unrestricted contributions, reaching a new high of $600,000. In addition, 22 corporations made special purpose grants totaling $310,000. Overall corporate giving amounted to $910,000.

The success of the Campaign may in part be attributed to the slide presentation "Alive and Well at 111," given before a number of business groups, followed by active staff solicitation for new and increased support. At the heart of the campaign is the committee of corporate leaders who devote considerable energies to communicating the importance of the Museum's cultural and scientific roles to their peers. Trustee William F. May, who provided outstanding leadership over the past four years, stepped down as National Chairman at the close of the fiscal year. His successor as Chairman is Donald C. Platten, a fellow Trustee.

The Employee Admissions Program, which had previously been offered on a trial basis to a limited number of corporations, was opened to all companies that make annual contributions in excess of $5,000. More than 25 corporations have already joined this popular program, and it is anticipated that many more will follow suit in 1980–81.

Trustees and other special friends of the Museum contributed $275,000 for the purchase of the unique collection of mineral specimens from Columbia University. And three foundations—the Booth Ferris Foundation, the Commonwealth Fund and the Josiah Macy Jr. Foundation—made sizeable pledges to the

Young Museum visitors examine a model of a diving suit used by Dr. Sylvia A. Earle to break the world's record for deep sea dives (1,250 feet) last year. Dr. Earle was the master of ceremonies at the Charles A. Lindbergh Awards Dinner held at the Museum, May 20.

Margaret Mead Fund. Launched several years ago to raise $5 million to carry on the spirit of Dr. Mead's work and to curate the Museum's unrivaled anthropology collections, the Fund now stands at $2,216,000.

Other foundations responded generously to Museum proposals for special project support grants. Excluding Mead Fund gifts and current year grants for continuing prior foundation-supported programs (Archbold, Astor, Mellon, Noble), new requests made to 24 private foundations resulted in grants and pledges amounting to $254,000.

Fall and Spring benefits organized by the Men's and Women's Committee raised $102,000. The Committees, chaired by Frank G. Lyon and Mrs. Robert V. Lindsay, also raised $83,000 in the form of outright gifts during the year.

Natural History Although *Natural History* magazine continued at a steady and stable level of subscribers/membership (480,000) and recorded a gain in advertising revenue of 20 percent, its operating surplus of $200,000 was well below the previous year's $376,000. A combination of postage increases and higher paper costs accounted for part of the decline, but the most important single factor was a decision to increase frequency of the magazine from 10 to 12 issues per year—a substantial added cost during this and next fiscal year. A simultaneous decision to raise membership dues from $10 to $15 and projected higher advertising volume are expected to more than recoup the cost by fiscal 1981–82.

Editorially, the year was an unqualified success, marked by the National Magazine Award for Essays and Criticism given to *Natural History* and Stephen Jay Gould, author of a series of feature essays, This View of Life. The April special issue, largest in its history, celebrated the magazine's 80th Anniversary with 45 fascinating articles selected from issues dating back to 1900, and also introduced the new and striking cover design of *Natural History.*

The Participating and Donor member program, numbering 18,000 at year end, consolidated last year's extraordinary 70 percent growth by renewing most of the members attracted by "Pompeii AD 79." This was accomplished by a concerted campaign which included priority viewing and member-only receptions for "Gold of El Dorado."

Public Affairs The highlight of the year came at the beginning of the fiscal period with the media campaign for "Gold of El Dorado: The Heritage of Colombia." The culmination of that campaign occurred with the appearance of Dr. Nicholson on the "Good Morning America" program and with a full-page, in-depth article in *Time,* in addition to broad coverage in other media.

A highly successful advertising campaign for "Gold of El Dorado" was conceived by Marsteller, Inc., and supported by Chemical Bank. With radio, magazine and commuter terminal advertisements, the campaign was a major factor in bringing 377,515 persons to the exhibition, more than half the total number of visitors to the Museum in the period from November to March.

The traveling exhibitions which started here or which came to the Museum from elsewhere, generated publicity for the Museum while they were here and continued to do so as they moved to other institutions around the country.

"Feather Arts" was also the subject of an excellent —and amusing—radio advertising campaign produced as a public service by the advertising firm of Ogilvy & Mather with the help of a sister agency, Scali, McCabe and Sloves. The ad message was delivered by chicken magnate Frank Perdue and drew coverage in the general and advertising trade media.

Discovery Tours Notwithstanding the forced cancellation of two trips because of political unrest in Iran and Afghanistan, the Museum sponsored seven exciting tours for 200 participants to the Nile and the Middle East, Mexico and Guatemala, the Bahamas and Alaska—all led by Museum scientists.

During the year, well-timed direct mail campaigns and advertising in *Natural History* magazine attracted 230 Museum friends to a July 1980 cruise around the British Isles. In the year ahead trips were also scheduled to Papua New Guinea, China, Egypt, Africa, and the Galapagos Islands.

Guest Services Increased development activities coupled with a number of special exhibitions broadened the activity of the office, which organized functions ranging from formal dinners to special tours.

During "Gold of El Dorado," a cocktail lounge—The Lion's Lair—was introduced on Wednesday and Friday evenings as a quiet area in which visitors could enjoy a relaxing moment. When "Gold of El Dorado" closed, the Lion's Lair was continued on Wednesday evenings as well as Saturday and Sunday afternoons.

Corporate receptions and dinners, catered and organized by Guest Services during "Gold of El Dorado," produced additional net income of $73,000.

Approximately 350,000 visitors and employees, and 126,000 school children were served in the cafeteria and school lunchrooms.

Volunteer Office The composition of the Museum's volunteer corps changes with the seasons. During the summer, it is a somewhat younger group, mostly vacationing students who work a daily schedule on almost a full-time basis, replacing for vacation breaks longer-service volunteers, who are frequently older and who give less time.

This year, volunteers contributed a total of 92,205 hours. Almost 43.4 percent of the volunteer hours were devoted to direct contact with the public at the information desks; on Museum Highlight Tours, VIP and Member tours; at the Margaret Mead Film Festival; and in teaching, origami demonstrations and the Discovery Room. In preparation for this work, volunteers received a total of 3,988 hours of training.

The information desks not only provide visitors with their first human contact in the Museum and contribute to the image of the Museum they carry away, but are a significant source of income. In the 1979–80 year, the desk volunteer personnel sold $106,804 worth of souvenir merchandise, cards, booklets, and an additional $20,042 in Memberships.

Juan C. Mannarino, left, of the Museo de Ciencias Naturales in Buenos Aires, Argentina, and his wife, Teresa, discuss exhibition design with Juan Barberis of the American Museum's Department of Exhibition and Graphics. Many museum professionals from the United States and throughout the world have participated in formal and informal information exchanges with American Museum personnel.

Treasurer's Report

The statements reflecting the financial condition of the American Museum of Natural History appear on the following pages. These statements, consisting of the Balance Sheet, Statement of Revenue and Expenses of Current Funds and Statement of Changes in Fund Balances, have been audited by Coopers and Lybrand and their notes on these statements appear on pages 58–67.

The Balance Sheet reports that investments in marketable securities, recorded at a cost of $58,746,307, included the following funds: General Fund of $4,182,801, Special Funds of $6,097,409 and Endowment Funds of $48,466,097. The total market value of these securities on June 30, 1980, amounted to $63,819,312, which is $5,073,005 greater than cost; this increase in value is largely applicable to the Endowment Fund as detailed in Note 1 of the financial statements.

The General Fund investments of $4,182,801 largely represent advance payments by Museum members for benefits due them in future years. This asset offsets, for the most part, the liability for unearned membership income amounting to $4,668,260. Special Funds investments of $6,097,409 consist of amounts reserved 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. The Endowment Fund investments of $48,466,097 represent the balance of donated funds allocated by the Museum for endowment purposes since its founding in 1869; the income from the investments of this fund is used to support both General and Special Funds activities.

The revenue and expenses of the General Fund and Special Funds appear on the Statement of Revenue and Expenses of Current Funds, page 60. The total revenue for these funds for 1979-1980 was $21,452,680; the total expenses amounted to $21,593,526. After adjusting for the support grants of $623,000, revenue exceeded the expenses by $482,154. Although the combined operation of these funds shows an excess of revenue over expenses, the excess resulted from Special Funds operations. Special Funds cover programs which are restricted in nature and may take several years to complete; the day-to-day operations of the Museum are supported by the General Fund.

In reviewing the General Fund for 1979-1980, it will be noted that the total revenue of $15,212,118 has increased by $1,122,801 over the preceding year. The excess of expenses over revenue in the General Fund was $893,270 in 1979-1980 (before support grants), compared to $1,224,682 in 1978-1979. After deducting the support grants of $623,000 in 1979-1980 and $571,200 in 1978-1979, the net operating deficit of the General Fund amounted to $270,270, compared to $653,482 in the preceding year.

The contribution from the City of New York included as revenue in the General Fund was slightly more in fiscal 1980 than in 1979, but the level of support for Museum activities actually declined, since the current year's appropriation includes negotiated and other salary increases. The decrease in the revenue from the Comprehensive Employment Training Act (CETA) reflects a reduction in the overall allocation to the City of New York by the Federal government, and the 18-month limitation in supporting any one position mandated in the Federal program. The substantial increase in net income from investments resulted from higher interest rates and increased dividends during the year.

Museum membership revenue reflects the effect of increasing, in March, 1980, the Associate Membership dues from $10 to $15 per year and Participating Membership dues from $20 to $30 per year. The increase in other revenue is a result of the efforts on the part of the trustees, various volunteer committees and the Museum administration to increase the income from fund raising programs and from the sales and services the Museum provides to the scientific community and general public.

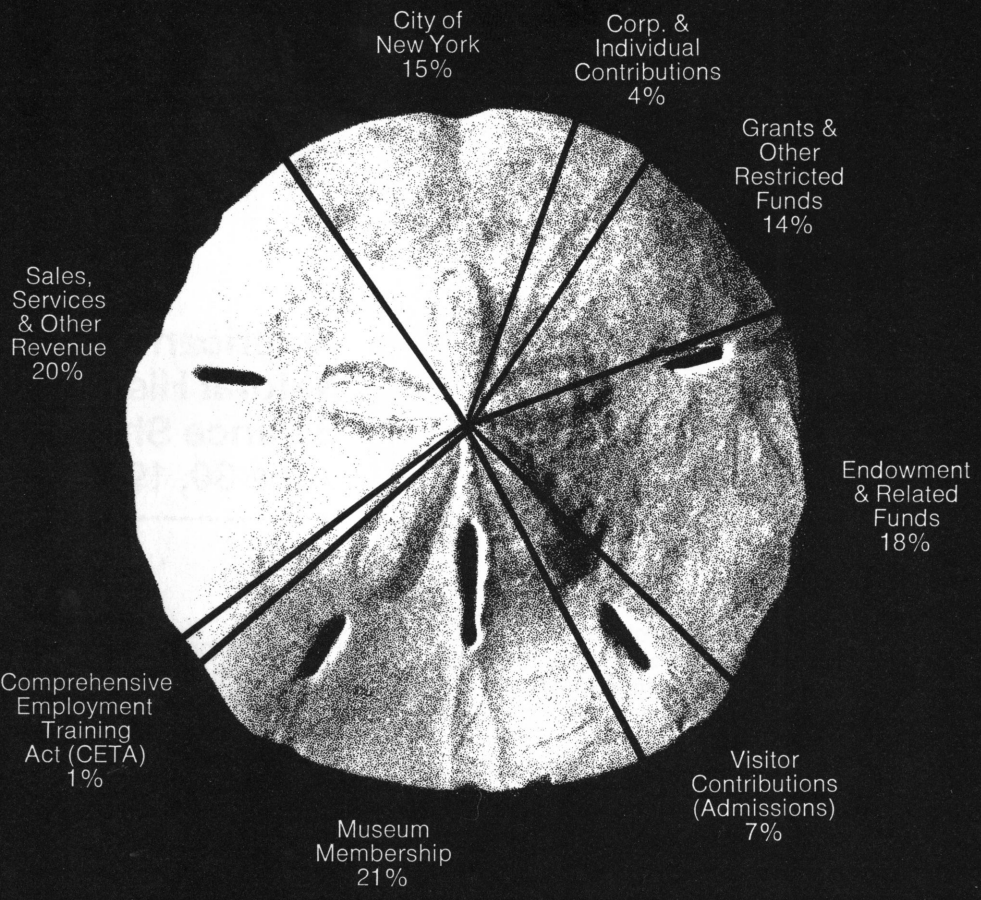
The increase in General Fund expenses in fiscal 1980 includes cost of living adjustments to the salaries of employees, the increased costs of personal services and supplies the Museum purchases from outside sources, and costs resulting from an adjustment in the publication and distribution of the magazine, *Natural History,* when the publication schedule was increased from 10 to 12 issues per year.

An overall review of the General Fund operation shows that two areas account for the major increase in General Fund revenue in the current year: net income from investments, and other revenue. The increase in net income from investments over fiscal 1979 reflects the inflationary economy in which we currently operate and is largely dependent on the interest rate received on Museum investments. The rise in other revenue reflects the Museum administration's efforts to increase revenue from auxiliary sources of income. Careful monitoring of costs for services and expenses incurred has borne fruit, in that the overall percentage increase in expenses in fiscal 1980 over fiscal 1979 has been less than the rate of inflation.

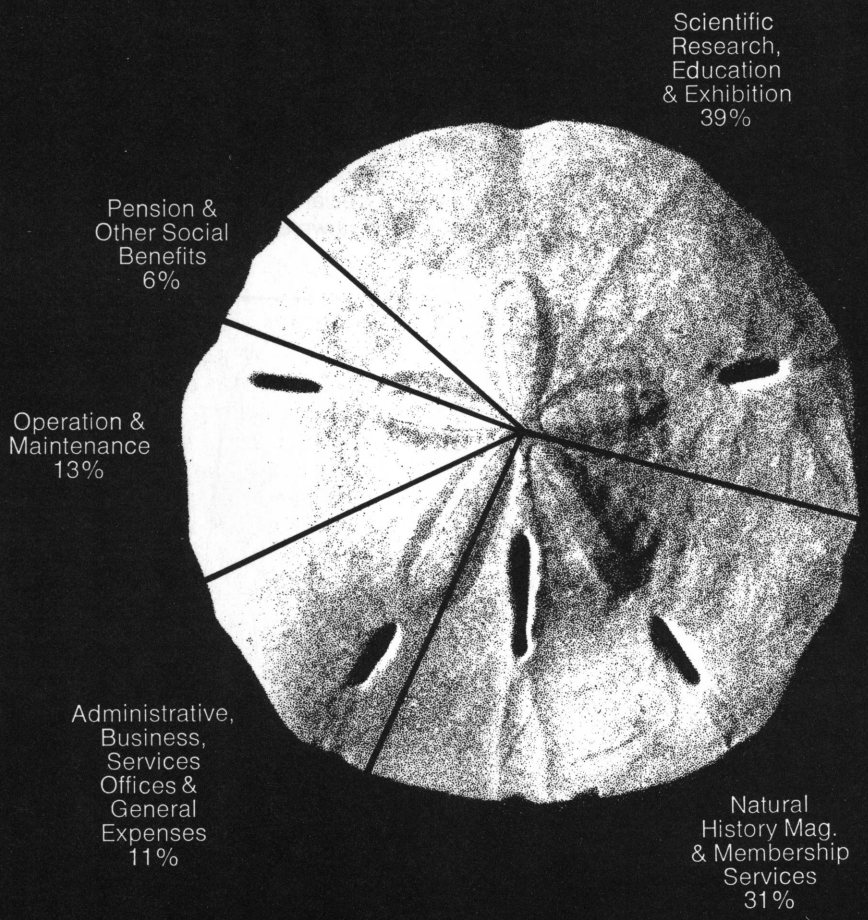
The Museum will continue to offer the scientific community and the public at large unparalleled opportunities for research and education in natural history. It is only with cooperation and support from both the public and private sectors that we can carry out this mandate for public service.

Frederick A. Klingenstein,
Treasurer

Revenue
$21,452,680



Expenses
$21,593,526



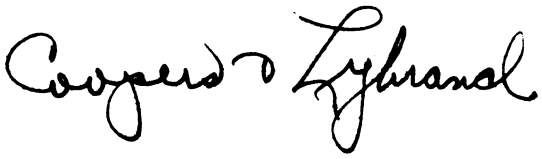
Keyhole sandollar
Mellita quinquiesperfora

Auditors' Report

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

We have examined the balance sheets of the AMERICAN MUSEUM of NATURAL HISTORY as of June 30, 1980 and 1979 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 aforementioned financial statements present fairly the financial position of the American Museum of Natural History as of June 30, 1980 and 1979 and the results of its operations for the years then ended, in conformity with generally accepted accounting principles applied on a consistent basis.



1251 Avenue of the Americas
New York, New York 10020
October 9, 1980

American Museum of Natural History Balance Sheets, June 30, 1980 and 1979

ASSETS:

Cash
Receivable for securities sold
Accrued interest and dividends receivable
Accounts receivable, less allowance for doubtful accounts of $151,636 in 1980 and $115,717 in 1979
Due from other funds
Investments in marketable securities (Note 1)
Planetarium Authority bonds (Note 2)
Inventories (Note 3)
Prepaid expenses

LIABILITIES and FUNDS:

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

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

1980				1979			
Current Funds				Current Funds			
General Fund	Special Funds	Endowment Funds	Total	General Fund	Special Funds	Endowment Funds	Total
$ 196,151	$ 6,409		$ 202,560	$ 139,086	$ 5,189	$ 170,480	$ 314,755
		$ 358,297	358,297				
351,720	71,680		423,400	395,179	100,596		495,775
861,359	369,849		1,231,208	1,036,939	435,508		1,472,447
	44,450		44,450				
4,182,801	6,097,409	48,466,097	58,746,307	3,800,929	5,411,409	44,938,344	54,150,682
	425,000		425,000		425,000		425,000
753,396			753,396	749,546			749,546
1,459,526	53,024		1,512,550	601,648	52,215		653,863
$7,804,953	$7,067,821	$48,824,394	$63,697,168	$6,723,327	$6,429,917	$45,108,824	$58,262,068
$2,147,757	$ 162,085	$ 40,912	$ 2,350,754	$1,893,290	$ 246,242		$ 2,139,532
1,395,990			1,395,990	1,314,300			1,314,300
		1,510,140	1,510,140			$ 52,706	52,706
		44,450	44,450				
4,668,260			4,668,260	3,869,219			3,869,219
(407,054)			(407,054)	(353,482)			(353,482)
	6,905,736		6,905,736		6,183,675		6,183,675
		47,228,892	47,228,892			45,056,118	45,056,118
$7,804,953	$7,067,821	$48,824,394	$63,697,168	$6,723,327	$6,429,917	$45,108,824	$58,262,068

Statements of Revenue and Expenses of Current Funds for the years ended June 30, 1980 and 1979

	General Fund		Special Funds		Total	
	1980	**1979**	**1980**	**1979**	**1980**	**1979**
Revenue:						
Appropriation from the City of New York	$ 3,180,709	$ 3,173,373			$ 3,180,709	$ 3,173,373
Comprehensive Employment Training Act (CETA)	230,556	375,530			230,556	375,530
Gifts, bequests and grants	937,233	879,453	$3,017,355	$3,055,025	3,954,588	3,934,478
Net income from investments	2,911,643	2,417,909	960,917	756,486	3,872,560	3,174,395
Visitors' contributions			1,385,431	1,433,642	1,385,431	1,433,642
Museum membership	4,439,616	4,353,032			4,439,616	4,353,032
Other revenue, net	3,512,361	2,890,020	876,859	817,432	4,389,220	3,707,452
Total revenue	15,212,118	14,089,317	6,240,562	6,062,585	21,452,680	20,151,902
Expenses:						
Scientific and educational activities	3,272,380	3,075,188			3,272,380	3,075,188
Exhibition halls and exhibits			1,456,612	1,481,954	1,456,612	1,481,954
Natural History Magazine	6,585,738	5,937,651			6,585,738	5,937,651
Other special purpose programs and projects			3,654,161	3,360,918	3,654,161	3,360,918
Administrative and general	2,303,948	2,214,879	166,484	132,313	2,470,432	2,347,192
Plant operating and maintenance	2,760,952	2,712,144			2,760,952	2,712,144
Pension and other social benefits (Note 7)	1,182,370	1,374,137	210,881	199,373	1,393,251	1,573,510
Total expenses	16,105,388	15,313,999	5,488,138	5,174,558	21,593,526	20,488,557
Excess of revenue over expenses (expenses over revenue) before support grant	(893,270)	(1,224,682)	752,424	888,027	(140,846)	(336,655)
Support grant (Note 8)	623,000	571,200			623,000	571,200
Excess of revenue over expenses (expenses over revenue)	($ 270,270)	($ 653,482)	$ 752,424	$ 888,027	$ 482,154	$ 234,545

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

Statements of Changes in Fund Balances for the years ended June 30, 1980 and 1979

	Current Funds					
	General Fund		Special Funds		Endowment Funds	
	1980	**1979**	**1980**	**1979**	**1980**	**1979**
Balance (deficit), beginning of year	($353,482)	($310,512)	$6,183,675	$5,582,525	$45,056,118	$45,033,133
Additions:						
Gifts, bequests and grants					106,477	113,576
Interest and dividend income					144,818	118,703
Net gain on sale of investments					2,378,160	321,317
Excess of revenue over expenses, as annexed			752,424	888,027		
Total additions			752,424	888,027	2,629,455	553,596
Deductions:						
Excess of expenses over revenue, as annexed	270,270	653,482				
Administrative and general expenses					149,372	87,034
Prior service contributions to CIRS (Note 7)					120,974	119,942
Total deductions	270,270	653,482			270,346	206,976
Transfer between funds:						
Financing of:						
1979 and 1978 General Fund deficits	353,482	310,512	(164,044)	(9,989)	(189,438)	(300,523)
Special Funds activities	(136,784)		133,681	23,112	3,103	(23,112)
Other (Note 9)		300,000		(300,000)		
Total transfers	216,698	610,512	(30,363)	(286,877)	(186,335)	(323,635)
Balance (deficit), end of year	($407,054)	($353,482)	$6,905,736	$6,183,675	$47,228,892	$45,056,118

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

Statement of Significant Accounting Policies

The Museum maintains its accounts principally on the accrual basis.

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

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

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

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

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 at market value.

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 its Board of Trustees.

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

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

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

Notes to Financial Statements

1. Cost and market quotations of investments at June 30 are as follows:

General Fund	
Special Funds	
Endowment Funds	

The Museum's investments consist of the following:

Short-term obligations	
Bonds	
Common stocks	

2. The investment in bonds ($570,000 principal amount) of the American Museum of Natural History Planetarium Authority ("Planetarium") is carried at cost. The financial statements of the Planetarium, which is operated under the supervision of the Museum, are annexed. Interest income of $25,650 received from the Planetarium in the years ended June 30, 1980 and 1979 is included in net income from investments of the General Fund.

3. Inventories comprise:

Paper for Natural History Magazine	
Museum shop merchandise	

4. Included at June 30, 1980 in Special Funds (funds which are received or appropriated for specific purposes) is approximately $3,500,000 of funds restricted by the donor as to use.

5. The balances at June 30, 1980 and 1979 of Special Funds are net of overdrafts of certain of these funds of approximately $395,000 and $175,000, respectively. These overdrafts represent expenditures in anticipation of transfers from Endowment and/or General Funds, receipt of gifts and grants, or the sale of property and equipment utilized by the Special Funds.

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

Endowment Funds, income available for:	
Restricted purposes	
Unrestricted purposes	
Funds functioning as endowment, principal and income available for:	
Restricted purposes	
Unrestricted purposes	

1980		1979	
Cost	Market	Cost	Market
$ 4,182,801	$ 4,146,345	$ 3,800,929	$ 3,793,734
6,097,409	6,044,266	5,411,409	5,400,967
48,466,097	53,628,701	44,938,344	48,291,236
$58,746,307	$63,819,312	$54,150,682	$57,485,937
$11,949,466	$11,984,946	$10,950,449	$10,941,888
13,347,173	13,435,223	15,853,370	15,550,917
33,449,668	38,399,143	27,346,863	30,993,132
$58,746,307	$63,819,312	$54,150,682	$57,485,937

1980	1979
$506,683	$432,307
246,713	317,239
$753,396	$749,546

June 30	
1980	1979
$21,604,874	$20,586,062
7,929,552	7,564,613
5,432,722	5,092,746
12,261,744	11,812,697
$47,228,892	$45,056,118

7. All eligible employees of the Museum are members of the CIRS Pension Plan (the "Plan"). The cost of this Plan amounted to approximately $680,000 in fiscal 1980 and $661,000 in fiscal 1979. Of these amounts, approximately $121,000 in fiscal 1980 and $120,000 in fiscal 1979 were funded through the pension support endowment fund. The balance (which included normal service cost and amortization of unfunded prior service cost over a 20-year period) of approximately $559,000 in fiscal 1980 and $541,000 in fiscal 1979 was charged to current funds.

8. In fiscal 1980 and 1979, grants of $598,000 and $571,200, respectively, were received from the New York State Council on the Arts towards the support of the General Fund's operations. Additionally, a grant of $25,000 was received from the Federal Institute of Museum Services in fiscal 1980.

9. Special Funds revenues include $300,000 in fiscal 1979 received from the National Endowment for the Humanities (a similar amount was received in the prior year). In fiscal 1979, $300,000 of these funds was transferred from Special Funds to the General Fund.

10. The Museum provides certain services, including accounting and maintenance services, for which the Planetarium was charged an aggregate amount of $82,331 in fiscal 1980 and $89,359 in fiscal 1979.

11. Certain amounts in the fiscal 1979 financial statements have been reclassified to conform with the fiscal 1980 presentation.

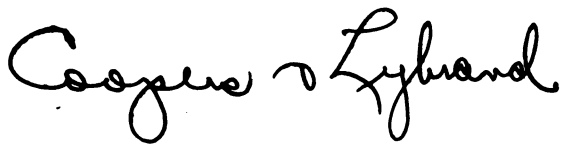
12. The Museum is a nonprofit organization exempt from income tax under Section 501(c)(3) of the Internal Revenue Code.

Auditors' Report

The Members of the American Museum of Natural History Planetarium Authority, New York, New York:

We have examined the balance sheets of the AMERICAN MUSEUM of NATURAL HISTORY PLANETARIUM AUTHORITY as of June 30, 1980 and 1979 and the related statements of income and expenses 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 aforementioned financial statements present fairly the financial position of the American Museum of Natural History Planetarium Authority at June 30, 1980 and 1979 and the results of its operations for the years then ended, in conformity with generally accepted accounting principles applied on a consistent basis.



1251 Avenue of the Americas
New York, New York 10020
October 9, 1980

American Museum of Natural History Planetarium Authority Balance Sheets, June 30, 1980 and 1979

ASSETS:

Cash
Short-term investments
Accounts receivable
Planetarium Shop inventory

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

Less, Allowance for depreciation (Note 6)

Furniture, fixtures and equipment

Buildings, at cost

LIABILITIES:

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

CONTRIBUTED CAPITAL and FUNDS:

Contributed capital:
Charles Hayden
Charles Hayden Foundation
The Perkin Fund

Funds:
Unrestricted fund (deficit)
Restricted funds

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

Statements of Income and Expenses for the years ended June 30, 1980 and 1979

1980	1979
$ 62,314	$ 68,419
350,000	300,000
19,102	19,502
43,285	33,823
474,701	421,744
221,928	221,928
307,668	307,668
529,596	529,596
(230,455)	(179,689)
299,141	349,907
1	1
299,142	349,908
1,019,210	1,019,210
$1,793,053	$1,790,862
1980	**1979**
$ 160,562	$ 202,115
83,940	81,511
570,000	570,000
315,450	315,450
1,129,952	1,169,076
156,869	156,869
429,455	429,455
400,000	400,000
986,324	986,324
(763,962)	(757,676)
440,739	393,138
663,101	621,786
$1,793,053	$1,790,862

	1980	1979
Income:		
Admission fees, less allowances and commissions	$665,853	$622,178
Auxiliary activity, sales booth	134,885	133,346
Special lectures and courses	43,375	36,513
Other income and grants	42,037	39,173
Total income	886,150	831,210
Expenses:		
Preparation, presentation and promotional	411,825	394,993
Operation and maintenance	193,443	191,835
Auxiliary activity, sales booth	117,169	107,125
Administrative and general	56,225	55,232
Pension and other social benefits (Note 3)	77,018	73,732
Total expenses	855,680	822,917
Income before interest and depreciation	30,470	8,293
Interest on past due 4½% Refunding Serial Revenue bonds	(25,650)	(25,650)
Provision for depreciation	(50,765)	(50,765)
Loss from operations before support grant	(45,945)	(68,122)
Support grant (Note 5)		25,000
Net loss	($ 45,945)	($ 43,122)

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

Statements of Changes in Fund Balances for the years ended June 30, 1980 and 1979

	Unrestricted Fund		Restricted Funds	
	1980	**1979**	**1980**	**1979**
Balance (deficit), beginning of year	($757,676)	($754,213)	$393,138	$441,356
Additions:				
Contributions			20,500	14,250
Proceeds from special presentations (Note 2)			140,935	140,374
Income from investments			39,056	30,121
Expenditures:				
Special purpose programs and projects			(13,293)	(36,064)
Special presentation expenses (Note 2)			(99,938)	(157,240)
Transfers between funds (Note 6)	39,659	39,659	(39,659)	(39,659)
Net loss, as annexed	(45,945)	(43,122)		
Balance (deficit), end of year	($763,962)	($757,676)	$440,739	$393,138

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

Statement of Significant Accounting Policies

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

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

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

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

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

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

Notes to Financial Statements

1. The Planetarium Authority bonds were purchased by the American Museum of Natural History ("Museum") in 1948. The Charles Hayden Foundation contributed $200,000 to the Museum toward the purchase of such bonds.
2. The Board of Trustees of the Planetarium has designated that the net income from special presentations be set aside in a board-designated restricted fund to finance current and future improvements and renovations.
3. Pension expense for fiscal 1980 and 1979 was $33,098 and $30,641, respectively.
4. The Planetarium receives certain services, including accounting and maintenance services, from the Museum. The aggregate charges for such services in fiscal 1980 and 1979 aggregated $82,331 and $89,359, respectively.
5. A grant was received from the Institute of Museum Services in fiscal 1979 for the purpose of funding the operating deficit.
6. 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.
7. Certain amounts in the fiscal 1979 statements have been reclassified to conform with the fiscal 1980 presentation.

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Charles DeBoer—five gems
Joseph DiMauro—107 pieces of African sculpture and artifacts
Cyril F. dos Passos—butterfly collection numbering 65,382 specimens and 617 slides
Samuel J. Foosaner—five items from the Jay Barbee space memorabilia collection
Fred Gardner—29 crystallized minerals
Charles Gradante—22 crystallized minerals
Arthur Grant—faceted deep red cubic-zirconia, weighing 13.60 carats
Tom Hall—33 crystallized minerals
G. H. Hawks—crystallized ferberite and a faceted danburite (15.85 carats, unusual pentagonal cut)
Richard Heck—corundum variety sapphire and a matrix specimen containing 10 morganite crystals with associated crystals of tourmaline and spodumene resting on quartz crystals
Estate of Bernard Heineman, Sr.—4,294 insect specimens from various parts of the world

This photograph of the late Carl Akeley, filming a Lion Spear Dance in Kenya, is one of 1,000 Akeley photographs donated to the Museum by the Thames Science Center in New London, Conn. Akeley, a taxidermist, inventor and explorer, revolutionized the mounting of animals and the re-creating of the animals' natural settings for Museum display.

David H. Kistner—1,840 specimens of Aleocharinae, Staphylinidae and Coleoptera
Lawrence Klosk—10 cabinets
Mabel C. Lamb—27 crystallized mineral specimens
Frederick Landmann—29 Andean archaeological artifacts
Ken Larson—Carl Akeley photograph albums containing 1,000 photographs
Shiro Matsunaga—46 crystallized mineral specimens
Mr. & Mrs. Dwight C. Minton—diamond octahedron in kimberlite from South Africa
Walter Mosmann—a beryl cat's eye and two calcites weighing 63.7 carats
Newmont Mining Corporation—an azurite crystal group from Tsumeb, Namibia and a crystallized gold specimen from the Empire –Star Mines, Grass Valley California
Dr. John T. Polhemus- –two gifts of Hemiptera specimens, collectively numbering 1,697 specimens
Isaac Putterman—13 minerals
Arthur A. Rasch—a 6.28 carat willemite from Franklin, New Jersey
Julian Reasenberg—148 mineral specimens
Norman V. Rothwell—23 crystallized minerals
Randall T. Schuh—665 Hemiptera specimens
Randall T. Schuh & Janet Crane—7,532 insect specimens from Brazil, Costa Rica, and Peru
Alice Bradley Sheldon—115 ethnological specimens, primarily from Africa, collected by Herbert Bradley and Mary Hastings Bradley
Dr. Herbert F. Weiss and Dr. Philippa Strum—a Cameroon grasslands statue

Gifts and Bequests

Bequests and other deferred giving programs are means by which donors may strengthen the Museum's future. For information contact the office of the Vice President.