At the National Museum of Natural History, our mission is to help people better understand the natural world and their place in it.

In calendar year 2000, the National Museum of Natural History was the most visited museum in the world with 9.5 million visitors – 50% more than in 1998. This extraordinary increase is the result of a burst of creativity on the part of our staff:

- We created blockbuster temporary exhibitions. Our most heralded attraction in 2000 – *Vikings: The North Atlantic Saga* – premiered to international acclaim. *Buccellati: Art in Gold, Silver and Gems*, the *Dresden Green Diamond* and *Forces of Change* were also immensely popular.

- We have restored an old favorite. In fiscal year 2000, the revitalized *Kenneth E. Behring Family Rotunda* debuted with the well-loved African elephant in a new, more realistic and educational setting.

- We opened a major new permanent exhibition – *African Voices* – which is the largest cultural hall in the Smithsonian and utilizes state-of-the-art multimedia presentations and objects from our collections to explore the cultural richness of the continent and its peoples.

- And recently renovated and new facilities – such as the Geology, Gem and Minerals Hall, the Discovery Center, the Johnson IMAX® Theater, the Atrium Café and the shops – all add to the experience of visitors to our Museum.

The combination of the Museum’s field and collections-based research – provided by more than 300 scientists and technical staff – is essential to understanding some of today’s most important issues. The cover story of this Annual Report focuses on biodiversity studies and the Museum’s role in this crucial research. In other areas of research, Museum scientists are working around the globe – from Washington, D.C., to the Galapagos Islands, Iran and China – and their efforts are described in the research highlights.

During the year, we continued to promote science education in our schools and science literacy among all citizens. We delivered learning opportunities to Americans where they live with traveling exhibitions, electronic outreach, and affiliations with other museums and corporate partnerships. You will find more on these initiatives in this Annual Report.

At the Smithsonian’s National Museum of Natural History, planning the evolution of the Museum involves both respecting tradition and seizing new opportunities. It’s a promising time and we invite you to join in sharing the excitement.

*Facing page: The Kenneth E. Behring Family Rotunda*
“Biodiversity” is shorthand for the variety of all living things on Earth, but the concept is even more broad and all-encompassing. Genetic variation within species, interrelationships between species and their geographic dispersion, links between local and global ecosystems – and how these factors change over time – are all part of understanding biodiversity and sustaining the health of the planet.

The Museum is deeply involved in studying all aspects of biodiversity, and this research – often involving collaboration with other scientists, organizations and governments – takes many forms:

▲ Identifying species and understanding their ecosystems, even as plants and animals disappear from the Earth at an unprecedented rate.

▲ Working with governments around the world to identify areas of high biodiversity for protection, and developing statistical models to predict species diversity for more informed conservation decisions.

▲ Centralizing data on the Museum’s biological collections for a global and long-term view of biodiversity, and to make this information available on the Internet.

▲ Training the next generation of scientists to document and protect our natural resources.

Systematics, which brings together our knowledge of the classification and evolution of organisms, is at the heart of the Museum’s biodiversity studies. Of the 124 million specimens in the Museum’s collections, 80 million are biological. These collections, coupled with the broad expertise of its scientists, make the Museum home to the largest natural history collection – and the greatest accumulation of biodiversity information – in the world.

“Through our research and collections activities in biology, along with our partner agencies, the Museum provides much of the systematics and information that fuel biodiversity research and management around the world.”

– Dr. Scott Miller, chair of the Department of Systematic Biology
In the Guianas of South America, huge flocks of macaws fly overhead, pig-like peccaries run in herds, and curious jaguars follow researchers in the field because they have never seen a human.

Unlike other areas of South America, 70% of the natural habitats of the Guianas region — Guyana, Surinam and French Guiana — remain pristine. These areas, however, are threatened by cattle ranching, increased logging and mining, and Amerindian practices of hunting and vegetation burning.

The Museum conducts expeditions throughout the region. For example, Museum scientists are working with the government of Guyana to identify areas of high biodiversity to be set aside as protected areas. More than 90% of Guyana’s small human population lives along the coast, leaving vast expanses of untouched rain forest and savanna inland.

“Thanks to the efforts of the Museum and our collaborators, Guyana has gone from one of the least-known countries in South America to one of the best known in terms of biodiversity,” says Dr. Vicki Funk, botany curator and director of the Museum’s Biological Diversity of the Guianas Program.
On the island of Carrie Bow Cay off southern Belize, the Museum’s research headquarters for coral reef studies sits atop the second largest barrier reef in the world. In 2000, more than 50 Smithsonian and cooperating scientists conducted biodiversity research at the Carrie Bow Marine Field Station through the Museum’s Caribbean Coral Reef Ecosystems program (CCRE).

According to Dr. Klaus Ruetzler, a Museum invertebrate zoologist and one of the founders of the station, “We chose to study one of the most diverse and least pressured reef ecosystems in the Americas. We can be fairer judges of cause and effect of environmental stress if we know how reef communities ideally develop and stay balanced.”

The Pelican Cays, a reef/mangrove island archipelago just south of Carrie Bow Cay, is a site of great biodiversity. The CCRE program built a database to describe habitats and organisms, including new species, and has recommended that the government of Belize add the Pelican Cays to a proposed marine reserve.

Scientists at the station are studying damage caused by Hurricane Mitch in 1997, as well as the impact of climate change, including massive areas of coral bleaching and death, and the possibly irreversible takeover of the dead reefs by certain species of sponges. This type of long-term study of a single area is critical to understanding environmental change and trends over time, and demonstrates one of the ways the Museum is uniquely positioned to contribute to worldwide knowledge of ecosystems.
Through the Museum’s Neotropical Lowlands Research Program, scientists are investigating the incredible diversity of beetles found in Latin American rain forest canopies, cataloging previously unknown species of spiders, and studying a type of fish that exhibits the rare behavior of fertilizing eggs inside its body. Some in the program are investigating plants with economic significance such as fruit, timber, caffeine and ornamental plants.

Similar to the Biological Diversity of the Guianas program, Museum scientists are working with Latin American colleagues to determine unique geographic areas for protection in order to maximize preservation of biodiversity. “As foreigners, we can’t rush in and tell a country how to develop its resources,” explains Dr. Richard Vari, Museum curator of fishes and a principal investigator, “but we are trying to provide reliable information to help them make the best decisions.”

By studying ancient coral reefs like this one in Papua New Guinea, paleobiology curator Dr. John Pandolfi has determined that coral communities are characterized by the same species, in the same relative proportions, in reefs over time. This may indicate close ecological links among reef species.

Neotropical Lowlands Research Program

The Brazilian Prochilodus bevis, subject of a collaborative research project with the Universidade de São Paulo, is a member of the most commercially important group of freshwater fish in South America. Hertz Santos of the Universidade de São Paulo collects specimens during a joint expedition to eastern Brazil.
Museum biological collections document more than 150 years of the history of the world's plant and animal populations, and provide a continuous record of changes in biodiversity. The Museum currently holds approximately 80 million specimens of plants and animals, and each year the collections grow by one to two percent. The additions document little-known places, changes in areas of prime conservation concern, and the human impact on habitats throughout the world.

In 2000, Museum collections saw vast use on-site and through loans around the world. To expand the use of the collections, the Museum is creating an electronic catalog that will consolidate a wide range of data currently held in such disparate places as ledgers, card files, specimen labels, field notebooks and databases. The catalog will synthesize the Museum’s projects into a global view of biodiversity that facilitates research in exciting new ways and allows dissemination of this knowledge more effectively through the Web.

THE IMPORTANCE OF IDENTIFICATION
In an example of the importance of biological collections, the Museum is frequently called upon by management agencies in the U.S. government and abroad to identify invasive species that can disrupt the balance of local ecosystems.

For example, in the past year U.S. Department of Agriculture scientists used the Museum’s collections to identify 30,000 insect specimens and found that many were potentially invasive species. One of these recently identified specimens is the Asian Long Horned Beetle, a significant pest on street trees in the northeastern United States that could spread to devastate entire forests. Scientists at the Walter Reed Biosystematics Unit are also using Museum collections to study the mosquitoes that are vectors of the West Nile Virus currently expanding throughout the northeastern United States.

PROVIDING CLUES TO CHANGE
Museum historical collections also provide a reference base for field research, such as the investigation into the unprecedented worldwide decline of amphibian populations. Amphibians can be a bellwether of environmental change, often responding more quickly than other species to climate change, habitat modification, new diseases and other stresses. Historical collections of specimens can be used to help identify these shifts. For example, the chytrid fungus, a newly discovered pathogen, was not evident in Museum specimens of tree frogs collected before the sweeping population declines.

CONSERVATION BY THE NUMBERS
In another demonstration of the value of collections, the Museum has helped develop a computer model that uses data on a region’s well-known species to predict the overall variety of species and their distribution in the region, including that of unknown or little-known groups.

In remote areas with a great variety of animals and plants, it is virtually certain there are many species yet to be discovered, but because many species are rapidly becoming extinct, there is little time in which to describe them. This statistical model will be invaluable in helping governments and other organizations predict the biodiversity of various regions and thus make more informed and timely conservation decisions.
For many years, more than 25 Museum-based entomologists – staff of the Museum and the U.S. Department of Agriculture – have collaborated in biodiversity studies in Costa Rica. These efforts bring together the resources of the Museum’s large historical collections with the collection and identification of new specimens, staff research, collaborative exploration, conservation and training.

One outcome of this work is an online database of moth species coordinated by Museum research associate Dr. Daniel Janzen. Scientists collect caterpillars in the wild on their food plants and raise them to adulthood, thereby obtaining a documented specimen of the adult moth along with information on the immature caterpillar stage, food preferences, environment and parasites. The Museum’s collections and the expertise of its scientists have been integral to the identification process. The database currently includes 120,000 rearing records and continues to grow as a team of researchers input data for further analysis.

The database supplies the raw material for research at the Museum and elsewhere, including several National Science Foundation projects, and is an important part of the project’s integrated approach to conservation.

As an international center of excellence for training in systematic biology, the Museum participates in the National Science Foundation’s Partnerships for Enhancing Expertise in Taxonomy (PEET). PEET encourages training in taxonomy – plant and animal classification – and facilitates the creation of broadly accessible sources of existing information, such as electronic databases.

Seven of the prestigious PEET grant awards, which fund research on groups of poorly known organisms, are hosted at the Museum. In March 2000, the Museum was the site of the bi-annual PEET workshop and a post-meeting program that educated participants on use of the Museum’s collections.

According to Museum invertebrate zoologist Dr. Stephen Cairns, who recently received a PEET grant, “The PEET program mirrors and enhances the Museum’s mission and its historic strengths while incorporating a vital component of formal and informal training for both graduate and undergraduate students.”
One thousand years ago, Viking warriors were infamous for their plunder of villages and monasteries in the British Isles and Europe. Yet this is a small piece of their story.

They were also master craftsmen, shrewd businessmen and fearless explorers. Their activities stimulated political changes in Europe and Russia, created a lasting society in Iceland and a shorter-lived one in Greenland, and led to the discovery of North America 500 years before Columbus.

The Museum’s groundbreaking exhibition – Vikings: The North Atlantic Saga – uses the research of an international group of scientists, along with more than 300 artifacts, to present the rich history and culture of the medieval Norse people and their remarkable expansion across the North Atlantic.

FROM PLUNDER AND PILLAGE TO TRADE AND SETTLEMENT
The first recorded Viking raid – widely held as the beginning of the “Viking Age” – was the killing and plunder at Lindisfarne Priory in northeastern England in A.D. 793. The attack is illustrated in the oldest piece in the exhibition – the Lindisfarne Stone, circa 832.

Over a period of 200 to 300 years, Vikings conducted widespread raids on locations in England, Ireland, Scotland, France, and even Kiev and Constantinople. Intense political rivalry among Viking chieftains demanded the constant influx of precious goods, as successful leaders gave these items to their followers in exchange for loyalty. The exhibition contains one of the most famous pieces of Viking loot – Ranvaig’s Casket – from the Danish National Museum.

What started as opportunistic raids on remote, undefended monasteries evolved into the establishment of an extensive Viking trade network and settlement of the British Isles. Heading westward across the North Sea, Vikings landed in Britain, Ireland and Scotland. In the less populated northern regions of Scotland – the Hebrides, the Isle of Man, the Orkney and Shetland Islands – Vikings took land and became farmers, settling huge areas and intermingling with the local populations.

As Scandinavia and northern Europe were beginning to evolve from scattered settlements into medieval kingdoms, the Norsemen continued to migrate westward across the North Atlantic, discovering and settling new lands in the Faeroe Islands (A.D. 860), Iceland (982) and Northeastern North America (1000), which they called “Vinland the Good.”

VIOLENT DEEDS, VAST ACHIEVEMENTS
Vikings took the world by storm and then stayed to trade and settle. The Viking Age, when seafaring bandits and barterers sought fortune in Europe and the Near East, lasted only about 300 years. By A.D. 1100, most Vikings had populated new lands in the North Atlantic, taken up farming and trading, and adopted Christianity.

- Vikings plunder Lindisfarne monastery in northeast England – the first major documented raid.
- Vikings establish Dublin as a trade and military base, and harass France, Spain and the British Isles for several centuries.
- Vikings settle in the Faeroe Islands.
- Vikings rapidly settle all of the best land in Iceland.
- Icelanders establish a national assembly, the Althing – Europe’s first parliament.

- 793
- 841
- 860s
- ca. 874-930
- 930
THE GREENLAND SETTLEMENTS REVEAL NORSE LIFE

Most of Greenland is frigid arctic tundra, but around A.D. 985, Erik the Red discovered two areas that were suitable for farming. According to the sagas, he called this land Greenland since “people would be attracted there if it had a favorable name,” and the resulting colonies flourished for more than 400 years. Then, only a few decades before Columbus arrived in America, they disappeared.

Archeological finds from two settlements in Greenland, coupled with complex scientific analysis of human and animal remains, artifacts, soil and environmental data, have revealed a wealth of new information about these Norse societies:

▲ Radiocarbon dating tells us they occupied the two settlements in southwestern Greenland from the late 900s to at least the mid-1300s.

▲ It has been estimated that the population peaked at about 2,500 in the settlements. Based on analysis of skeletons and teeth in gravesites, these people were mostly hardy and healthy.

▲ They kept horses, cattle, sheep and goats for domestic production of milk and wool.

▲ They ate wild animals such as caribou, and later more marine animals like walrus, seals and fish.

▲ While their agricultural practices denuded the grasslands and scrub forests of the region, they tried to recoup these losses through manure-based fertilization and irrigation.

▲ From textile and metallurgical analyses, we learn that they wove cloth, built complex homesites and furnished impressive churches.

▲ Greenland Norse converted to Christianity about A.D. 1015, as revealed through oral histories, dated archeological finds of crosses, a small church circa 1000 and the adoption of Christian burial habits.

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VIKINGS DISCOVER NORTH AMERICA LONG BEFORE COLUMBUS

Excerpts from The Saga of Erik the Red and The Saga of the Greenlanders contain reports of the first European discovery of North America. These 13th- and 14th-century documents, hand-written on vellum, transcribe the rich oral histories of events passed down from hundreds of years earlier.

Leif Eriksson, son of Erik the Red who colonized Greenland, sailed off in the year A.D. 1000 to investigate wooded lands sighted by Bjarni Herjolfsson some years before. Leif and his men landed on and named three lands. Helluland, meaning “flat slab land,” is believed to be Baffin Island and Northern Labrador. Markland, “forest land,” is considered to be Southern Labrador and perhaps Newfoundland. Vinland, or “wine land,” is thought to be the region surrounding the Gulf of St. Lawrence.

Historic documents and archeological discoveries suggest that Helluland and Markland were visited by the Norse Greenlanders well into the 14th century.

In far northeastern Newfoundland, Leif Eriksson’s party of three ships established an elaborate year-round homebase near present-day L’Anse aux Meadows, which corresponds well to descriptions in the Old Norse sagas. The site was discovered in 1960 by Norwegian writer and explorer Helge Ingstad. Overcoming initial skepticism, he and his archeologist wife, Anne Stine Ingstad, spent the next decade excavating the site.

Excavations of L’Anse aux Meadows revealed a number of Viking artifacts and documented wooden shipbuilding, weaving and iron working – activities that were not practiced by Native Americans until after A.D. 1500. The style and construction of the three longhouses and outbuildings are identical to those in 11th century Iceland and Greenland. The evidence amassed during the past few decades has now convinced scientists and scholars that L’Anse aux Meadows was the earliest European settlement yet known in North America and likely Leif Eriksson’s own North American encampment.

Masters of the Sea

In his raids, hunting and explorations, a key advantage for the medieval Norseman was the superiority of his ship. Well-preserved Viking ships (circa A.D. 900) excavated in Norway exhibit sophisticated manufacturing techniques and technology superior to that of their European neighbors.

The hulls of Norse ships – made from large planks of wood fastened together with iron boat nails fashioned in simple forges – were much stronger than hulls of earlier craft made with thin planks lashed together. Researchers have also discovered thousand-year-old fragments of sails woven from the long, lanolin-rich wool of Norse sheep. Sailing ships – quieter, more maneuverable and easier on the crews than rowing vessels – gave the Vikings an important advantage over their seafaring neighbors without sails.

It is remarkable that the Vikings managed to navigate across the North Atlantic without compasses or other navigational aids. They used only the stars, the height of the sun at noon, and their knowledge of the movements of birds, patterns of winds and waves and other natural clues.

In the summer of 2000, the Islendingur (Icelander) replica Viking ship retraced the route of Leif Eriksson from Iceland to North America.
from a Thule Inuit site on Baffin Island just south of the Arctic Circle. But there is scientific disagreement on whether these widespread artifacts represent far-flung and frequent Norse explorations, a single expedition or perhaps wide trading of Norse artifacts among indigenous peoples.

THE RESEARCH CONTINUES
The Museum’s exhibition brought together a broad body of scientific research – the study of ice cores, human and animal parasites, linguistics, DNA, pollen, literary analysis, metallurgy, cartography, textile sampling, shipbuilding and numismatics – and a remarkable new picture of Norse life and explorations has emerged. Many unanswered questions remain, but ongoing research will continue to deepen our understanding of the Norse, their culture and their intrepid expansion across the North Atlantic.

ROYAL PRAISE FOR THE VIKINGS EXHIBITION
On April 27, 2000, royalty and heads of state gathered at the Museum to celebrate the opening of Vikings: The North Atlantic Saga, which commemorates the 1,000-year anniversary of Leif Eriksson’s arrival in North America. Honored guests (pictured at right) included H.M. King Harald V and H.M. Queen Sonja of Norway, the Crown Princess of Sweden Victoria, H.R.H. Prince Joachim of Denmark, Finland’s President Tarja Halonen and Iceland’s President Olafur Grimsson. Another special guest was Norwegian explorer Helge Ingstad (100), who with his late wife, Anne Stine Ingstad, discovered and excavated L’Anse aux Meadows, the only known Viking site on the North American mainland. This appearance marked Ingstad’s last trip abroad before his death.

Historical, archeological and environmental research has increased our understanding of the Vikings’ remarkable territorial expansion. The $3.5 million, 5,500-square-foot exhibition featured precious artifacts from the Viking homelands in Scandinavia and objects from Viking explorations and settlements. After closing at the Museum, the traveling exhibition embarked on a three-year tour of North America. In addition to the exhibition, Vikings also features an extensive catalog, a website (www.mnh.si.edu/vikings), a television documentary and educational programming.

Vikings was supported by the Nordic Council of Ministers, Volvo Group North America, Inc., and Volvo Cars of North America, Inc. and produced in partnership with the White House Millennium Council.
A natural history museum is a living institution – powered by the ideas and dreams of many people – and presents ever-changing perceptions of our physical world. The National Museum of Natural History is constantly evolving in its physical spaces, exhibitions, collections and scientific research.

The EVOLVING MUSEUM

The rotunda of the Museum – one of the grandest rooms in America – and the elephant at its center have greeted millions of visitors over the years. During 1999, we renovated both. The Kenneth E. Behring Family Rotunda honors the generous donor who made the renovations possible.

Since 1959, the Museum’s four-story rotunda has been the home to the largest mounted animal in the world – an African elephant standing 13’ 2” at the shoulder. “Since its installation, the elephant had stood on a raised oval platform in the center of the rotunda,” says Museum Director Robert W. Fri. “Now, for the first time, the natural ecological habitat of an African elephant living in Angola has been incorporated into the diorama.” Authentic grasses from Africa, actual sand with animal footprints, a mix of real and model insects, and even realistic dung piles are included. A white-backed vulture with a seven-foot wing span soars above the diorama.

A new information desk welcomes and orients visitors – nearly 9.5 million in 2000 – and the renovated rotunda now serves as a proper portal to the world’s most visited museum.
**African Voices**, a new permanent multimedia exhibition that opened in December 1999, explores the peoples, cultures and history of the African continent. "African Voices uses a new model for the development of cultural halls – one based upon close collaboration with the communities represented," according to Museum Director Robert W. Fri.

The 6,500-square-foot exhibition, the largest cultural hall in the Smithsonian, examines the diversity and global influence of Africa's peoples and cultures over time in the realms of family, work, community and the interaction with the natural environment. "African Voices celebrates Africa as a historic and living entity with contemporary and future relevance," says exhibition lead curator Dr. Mary Jo Arnoldi.

"The exhibition demonstrates how African cultures have spread worldwide and become an integral part of American life," adds co-curator Dr. Michael Atwood Mason. "It encourages people to look beyond the existing stereotypes and assumptions about Africans."

African stories are told through more than 400 objects from the Museum's collection as well as photographs, film, video interactives and sound stations. The voices of African people are central to the exhibition, and each story comes to life through cultural proverbs, poetry, songs and commentary from historical and living persons.

The Museum's $5.5 million ongoing African Voices Project also includes changing exhibitions, an electronic resource center, a website, and local and national educational programs.

In the six-year development of African Voices, the Museum has benefited from the generosity and cooperation of individuals, institutions and communities throughout the United States and abroad, including Brazil, Mali, Ghana, Nigeria, Kenya, Malawi, Tanzania, Egypt and South Africa. The Museum thanks the Shell Oil Company Foundation for its significant financial leadership in supporting African Voices, and the Coca-Cola Foundation and Sappi Limited for their additional support.

"**Having the people of Africa speak to the Smithsonian’s international audience will help contribute to a framework for global understanding.**"

– United Nations Secretary-General Kofi A. Annan
The return of Ishi’s remains to the tribe of his ancestors focused public attention on the Museum’s Repatriation Program, its changing relationship with collections of human remains and its increasing collaboration with the cultures it studies.

Ishi, commonly thought to be the last Yahi-Yana Indian, emerged from the woods of remote Butte County, California, in 1911. He was starving and near death. Ishi came to the attention of Dr. Alfred Kroeber of the University of California-San Francisco anthropology department and was taken there to live. Called the “Last Wild Man in North America,” Ishi gave demonstrations of arrow making and fire building for visitors and helped researchers document the Yahi language.

Ishi died of tuberculosis in 1916. His body was cremated but his brain was removed and preserved, and Kroeber donated it to the Smithsonian. Although there is no record of any research ever being done on Ishi’s brain, it remained in the Museum’s collections for 85 years.

In 1999, the Museum’s Repatriation Office received a request for the return of Ishi’s brain so it could be reunited with the cremated body. In some Native American beliefs, the soul cannot be at rest until the body is cremated whole and placed in its homeland. Following consultations with northern California Native Americans, the Museum returned the human remains of Ishi in August 2000 to the Yana people, to whom he is closely related.

In returning Ishi’s remains, the Smithsonian followed both the letter and spirit of the law. The Native American Graves Protection and Repatriation Act of 1990 embodies the moral principle that Native Americans and Native Hawaiians have the right to determine the destiny of their ancestral remains, sacred objects, funerary offerings and cultural patrimonial objects conserved in museums throughout the United States. At the Smithsonian, repatriation is a collaborative process, in which both Museum staff and Native peoples become involved in determining the future of human remains and cultural objects.

The Museum’s Repatriation Program is a model in this field, the largest and most active program of its type. More than 3,000 human remains and nearly 1,000 cultural objects have been repatriated by the Museum. According to Museum Director Robert W. Fri, “Cooperative relations founded upon the repatriation effort promise to strengthen the Native voice and perspective at the Smithsonian and have positively changed the way we work with the people whose history and culture we document.”
The Museum's Triceratops has been the subject of intensive conservation, measurement, scientific interpretation and computer analysis for the last two years. Soon scientists will be able to exhibit a newly mounted Triceratops that is anatomically accurate and, for the first time, model its movements to better understand its behavior.

“We’re beginning to reconstruct dinosaurs in a more realistic way than before,” says Dr. Richard Benson, senior scientist and chair of the Department of Paleobiology.

In 1905, the Museum displayed the world's first Triceratops mount, a composite of at least ten animals of different sizes from different places. Early in 1999, it became necessary to disassemble the Triceratops for cleaning and massive conservation measures. Scientists from the Museum's Department of Paleobiology and Applied Morphometrics Laboratory seized this opportunity to use advances in technology and in scientific interpretation to preserve the fossils, correct shortcomings in the old mount and explore new ideas about Triceratops.

Ralph E. Chapman, head of the Museum's Applied Morphometrics Laboratory, worked with Scansite 3-D Services, Steinbichler and Virtual Services Inc., all of whom contributed their time, talent and technology. After first scanning the bones, they built virtual models of each individual bone, which were then composed into a three-dimensional skeleton and used to create a 1/6 scale model of Triceratops.

The computerized data of Triceratops contain a wealth of information, which researchers are only beginning to access and interpret. “Ninety-nine percent of the biomechanics of dinosaurs have yet to be worked out,” notes Chapman. “With the digital Triceratops, we can see how he worked as an animal.”

After conservation steps were taken to preserve the real Triceratops bones, molds and casts were made to create a replacement mount of the skeleton. A bigger skull was needed for the mount, so the solid imaging laboratory of Shared Replicators, in cooperation with Tulsa Technology Center, used the scan data and stereolithography to produce a skull – 15% larger than the original – in lightweight plastic material. The newly created Triceratops skull was transported from Tulsa to Washington, D.C., thanks to the efforts of Evergreen International Airlines, Inc.

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Casts of the corrected bones are being reunited with the casts of the remaining bones to yield an up-to-date model of *Triceratops*, which will be unveiled during 2001. An animated version of the digital dinosaur will also be a part of the new exhibition.

The Paleobiology Department hopes to apply similar methods to conserve and animate the rest of its dinosaurs. “It’s a continuing project,” says Benson. “*Triceratops* is a showpiece for the things to follow.”

The Museum holds more than 124 million biological, geological and ethnographic objects and specimens. Caring for them all is a monumental task. The collections are as varied as fluid-filled jars of fishes, pressed plants, dinosaur bones, historic photographs and large-scale objects, such as canoes. In 2000, almost 1,600 people used the Museum’s holdings for research, and nearly 1,700 loans—representing 170,000 specimens—were made. Thorough and accurate information about each collection’s preservation status is critical to ensuring its continued use for scientific work and public display.

Developed by Museum staff, a new Collections Profiling Project is designed to assess the collections via six specific measures of “health.” The profile establishes a quantifiable baseline against which changes in condition can be measured and yields practical information to determine short-term and long-term collections management goals.

“The Museum’s Collections Profiling Project has attracted considerable interest in the natural history community,” acknowledges collections officer Sally Shelton, “as few such profiling tools currently exist at this scale anywhere.” The new process has been shared with other collections-holding institutions and is being adopted around the world.

Why do scientists collect specimens of living things?

The more than 124 million biological, geological and anthropological objects and specimens in the Museum’s collections comprise the largest and most comprehensive natural history “reference library” in the world. Scientists collect biological specimens to provide a comparative database of the living world and a baseline against which to measure future changes.

The similarities and differences between a new biological specimen and those already in the collection can add to our knowledge of changes in a species or its environment, location or behavior. Collections are also necessary to determine if an organism is unique, and therefore possibly represents a species new to science. Conversely, if a known species is not seen in field locations for a lengthy period of time, scientists may suspect that it is in decline or threatened with extinction.

Scientists and scholars around the globe use the Museum’s holdings for their research. With advances in technology and new scientific theories, ongoing research using the collections contributes to the worldwide body of natural history knowledge. The value of this research underscores the importance of augmenting and maintaining the Museum’s extensive holdings.
**Research HIGHLIGHTS**

**Global Warming a Factor for Early Blooming**

Washington, D.C.’s famous cherry trees, along with many other flowering plants, are blooming an average of seven days earlier than 30 years ago. According to Museum scientists, global warming seems to be the explanation.

In March 2000, the Museum released the results of a 30-year study of flowering plant species common in the Washington metropolitan area. The study, conducted by the Museum’s Department of Botany, indicated that rising minimum temperatures are producing earlier flowering in 89 of the 100 common plant species investigated. On average, flowering plants blossomed 4.5 days earlier in 2000 than in 1970.

“This trend of earlier flowering is consistent with what we know about the effects of global warming,” says Dr. Stanwyn Shetler, a Museum botanist who conducted the study with Dr. Mones Abu-Asab, Dr. Paul Peterson and Sylvia Stone Orli. “Based on our findings, we can expect a gradually expanding growing season. Over a long period, the species composition of our local flora could change.”

**Ancient Insect/Plant Relationship Persists through Time**

Museum researchers and their collaborators have turned back the geologic clock on the well-known herbivore/host interaction between beetles and the leaves of gingers, Heliconias, and their relatives in the Zingiberales order of flowering plants. Their work was published in the July 14, 2000, issue of Science.

In 1998, Dr. Conrad Labandeira and Dr. Peter Wilf of the Museum’s Department of Paleobiology were examining early Eocene fossils from Wyoming when they discovered unusual feeding marks on a fossilized ginger plant. They ultimately determined that damage from hispine beetles on modern Zingiberales is similar to the distinctive marks on the fossil specimens. This finding confirmed that hispine beetles in general, and rolled-leaf beetles in particular, existed 20 million years earlier than previously recorded. They co-existed with dinosaurs and outlived them, while never changing their diet of Zingiberales.

The scientists credit the discovery in part to exceptional interdisciplinary collaboration among paleobiologists, botanists, entomologists and tropical ecologists and the comprehensive research collections of the Museum. Museum scientists Dr. Conrad Labandeira, Dr. W. John Kress (Department of Botany), Dr. Charles L. Staines (Department of Entomology) and Ashley L. Allen (Department of Paleobiology) co-authored the paper with Dr. Donald M. Windsor (Smithsonian Tropical Research Institute), Dr. Kirk R. Johnson (Denver Museum of Natural History) and lead author Dr. Peter Wilf (now at the University of Michigan’s Department of Geological Sciences).
During 1998 and 1999, a team of Museum scientists spent fourteen weeks on a research and filming expedition in the Galapagos Islands, located in the eastern Pacific Ocean about 600 miles off the coast of Ecuador. The Museum’s 3D large format film, Galapagos, provides an extraordinary view of life on the islands made famous by Charles Darwin.

The first new species to be reported from the expedition is Anthias noeli, a brightly colored sea bass named in memory of Galapagos cameraman Noel Archambault, who died in an ultralight aircraft crash during filming. This sea bass is more closely related to certain sea basses of the Atlantic Ocean than to those in the Pacific.

Previously thought to be extremely rare, this urchin (Centrocidaris douderleini) was observed in great numbers in the Galapagos.

This sea star (Peribolaster cf. folliculatus), known to live more than 600 miles from the Galapagos off southern Chile, was observed and collected for the first time in the Galapagos during the expedition.

Wrasses are a conspicuous component of the coral reef fish fauna, but this new species was found on a sand bottom at about 400 feet. The newly discovered wrasse (Halichoeres new sp.) will be named in honor of Bill Raisner, the ultralight aircraft pilot who died during the filming of Galapagos.
This past year, Museum scientists Dr. Carole Baldwin, Dr. David Pawson and Dr. Jerry Harasewych studied samples collected during the expedition to investigate their scientific significance. They discovered numerous new species — including fishes, sea and sun stars, urchins and mollusks — and documented many species of marine life not previously known in the Galapagos Islands.

"Knowing that you’re looking at a species of life that occurs nowhere else on the planet is thrilling. I have never felt so confronted with the origin of new life as I feel here in the Galapagos," says Baldwin.

The study of anatomical characteristics of this half-meter catshark (*Bythaelurus* new sp.), with bright green eyes, will contribute to scientists’ knowledge of the catshark family tree.

This slow-moving pencil urchin (*Histocidaris* new sp.), found at 1,830 feet, uses its sharp teeth to scrape tiny organisms off the deep-sea rocks where it lives. Closely related fossil forms are as old as 350 million years.

Discovery of this new species of volute (*Adelomelon* new sp.) in the deep waters off Galapagos will help scientists determine the historical expansion of these predatory snails from the Southern Hemisphere to the Northern Hemisphere 25 to 40 million years ago.

Scientists collected eight new species of echinoderms, including this new species of sun star (*Coronaster* new sp.) found most often in rocky habitats.

Dr. Carole Baldwin examines specimens collected during the Galapagos expeditions.
For more than 50 years, scientists have been perplexed by an artifact missing from the archeological record of East Asia. Where were the large, two-sided, flaked stone tools so common in Africa beginning about 1.5 million years ago and in Europe from 500,000 years ago? Did they exist in East Asia, and if so, why hadn’t any been found?

A team of scientists from the United States and China has begun to unravel this mystery. Their project is co-directed by Dr. Rick Potts of the Museum’s Human Origins Program and Professor Huang Weiwen of the IVPP (Chinese Academy of Sciences) and includes Jennifer Clark, also of the Human Origins Program. As reported in the March 3, 2000, issue of *Science*, they have found the oldest known large cutting tools in South China, which resemble the handaxes of their African and Eurasian contemporaries.

Carefully shaped all-purpose handaxes were a major invention as early hominids refined their techniques for turning stone into technology. The making of handaxes required a more sophisticated understanding of a rock’s structure, knowing where suitable raw material could be found and learning how it could be worked into a tool by pounding and hammering – the remote beginnings of physics, geology and the sharing of highly complex visual information.

Potts and his colleagues analyzed 991 stone artifacts from 24 sites in the Bose Basin of South China. This collection, dated at 803,000 years ago, included 35 pear-shaped handaxes featuring two sharpened edges extending from a rounded base. According to Potts, “Until now, we believed such tool use in East Asia to be no more than 500,000 years old, whereas Africans were making sophisticated tools much earlier. Now we know that *Homo erectus* had common abilities and intelligence wherever they were.”

Ancient Axes Discovered in China
New Insights into the Origins of Animal Domestication

In the Zagros Mountains of western Iran and northeastern Iraq, the interaction between humans and goats changed dramatically around 10,000 years ago. New research by Dr. Melinda Zeder, curator of Old World archaeology & zooarchaeology, and Dr. Brian Hesse of the University of Alabama at Birmingham, shows that goats, which had been hunted in the region since the time of Neanderthals, were by this time being bred and herded instead. Their findings were reported in the March 24, 2000, issue of Science.

It was long thought that domesticated animals developed smaller bodies than their ancestors or wild contemporaries. Zeder discovered that sex, not domestication, is the single most important factor affecting body size. This finding, coupled with the ability to determine age at the time of death, provides a powerful means of establishing the timing of early animal domestication.

A hunter is more likely to target larger adult individuals (generally males) which return more meat for every kill. The herder, interested in promoting the productivity of the herd, is likely to kill males for food at young ages, allowing females and a few breeding males to survive much longer.

Zeder and Hesse were able to reconstruct the profile of animals slaughtered at the 10,000-year-old archeological site of Ganj Dareh, Iran, and found the distinctive signature of modern domestic herds — selective killing of young males and prolonged female survival.

By applying the Zeder and Hesse methods to domesticated animal species in other regions of the world, we may yet learn why humans who had been hunter-gatherers for more than one million years converted to a lifestyle of tilling the soil and herding animals. This lifestyle shift is one of the most fundamental changes in human history and marks the threshold of the modern era.
Asteroid Named for Stellar Museum Scientist

Of the 15,000 numbered asteroids, approximately one half are named, and only a few thousand of those are named after people. Asteroid 4259 McCoy – discovered by Dr. Bobby Bus at Cerro Tololo, Chile, in 1988 – was named for the Museum’s meteorite curator Dr. Tim McCoy on May 23, 2000, marking the fourth celestial body named for Smithsonian staff.

Asteroids and meteorites, which are pieces of asteroids, form from materials of the solar nebula – the cloud of gas and dust that produced the planets and sun of our solar system – and proceed through a complex process of heating and melting. Bus chose to honor McCoy for his research on the stages that meteorites undergo as they are transformed by radioactive heating.

McCoy is continuing his research into the structure of asteroids by participating in NASA’s Near Earth Asteroid Rendezvous (NEAR) mission. NEAR provided the first close-up study of the mineralogy, chemistry and structure of asteroid 433 Eros, the first near-Earth asteroid to be discovered and the second largest one known.

Handley Memorial Fund Preserves a 53-Year Legacy

A research fund has been established in memory of Dr. Charles O. Handley, Jr. (1924-2000). Handley, curator of mammals in the Museum’s Vertebrate Zoology Department, worked at the Smithsonian Institution for 53 years.

Handley published 188 papers and two books. He had a particular interest in bats and Latin American fauna. An inspiring teacher and mentor, he taught many courses in natural history over the years.

The Handley Memorial Fund will support research in mammalogy and tropical biology, Handley’s

main areas of expertise. In particular, the Handley Memorial Fund will support the research of Latin American students and the projects that Handley left unfinished when he died.

The Museum is still receiving contributions to the Charles O. Handley, Jr., Memorial Fund. Send your contribution to the address below or contact the Office of Development at 202.786.2387.

The Charles O. Handley, Jr., Memorial Fund
National Museum of Natural History
Attention: Development Office
10th Street & Constitution Avenue, NW
Washington, D.C. 20560-0135
Exhibition Highlights

Forces of Change: A New View of Nature

The book *Forces of Change: A New View of Nature*, released in June 2000, is the first-ever publishing collaboration between the Smithsonian Institution and the National Geographic Society. According to Museum Director Robert W. Fri, "*Forces of Change* represents the Smithsonian's commitment to better understanding our world, the changes that have brought us to this point and what we face at the start of the 21st century."

A different facet of Earth's present state and its expected future is explored by each of the 20 distinguished contributors — including John McPhee, Dr. Stephen Jay Gould and many others — through compelling essays and dramatic photography. Museum contributors include Director Robert W. Fri, Dr. Anna K. Behrensmeyer (Department of Paleobiology), Dr. Alan Cutler (Department of Paleobiology), Dr. William Kiene (Department of Paleobiology), Dr. Michael Mason (Department of Anthropology) and Dr. William Melson (Department of Mineral Sciences). Dr. Melinda Zeder (Department of Anthropology), Dr. Don Wilson (Department of Vertebrate Zoology) and Dr. William Melson served as science advisers.

The exhibition included 28 large-format photographs that represent the interplay between natural forces of change and human attempts to influence and understand the earth's powerful processes. From eruptions of Kilauea Volcano in Hawaii to glaciers in southern Iceland, the *Forces of Change* exhibition provided a dynamic visual journey through some of the Earth's most magnificent natural features.

The exhibition and book are part of the Museum's ongoing *Forces of Change* program, which will include traveling exhibitions, publications, interactive computer products and public programming. The *Forces of Change* Gallery on the Museum's second floor will feature rotating exhibitions dedicated to the themes of global change and human participation in it.

The Museum also mounted a companion photographic exhibition "Selections from *Forces of Change: A New View of Nature,*" which ran through October 2000.

In 2000, the Museum hosted the visiting show "In Place of Prairie." Award-winning photographer Terry Evans explored the beauty and diversity of the prairies of North and South Dakota, Kansas, Illinois and Canada, the people who settled them and their way of life.
Exhibition Highlights

Buccellati: Art in Gold, Silver and Gems

The Museum’s special exhibition *Buccellati: Art in Gold, Silver and Gems* featured the exquisite work of the House of Buccellati, the renowned Italian jewelry and design firm. The exhibition presented 75 objects of silver and jewelry dating from 1919 to the present. Running October 2000 through March 2001, it celebrated Buccellati’s stunning jeweled and precious metal masterworks and was a showcase of the finest in Italian craftsmanship. Previously unexhibited gems and minerals from the Museum’s collections enlarged the scope of the exhibition.

The innate character of the natural materials is the inspiration for Buccellati jewelry and tableware. Precious stones and metals, ivory, corals, pearls and other materials are brought together in unusual combinations. Materials are juxtaposed in soft tonalities and dramatic contrasts, reflections and tints. The House of Buccellati is renowned for developing a technique called texture engraving, now the most identifiable feature of its work.

The centerpiece of the exhibition was the Smithsonian Cup, a commemorative object created by Gianmaria Buccellati in honor of this exhibition. The newest masterwork features intricately engraved yellow, white and rose gold, silver, pearls and agate. The Buccellati family contributed this piece to the Museum, and it will be a permanent addition to the U.S. National Gem and Mineral Collection.
From October 2000 through January 2001, the Museum offered an unprecedented viewing of two of the world’s most famous diamonds: the Hope and the Dresden Green. Visitors were able to see the 41-carat Dresden alongside the 45.52-carat Hope in the Museum’s Harry Winston Gallery. The exhibition marked the first time the Dresden Green Diamond has left Germany since 1741.

“We were excited to present two of the world’s most beautiful and famous diamonds,” says Dr. Jeffrey Post, curator of the Museum’s National Gem and Mineral Collection. “Both diamonds are the extraordinary results of highly unusual earth processes. They were soul mates in their geological formation.”

The two diamonds share other similarities: both originated in India’s ancient Golconda Mines; both were cut in London; and both were once crown jewels. Discovered in the 1700s, the Dresden Green was owned by Friedrich Augustus II of Saxony and is assumed to have been a hat pin or shoulder ornament for the Saxony royal family.

New York jeweler Ronald Winston, whose father contributed the Hope Diamond to the Museum in 1958, made the exhibition possible through the generous support and assistance of the Harry Winston Research Foundation. The Green Vault, one of the first public museums in Europe, is the diamond’s permanent home in Germany.

WHAT CAUSES THE COLOR?

The Hope and Dresden Green Diamonds are unique largely because of their brilliant color. The Hope Diamond’s deep blue coloration is caused by trace amounts of the element boron in the stone. Diamonds with a natural green body color throughout – like the Dresden Green – are extremely rare. This phenomenon occurs when a diamond is exposed to a source of radioactivity during its formation. Radioactivity causes defects in the internal structure of the crystal that interact with light to produce the green color.
Smithsonian In Miami: Reaching Southeastern Educators

The Museum’s Affiliations Program was created to share its collections more widely and enhance relationships with communities throughout the nation. In one of the growing number of partnerships under this program, the Museum is working with the Miami Museum of Science on long-term artifact loans and curatorial and programmatic collaboration.

In fall 1999, the Miami Museum of Science mounted Smithsonian Expeditions: Exploring Latin America and the Caribbean, an exhibition about the Museum’s study and preservation of the natural history and cultures of the Americas over the past 150 years. Included are many artifacts that have never before been exhibited or have not been seen for nearly a century, including four large stone carvings from Nicaragua that were sent to the Smithsonian in 1849.

The Miami Museum of Science had also begun a four-day professional development institute designed to help university education professors in six southeastern states utilize technology more effectively to train future teachers. The marriage of this program with the Miami exhibition made sense to Dr. Jane Walsh, Museum anthropologist and lead curator. She says, “This is an interactive, immersive exhibition encompassing some of the earliest artifacts from our nation’s collection. It’s a perfect vehicle for ‘show and tell,’ which works quite well in the context of a teleconference.”

One full day of the institute is devoted to a teleconference, and in 2000, a virtual tour of Miami’s Smithsonian Expeditions exhibition was offered. Interacting live with Smithsonian curators, participants asked questions about what could be learned through the artifacts. In the process, the professors gained hands-on experience in utilizing museums in curricula, as well as ideas about using technology to amplify classroom work.

The Expeditions teleconferences have been one of the most popular components of the teacher institutes and the National Museum of Natural History will continue to build on them and develop other innovative methods to share its collections with people in other parts of the country.
For ten weeks each summer, young science students from around the world work alongside curators at the Museum in the Research Training Program. Dedicated to encouraging talented and highly motivated students to pursue natural history careers, this year’s program included 22 undergraduate participants—selected from nearly 300 applicants—from the United States, Colombia, Germany, Guyana and Malaysia.

The students, each guided by a Museum adviser, used the Museum’s vast resources to address important scientific questions, and then shared their findings in published articles or scientific presentations. Their diverse projects involved prehistoric birds in Hawaii, endangered trees in Malaysia and Borneo, the chemistry of Central American magma, assassin bugs in Ecuador and a little-known Algonquin language spoken by a small community in Wisconsin.

To celebrate the Research Training Program’s 20-year anniversary, Museum benefactor Alice Eve Kennington contributed $100,000 to establish the first endowed student position.

Program Director Mary Sangrey remarks, “It has been my privilege and pleasure to welcome these students to the Smithsonian community and then watch as their careers—and their lives—develop.”

WHERE ARE THEY NOW?

Since its beginning in 1980, more than 400 students have participated in the Research Training Program. Most have gone on to successful careers in the natural sciences.

Dr. Kate Jackson (1993), shown left with an anaconda she captured in Venezuela, recently earned her Ph.D. from Harvard by continuing her research on the morphology of snake venom delivery systems.

Dr. J. Phil Gibson (1987), shown right, now a professor of botany at Agnes Scott College, continues collaborating with his Research Training Program mentor, botany curator Dr. Vicki Funk.

Tsiti McPherson, a 2000 Research Training Program student from Guyana, studied moths from Chile and Argentina with her mentor, entomologist Dr. John Brown.
Outreach Highlights

Educational Opportunities Extended by the Web

Today, it is difficult to imagine life and learning before the Internet. The National Museum of Natural History has embraced the tremendous power of this technology and uses its Web presence to reach a variety of audiences across a broad range of disciplines.

Electronic Fieldtrips

Students from around the world engage in live, interactive electronic field trips to the Museum, where they have online and telephone conversations with expert scientists about the mysteries of the natural world.

- **A Gem of a Story** explores the Janet Annenberg Hooker Hall of Geology, Gems and Minerals, the single largest exhibition hall ever constructed by the Museum.

- **Messages from Outer Space** brings students to the Museum’s Moon, Meteorites and Solar System Gallery.

- **Stories Written in Stone** investigates volcanoes, earthquakes and plate tectonics.

- **The Mystery Migration: Tracking Sea Turtles** showcases the behavior of these rare animals.

- **African Voices** introduces students to the diversity, vitality and history of Africa.

Learning Websites

Dedicated to understanding the biological and cultural foundations of human life, the Museum’s Human Origins Program supports fieldwork in Africa, Asia and Europe. Clues and data about early human adaptation, evolution and environmental change are available at [www.mnh.si.edu/anthro/humanorigins](http://www.mnh.si.edu/anthro/humanorigins). Online visitors can follow the fieldwork and learn about hot new topics in the field of paleoanthropology. The site also features a Hall of Human Ancestors where visitors track fossil records in the Museum’s National Collection and post questions for Museum scientists.

Both scientists and the general public use the Museum’s Mammal Species of the World website at [www.nmnh.si.edu/msw](http://www.nmnh.si.edu/msw). A database of 4,629 currently recognized species of mammals is organized in a biologic hierarchy that includes Order, Family, Subfamily, Genus and Species. Visitors search the database using either the mammal’s scientific name or common name and can view a map showing the geographic distribution of most species.
Insects Invade the National Mall

The Museum buzzed into spring with BugFest on May 20, 2000. This celebration on the National Mall offered visitors of all ages an unusual opportunity to observe, handle and learn about insects and their relatives.

The event crawled with live specimens – including tarantulas, giant millipedes and a bumblebee colony – cockroach races, and insect identification. Bug origami, costumed insect characters, and edible insects like grasshopper kabobs and scorpion scaloppini were all popular, as were displays from the Museum’s vast collection of preserved butterflies, moths, flies and beetles.

“BugFest is an exciting way to appreciate the fascinating role that insects play in our environment. The huge variety of activities offer people of all ages a hands-on chance to learn about insects,” says Dr. Scott Miller, chair of the Museum’s Department of Entomology.

Students from Thomas Jefferson High School of Science and Technology in Alexandria, Virginia, participated by developing their own insect exhibits and producing the BugFest 2000 web page (http://160.111.87.10:591/Bugfest/index.html). Thornton Junior High School students in Fremont, California, also created an insect web page (www.insecta-inspecta.com).

BugFest 2000 was a collaborative effort of the Museum’s Department of Entomology, Department of Public Programs and the O. Orkin Insect Zoo, the Smithsonian’s Horticulture Services Division, the Systematic Entomology Laboratory of the U.S. Department of Agriculture, and the National Fish and Wildlife Foundation.

The Nation’s Best and Brightest Compete at the Museum

The Discovery Young Scientist Challenge, created by Discovery Communications, Inc., in partnership with Science Service, Inc., is the only national science competition for middle school students. In October, 40 middle school students competed in interactive challenges in the Museum’s research laboratories. The students identified sediment samples from around the world, examined animal bones in the Museum’s FossiLab, and worked with world-renowned marine scientists on unusual underwater creatures. Contestants were judged on their scientific problem-solving skills, communication and leadership abilities, and their original science projects.

“The Museum is proud to support a program that puts young students in the lab with Smithsonian scientists,” says Museum Director Robert W. Fri. “It’s our hope that this experience will inspire them and heighten their interest in the natural sciences.”
Searching for the Giant Squid

Museum zoologist Dr. Clyde Roper's work was featured in “Quest for the Giant Squid,” a documentary that premiered in June 2000 on the Discovery Channel. Roper led a deep-sea expedition to the ocean depths of Kaikoura Canyon, New Zealand, in an attempt to observe the largest known invertebrate – Architeuthis dux – the giant squid. Viewers joined Roper and his team on the Kaharoa, a New Zealand research vessel equipped with sonar tracking devices, state-of-the-art low-light cameras and the submersible Deep Rover.

The scientists and crew battled harsh weather and technical difficulties while explaining the importance of studying the giant squid in its natural habitat and detailing their theories on how this incredible animal hunts, sees, moves and mates. Throughout the program, viewers learned about the 60-foot animal and why, despite its enormous size, the giant squid has never yet been seen alive.

"During this expedition," explains Roper, "we documented the squid's probable habitat in the deep sea and observed many of its neighbors and prey species – for the first time – alive." Confident that a live specimen eventually will be discovered, Roper says, "Just a minute or two of observation will answer many questions about the habitat, morphology and behavior of this magnificent creature."

The Smithsonian Book of North American Mammals

A valuable new research publication edited by Museum zoologist Dr. Don E. Wilson, and Sue Ruff – The Smithsonian Book of North American Mammals – provides detailed descriptions and information on the continent’s 400-plus mammal species.

Wilson began the massive project eight years ago after realizing there was not a single reference that included all the continent’s mammals. Since most of the book’s contributing authors have studied the animals first-hand and have done extensive field work on their subjects, the book is entertaining and informative for both scientific audiences and the public.

The work has received tremendous popular acclaim and was named one of the “Best of the Best Books” for 1999-2000 by the American Library Association.
Riches of Baja California Revealed

On September 13, 2000, the Museum hosted the world premiere of *Ocean Oasis* in its Samuel C. Johnson Theater. This large-format film explores the Gulf of California and the Baja California peninsula along Mexico’s Pacific coast. *Ocean Oasis* was created by Summerhays Films, the San Diego Natural History Museum, and PRONATURA, Mexico’s oldest and largest conservation organization.

Only 100 miles at its widest point, this region’s variety of habitats – ocean, coast, mountains, desert and gulf – contain exceptional diversity and density of plants and animals. This richness, including more than 900 species of fish and marine mammals, makes Baja California one of the most significant ecosystems in the world. In the past decade alone, researchers have discovered more than 15 new species in the region.

According to Museum Director Robert W. Fri, “The close cooperation between the United States and Mexico that led to this film’s creation is an excellent model for future joint stewardship of the unique Baja California region.”

Exploring the World’s Hot Spots

Broadcasting from the Museum on September 17, 2000, MSNBC’s “Time and Again” aired *Volcano!*, an in-depth look at the causes of volcanic eruptions and the resulting destruction. Anchor Robert Hager interviewed Museum geologist Dr. Richard Fiske, an internationally known volcanologist, on the geologic causes of volcanic eruptions. Fiske’s research emphasis is the study of underwater explosive volcanoes, especially in the area of Japan, and the explosive and structural history of Kilauea Volcano in Hawaii.

The clashing of moving crustal plates around the edges of the Pacific creates “The Ring of Fire,” site of many of the world’s most memorable eruptions – including Mount St. Helens, Washington; Mount Pinatubo, Philippines; and Nevado del Ruiz, Columbia – all of which are featured in *Volcano!* Also highlighted are the Hawaiian Islands, where lava flows are entering the ocean and enlarging the Big Island of Hawaii.

Fiske emphasized that most volcanic eruptions happen underwater, but global study of volcanism will lead to better prediction of dangerous eruptions near human populations.
New Acquisitions
ENHANCE MUSEUM COLLECTIONS

The Museum acquired more than 250,000 biological, geological or anthropological specimens and objects of scientific value during 2000. Selected acquisitions include:

The Department of Anthropology obtained the Margaret Robbins Walters Collection of approximately 860 modern replicas of Paleoindian stone projectile points. Made by 20th century flintknappers and collected by Robert Walters, the items in the collection will be used to distinguish modern replicas from genuine examples of Paleoindian work and for exhibitions.

The National Anthropological Archives acquired the Boudreau Collection of nearly 700 photographs, taken between 1959 and 1988, of the ceremonial and daily life of Tarahumara Indians of northern Mexico.

The Newmont Mining Corporation contributed a significant orpiment specimen to the Department of Mineral Sciences. Orpiment is a yellow to red crystalline mineral, which was once used as a pigment. This example from the Twin Creeks mine in Nevada is a vibrant orange-red with very distinct crystals. It is undoubtedly the finest orpiment in the National Gem and Mineral Collection and is one of the five best specimens in the world.

Marc Sarosi and Lily Kanter contributed 25 African gemstones to the National Gem and Mineral Collection. The gemstones are of exhibition quality and size. Most are from localities that were not previously represented in the Museum’s collection.

Marc Sarosi and Lily Kanter contributed 25 African gemstones to the National Gem and Mineral Collection. The gemstones are of exhibition quality and size. Most are from localities that were not previously represented in the Museum’s collection.

The extensive library and collections of Dr. Arthur G. Humes, founder of the Boston University Marine Program at Woods Hole, Massachusetts, were bequeathed to the Department of Invertebrate Zoology. Humes studied copepods, which are microscopic crustaceans. He was the world’s foremost authority on copepods parasitic on marine invertebrates, which he studied for more than 40 years. His gift will greatly enhance the Museum’s holdings.

Dr. Nancy Healy, formerly of the University of South Carolina, contributed the Dr. Frank Van Morkhoven Collection of 16,000 specimen lots and samples of foraminifera to the Department of Paleobiology. Van Morkhoven was a micropaleontologist who spent his life collecting microfossils from around the world.

Ruth Shear of Danville, Kentucky, contributed a mounted albino Adelie penguin to the Division of Birds. Her late husband, Dr. James Shear, found the penguin in 1956 when he served as scientific leader at Cape Hallett Station, Antarctica.

The Department of Entomology acquired the Johns Hopkins University mosquito collection, which greatly enhances the world-class holdings of the Smithsonian. This collection is a basic tool that is necessary for the study, detection and control of mosquito-borne diseases like the West Nile virus, malaria and yellow fever.
These charts represent the National Museum of Natural History’s pre-audit sources and uses of fiscal year 2000 funds, excluding capital expenditures. Federal appropriations are the source of support for most ongoing efforts, such as long-term research, collections management, facilities maintenance and safety programs. Income from private gifts, grants and endowments supports some research projects and nearly half of the Museum’s public program activities, providing vital funds for special exhibitions and an ambitious schedule of exhibit renovation. Smithsonian business activities provide funds for short-term projects and some administrative support. Federal grants and contracts underwrite several research projects.
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