

ROTUNDA



AMERICAN MUSEUM OF NATURAL HISTORY

Member Magazine
Winter 2012 Vol. 37 No. 1

PICTURING SCIENCE

*FOUR DECADES
ON ST. CATHERINES
ISLAND*

*Curious
Collections*

From the President

Ellen V. Futter



Every week, it seems, brings reports on the daunting status of American education, in particular, our failure to provide our children with adequate training in math and science and to prepare them for 21st-century jobs. There are certainly many challenges, but this is also a problem that is susceptible to cure, if we have the will, think differently, and all play a part.

The Museum is taking steps to improve science education and to set the stage for broader reform in which institutions like ours assume a more formal role in helping to mitigate this crisis.

One example is the pioneering Urban Advantage program, led by the Museum, which aims to improve science teaching and learning in middle school, a critical point at which students turn to, or away from, science and math. Now in its eighth year, this five-borough consortium, together with the New York City Department of Education, combines

the extensive resources of our City's zoos, aquaria, botanical gardens, and the Museum to infuse learning with the excitement of inquiry-based science. Evaluations show that Urban Advantage students do better in science than other students.

We are in the planning year for our latest ground-breaking effort: our Master of Arts in Teaching program (MAT) in Earth science, the nation's first museum-based Master's program in teaching. The MAT pilot program receives support through federal Race to the Top funds allocated by the New York State Board of Regents, an important validation of our work, and joins the Museum's Richard Gilder Graduate School in bringing an innovative approach to post-secondary education.

We look forward to keeping you up to date on these programs and other steps the Museum is taking to improve science education and inspire the public understanding of science more broadly.

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ROTUNDA

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Magazine
Editor Eugenia V. Levenson
Contributors Whitney Barlow, Joan Kelly Bernard, Jill Hamilton, Elena Sansalone, David Hurst Thomas, Michael Walker
Design Hinterland

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Photo 4 courtesy of the Division of Anthropology; photo 6 © AMNH/J. Carpenter; photo 10 © B. Ballenberg, courtesy St. Catherine's Foundation; photo 18 © AMNH/J. Beckett and C. Chesek

Nile Crocodile Is Two Species



DNA from mummified crocodiles helped reveal that the Nile crocodile is really two distinct species.

The Nile crocodile is in fact two distinct species, according to recent genetic analyses of mummified crocodiles from ancient Egyptian temples.

Evon Hekkala, an assistant professor at Fordham University, conducted DNA analyses at the Museum's Sackler Institute for Comparative Genomics by extracting DNA from 57 historic specimens, some of them mummies, and from 123 modern crocodiles, which she then sequenced at the Sackler Institute.

The study found that the two species are not even each other's closest relatives. *Crocodylus niloticus*, known for being the more aggressive of the two, is more closely related to four Caribbean species than to the previously unacknowledged *Crocodylus suchus*. George Amato, director of the Sackler Institute and one of the study's co-authors, says that the finding will have a direct impact on efforts to manage the iconic crocodiles' conservation. The discovery that these animals are really two species means their ranges are far smaller than previously estimated, with *C. niloticus* inhabiting eastern and southern Africa and *C. suchus* in the interior and the west. *C. suchus* is especially threatened, most likely due to its habitat drying out.

In particular, the study will affect the lucrative trade of crocodile skins, which was formerly hailed as a model for responsible wildlife use. "Agreements intended to promote the sustainable harvest of the Nile crocodile should be reconsidered to reflect the need to preserve two distinct species, not one," Dr. Amato explains. "In fact, following the original quotas and policies may inadvertently result in a significant loss of crocodilian diversity."

The discovery shows how DNA analysis can change scientists' views of seemingly well-known animals. "It's incredible how little we still know about large, familiar wildlife," says Amato.

The study also debunks the long-held view that crocodiles are literal living fossils, or species that are no different from specimens in the fossil record. Modern crocodiles, it turns out, are relatively recent descendants of an older lineage that lived alongside the dinosaurs. Though the long-term success of the crocodilian body plan makes the modern animals resemble their ancient relatives, crocodiles have evolved over millennia. As Amato says, "They're as modern as any other species alive today."

For more information about the Sackler Institute for Comparative Genomics, visit amnh.org/research.

Beyond Planet Earth App

Have you downloaded the Beyond Planet Earth Augmented Reality App yet?

This free app for iPhone, iPod touch, and iPad 2 was created as a companion to the new exhibition *Beyond Planet Earth: The Future of Space Exploration*. Download it before your visit, then look for 11 AR icons throughout the exhibition.

Use the camera on your device to activate the icons and unlock animations—including a Mars-bound spaceship, a near-Earth asteroid, and a lunar elevator—then share images by email, Facebook, and Twitter.

Visit amnh.org/apps for more information.



Correction
In the Fall issue, the article "Museum Scientist Named to NASA's 2016 Mission to Asteroid" on p. 19 contained a typographical error in a reference to the formation of the solar system. "More than 4.5 million years ago" should have read "more than 4.5 billion years ago." *Rotunda* regrets the error.

AN AMBITIOUS BEGINNING

The first Lumholtz expedition to Mexico for the Museum received support from the federal government and the American Geographical Society. It included eight scientists, 22 laborers, and 70 pack animals. Its goal: to find links between prehistoric settlements in Colorado and Mexico while studying geology, plants, and animals. The expedition sparked Lumholtz's interest in the peoples of the Sierra Madre and paved the way for later fieldwork.

FIELD TECHNOLOGY

In preparation for Lumholtz's expedition to Mexico, Alexander Graham Bell gave him a wax-cylinder "graphophone" to record sound, which he used to record Tarahumara and Huichol chants and songs. These recordings, along with Lumholtz's careful notes, photographs, publications, and drawings, helped establish him as a foremost authority on the tribes of northwest Mexico.

COMPREHENSIVE COLLECTION

The Museum's collection includes 2,600 masks from around the world made of many raw materials, including wood, fiber, clay, shell, hide, feathers, and fur. Masks typically represent humans, animals, supernatural beings, and combinations of the above and are used in a wide variety of ceremonial practices.

MEXICO, PAST AND PRESENT

The Museum's Mexican ethnology collection includes more than 5,000 objects, representing living cultures, which can be viewed on the Division of Anthropology's website. The Mexican archaeology collection includes almost 50,000 artifacts representing peoples of the past. Some 1,200 of these are on permanent exhibition in the Hall of Mexico and Central America.

'ROUND THE WORLD

In total, the Museum's anthropology collections include about 300,000 archaeological and 200,000 ethnological objects from around the world, cared for by collections management and objects conservation specialists. The National Endowment for the Humanities has provided support for the construction of new storage facilities and has funded the digital imaging of the collection for online research. View the collection online at research.amnh.org/anthropology.

A Lumholtz Legacy: Tarahumara Mask

For the first expedition organized by the Museum's Division of Anthropology—to the Sierra Madre range in Mexico in 1890—the Museum recruited a researcher with a truly global resume.

Born near Lillehammer, Norway, Carl Sophus Lumholtz was an ethnologist and naturalist with an intense interest in people and their environments. A pioneer of the participant-observation technique, he had come to the Museum's attention for his work in Australia, where he spent four years learning the customs of the indigenous Australians while collecting botanical and zoological specimens.

Between 1890 and 1897, Lumholtz led three expeditions to Mexico, traveling some 900 miles in the Sierra Madre Occidental. It was during the second expedition, in 1891, that he lived among the Tarahumara Indians, known as extraordinary distance runners, and detailed Tarahumara daily life, rituals, and beliefs. He also collected and documented 230 objects—among them, three carved wooden masks with human faces, including the one pictured below.

A beautiful example of Tarahumara material culture, this mask had already lost one of its two antlers by the time Lumholtz acquired it on January 6, 1891, during dances celebrating the Feast of the Epiphany. The Tarahumara incorporated traditional beliefs into their Christian observances, and this mask was associated with supernatural beings that helped ensure an abundance of animals to hunt.

During his Mexican expeditions, Lumholtz also researched the Huichol, Cora, and Tepehuane cultures, ultimately collecting some 2,000 objects. The quintessential researcher, he brought back numerous botanical and zoological specimens and meteorological data he had gathered along the way.

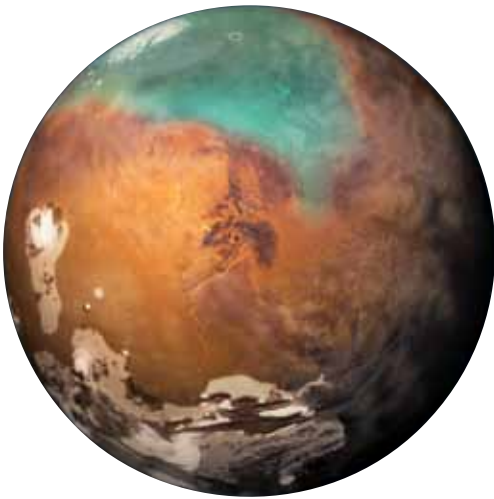
See this mask and more on a behind-the-scenes tour of the Division of Anthropology on February 9. For details, turn to page 15.



Catalog no. 65/1030

Courtesy of the Division of Anthropology

Mars in transition



The Re-making of Mars: Terraforming Table

The scent of evergreens, stones covered in moss, and the hum of rushing water are familiar features in many forests on Earth. But could these also describe a future landscape on Mars?

Once a staple of science fiction, terraforming—or making a planet more like Earth—is now being studied as a real possibility, as scientists research how to apply knowledge of evolution, climate, and technology to re-create the blue planet's environment on the red planet. (For one of the many ethical issues that remain, see sidebar.) Visitors can learn firsthand how humans might make Mars habitable with a custom, multi-user touch table featured in the Museum's exhibition *Beyond Planet Earth: The Future of Space Exploration*.

Created by the Museum's Exhibition Department, the one-of-a-kind table is the latest example of digital elements that help make exhibitions increasingly interactive. "Museum visits are social experiences," says Hélène Alonso, director of exhibit interactives and media. "With the terraforming table, visitors will be able to team up to achieve Mars's transformation. They can share a goal, compare strategies, help each other." At 6 feet wide and 4 feet long, the table is also large enough to allow others to watch the planetary metamorphosis unfold.

The simulation opens with an aerial shot of Mars, looking like a giant penny against a dark backdrop of space. From this global view, players must warm the planet and build its atmosphere by various means, including crashing asteroids to release frozen carbon dioxide that will thicken the atmosphere and building soil-burning factories to set off a runaway greenhouse effect, a process that would speed global warming. The team rigorously researched the science behind each scenario—even down to the routes melting water would travel across the Martian globe, for which they relied on NASA terrain maps.

Once users have created a warm planet with an atmosphere, the simulation zooms in on the Martian surface. Here, players build the biosphere by introducing bacteria, lichen, and algae, which prepare the soil for flowering plants and, eventually, oxygen-pumping evergreens. As visitors work individually to alter the climate and flora, alerts about the group's collective progress scroll overhead like a Twitter feed.

Planet-building has never seemed so easy, even if terraforming is still many centuries, and technologies, away.

Members receive free admission to *Beyond Planet Earth: The Future of Space Exploration*.

RED, GREEN, AND BLUE

Science fiction writer Kim Stanley Robinson depicted the terraforming of Mars in a popular trilogy published in the 1990s. A rocky *Red Mars* is colonized and transformed into a plant-filled *Green Mars* and, eventually, a *Blue Mars* with cerulean skies and seas. Fans will recognize technologies featured in this saga in the table, including orbital mirrors that warm the planet's surface by reflecting solar energy.

IN-HOUSE TEAM

The Museum's Exhibition Department creates models, multimedia, text, and graphics in-house. In the case of the terraforming table, the interactives team assembled the unique multi-touch screen, software, 3D animations, and other content. Producing this technology at the Museum expands the department's toolkit for future exhibitions.

THE ORIGINAL TERRAFORMED PLANET

Terraforming—which means "Earth-shaping"—occurred on Earth over billions of years. The planet's original atmosphere lacked oxygen until photosynthetic cyanobacteria pumped the gas into the air. Humans can apply this principle when terraforming Mars by using similar microorganisms to create an oxygen-rich atmosphere—one that humans could eventually inhabit unprotected by spacesuits.

COSMIC BUFFET

There's more than one way to terraform a planet. To prepare Mars for transformation, each player can choose from a menu of tools on the touch-table screen. The interactives team created a complex set of algorithms so that the number of users and their unique combination of tools would determine the speed of terraforming.

UP FOR DEBATE

Scientists and philosophers will continue to review the ethical dimensions of terraforming as research continues. For instance, if microbial life is discovered on Mars, humans will need to decide whether to proceed with terraforming or to leave the microbes undisturbed.

© AMNH/C. Engelbert

LAB

CONFIDENTIAL

EACH OF THE 41 INTRIGUING IMAGES IN THE EXHIBITION *PICTURING SCIENCE: MUSEUM SCIENTISTS AND IMAGING TECHNOLOGIES* TELLS A FASCINATING STORY ABOUT RESEARCH OR CONSERVATION PROJECTS AND CUTTING-EDGE TOOLS. HERE ARE FOUR SNAPSHOTS.

DIGITAL DOSSIER

New imaging technologies have revolutionized the age-old scientific tasks of observation and classification. And for James Carpenter, a curator in the Division of Invertebrate Zoology, they've opened up a new way of seeing.

Dr. Carpenter is tracing the ancestry of various wasps, which he does by examining the insects' physical features to identify them and place them in their evolutionary context. His lab's current project, funded by the National Science Foundation, is to reconstruct the phylogeny, or evolutionary history, of Vespinae, a subfamily of wasps consisting of hornets and yellowjackets.

Carpenter's methods include photomontage—essentially digital photography—which allows him to stack images to focus on specific features. A side-view of the abdomen of an oriental hornet (left), part of the ongoing exhibition *Picturing Science: Museum Scientists and Imaging Technologies* now on view in the Akeley Gallery and curated by Curator Mark Siddall, uses this technique to bring selected areas into sharp focus. These snapshots enable Carpenter to place the insect in the tree of life.

His lab also uses a variety of high-tech microscopes, including an environmental scanning electron microscope. This instrument highlights minuscule features without destroying the specimen, as often happened with earlier versions of the technology. Once Carpenter has the traits, he plugs the data into a computer program that synthesizes them at rapid speed.

Another imaging project of the lab involves putting photographs of the Museum's collection of 1,200 wasp nests—the world's largest—online so that researchers worldwide can study them. Details of nest architecture will aid Vespinae's reconstruction as well—and sometimes, it's the most basic evidence that counts. "Wasp nests have a certain development, much like the ontogeny of an organism," Carpenter says. "Early stages are widely shared across many taxa." By analyzing a nest that was never finished or a fragment from the base of a nest, scientists can learn more about its former inhabitants' broader relationship to the rest of the family.

PROKARYOTIC PARTNERS

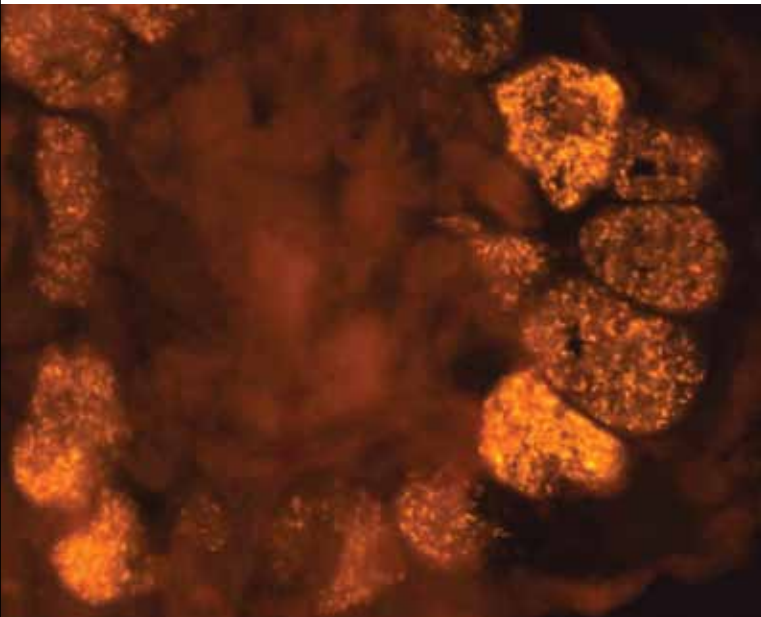
While researching bacteria found in blood-feeding leeches, Associate Curator Susan Perkins and Curator Mark Siddall have conducted fieldwork around the world, from French Guiana to South Africa.

But one of their most exciting discoveries took place in a Museum lab 10 years ago. DNA sequencing revealed that the symbiotic bacteria in turtle leeches belong to a group of bacteria that were previously found only in plants or as pathogens. As leeches have evolved and diversified, they’ve forged unique partnerships with bacteria at least three different times.

Dr. Perkins and Dr. Siddall confirmed they had sequenced the correct DNA using a technique called fluorescence *in situ* hybridization, or FISH. This method involves applying fluorescent DNA probes to thin slices of tissue that light up in the case of a DNA match. FISH also showed that symbiotic bacteria were present in young leeches that had never fed on blood, “suggesting the leeches pass the bacteria directly to their offspring,” explains Siddall. Images of glowing bacterial populations in leeches can be seen as part of *Picturing Science*.

“A leech couldn’t be a leech without its bacteria,” says Perkins. “And humans couldn’t be humans without their bacteria. These technologies give us a bird’s-eye view of some of the organisms we take for granted.”

Siddall continues to explore these fascinating relationships along with Sebastian Kvist, a student at the Richard Gilder Graduate School. The researchers are studying the evolutionary history of these partnerships and also trying to determine whether bacteria provide their leech hosts with essential vitamins. They now have a new tool that promises to help answer questions that still remain: a next-generation DNA sequencer called a pyrosequencer, which arrived at the Museum’s Sackler Institute for Comparative Genomics this fall. Sackler Institute Director George Amato says it will allow Museum scientists to “complete in days what would have once taken a year.”



A technique called FISH causes bacteria in an adult hippopotamus leech to glow.



Tibetan deity figures were analyzed as part of the Museum’s conservation efforts.

CONSERVE AND PROTECT

For the past year, a 7-foot-tall totem of an eagle has towered over the well-ordered tables of the Museum’s Objects Conservation Lab, the special department within the Division of Anthropology charged with protecting its collections for future study.

“This is one of the *smaller* totem poles,” says Director of Conservation Judith Levinson, whose team is in the process of preserving the totem poles and other large carvings from the Hall of Northwest Coast Indians with support from the Institute for Museum and Library Services and the Stockman Family Foundation. The tallest of these never leave the hall, where they must be laid horizontally, like patients on a table. Conservators then remove pinpoint-sized samples for examination with a microscope and UV illumination in the lab, allowing them to see layers of coatings, paint, and dirt—the history of previous restoration efforts.

The totem pole project is just one of the most recent examples of the lab’s wide-ranging activities. Levinson’s team routinely surveys the Museum’s collections to decide which specimens and artifacts need urgent care.

“We usually do not try to bring objects back to their original condition,” explains Levinson. For instance, alterations related to ceremonial use would be left untouched. But if something occurred after the object’s arrival at the Museum—even a well-intentioned, but misinformed, attempt by a previous restorer—the team has a decision to make.

“We may attempt to reverse it, as it may distort the real appearance of the artifact,” says Levinson. In the case of the looming eagle in the lab, the conservators have adjusted the angle of its head to match that seen in an early photograph of the totem *in situ* in British Columbia.

In all of their efforts, the team looks not only to preserve the past, but also to preserve for the future. While working on a collection of metal Tibetan figures, one of which is featured in *Picturing Science*, Levinson’s team discovered that many of the coatings on the copper alloy sculptures were not merely soot, as previously assumed, but also plant extracts and oil-based lacquers, which gave the team crucial clues about libations in ceremonial rituals and other details. Thanks to this information, future conservators will know not to clean off a crucial part of the life histories of these objects.

Bottom left © AMNH/S. Perkins; top left © AMNH/J. Levinson and K. Krauer; right © AMNH/D. S. Ebel

POP ROCKS

To the average person, meteorites look like black or occasionally brown lumps of rock from space.

But Denton Ebel’s new computer program transforms them into a kaleidoscope of colors that holds clues to the early solar system.

Dr. Ebel, curator in the Department of Earth and Planetary Sciences, uses an electron microprobe—what he calls “the workhorse” of the meteorite lab—to send a beam of electrons across a specimen. Spectrometers built into the machine measure the x-rays emitted by each excited element, and then the computer program, written by Ebel, generates a color-coded map of each element in the meteorite.

“They’re not just pretty pictures,” says Ebel of the Warhol-esque montage of meteorites featured in *Picturing Science* (on the cover; a detail below). “We’re getting quantitative information from qualitative information. Maps are qualitative since they’re not giving you a robust chemical analysis. But once you do the mapping, you can go back with the probe for a very specific chemical composition.”

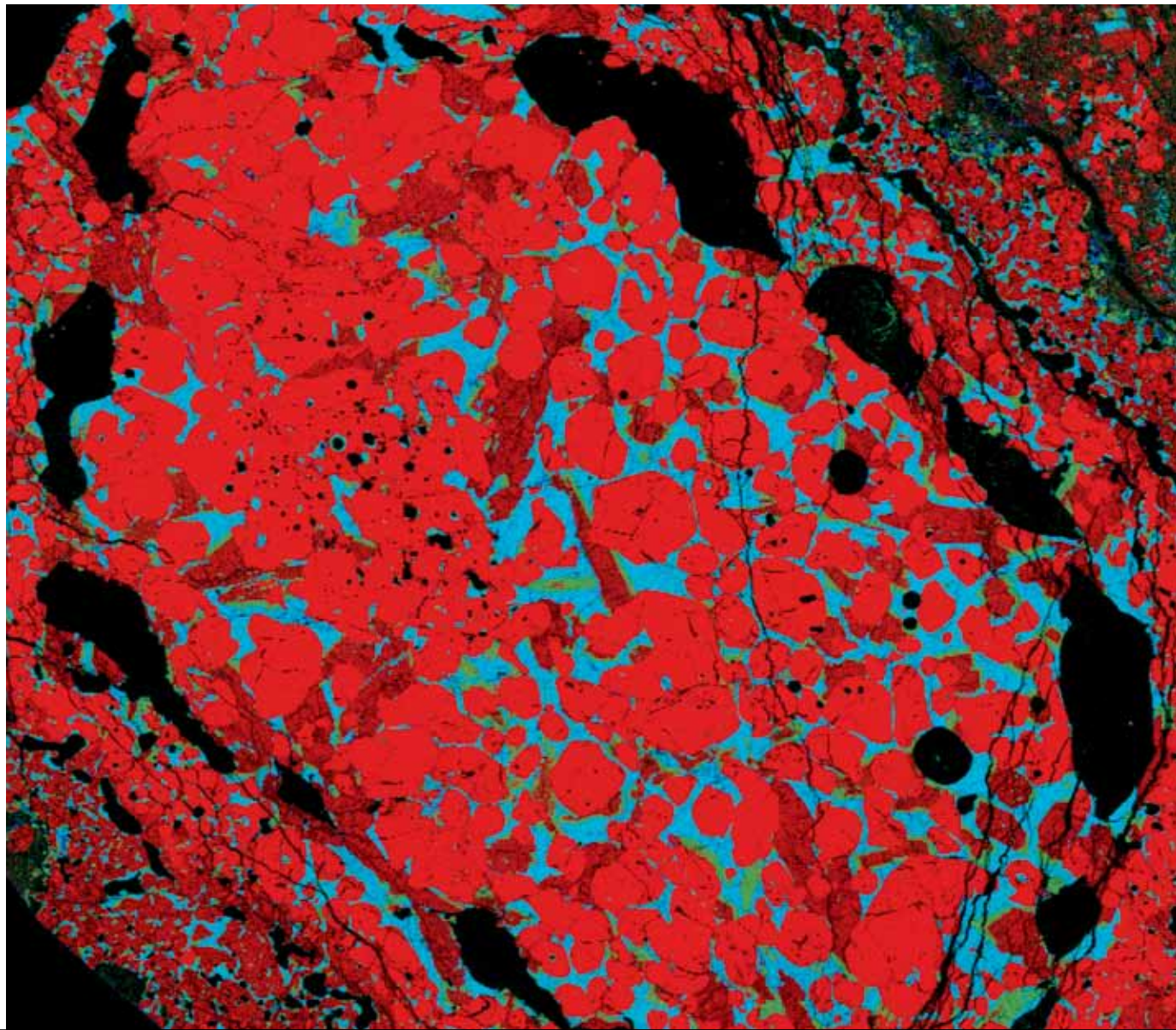
Since the mineral makeup of a meteorite can vary greatly throughout the specimen, often the only way to understand these objects’ 4.5-billion-year-old histories is to slice the specimens like loaves of bread using a thin wire saw, about the width of a fine human hair.

But the Museum’s new CT scanner, which images specimens in three dimensions, eases the stress of carving up the oldest objects in the solar system. Thanks to this instrument, Ebel can locate areas of interest before putting the meteorite to the blade. He can, as he says with a relieved smile, “cut with intelligence and foreknowledge.”

Join Curator Mark Siddall on a behind-the-scenes tour of *Picturing Science* on January 19. For details, see page 14.

The presentation of Picturing Science is made possible by the generosity of the Arthur Ross Foundation.

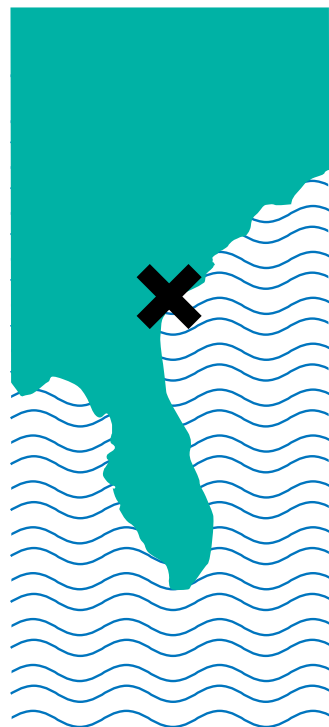
A computer program generates color-coded maps to represent the chemical elements of meteorite specimens.



Decades of Discovery on St. Catherines Island

How Archaeological Finds
are Proving History Books Wrong

By David Hurst Thomas



For nearly four decades, it's been my privilege to work as an archaeologist on St. Catherines—a Manhattan-sized island 10 miles off the Georgia coastline. One of the storied Golden Isles, St. Catherines is privately owned; only two people live there. Forty years ago, the Edward John Noble Foundation established a long-term relationship with the American Museum of Natural History to pursue scientific research, conservation, and education on the island.

I've long been intrigued by Spanish mission archaeology. By the time I was 12, I'd visited all 21 of the Spanish missions in my native California. So when I arrived on St. Catherines Island in 1973, I was well aware of its rich mission history. For more than a century, Mission Santa Catalina de Guale was the northernmost Spanish settlement along the eastern seaboard. But after British and native forces overran the island in 1680, the Franciscan mission simply disappeared. People had been looking for it ever since.

Combining probabilistic sampling theory with first-generation geophysical remote sensing technologies (including proton magnetometry, soil resistivity, and ground-penetrating radar), we spent five years looking for the site. As fate would have it, the long-lost mission was buried beneath the westernmost road on St. Catherines Island. I'd driven across it a hundred times.

American history books have long disparaged the Spanish presence in America, discounting “poor little St. Augustine” as one of the most impoverished outposts in the Spanish global community. The colonists self-characterized *La Florida* as a place of neglect and ruin.

For 15 years, I directed Museum excavation at this extraordinarily well-preserved 16th- and 17th-century Franciscan mission, and I can safely say that those history books are dead wrong.

The archaeology produced surprises from the very start. The church and surrounding mission buildings were well constructed and carefully laid out on a town grid. Knowing that Franciscan customs dictated that the mission cemetery be placed inside the church, we encountered the remains of more than 400 people interred there. We were shocked by the quantity and quality of the

grave goods we recovered. Having excavated several burial mounds on the island—often loaded with mortuary offerings—we knew that indigenous St. Catherines Islanders had long felt that “you can take it with you” to the afterlife. The Guale people clearly continued to place grave goods with the Christian burials. We puzzled over why the Franciscan friars would permit such “heathen” customs to be practiced at Mission Santa Catalina.

As the archaeological evidence accumulated, we began to question the conventional historical wisdom.

We were also startled by the remarkable artifacts we found—gold and silver medallions, silver sacred heart rings, bells, mirrors, several complete ceramic vessels, and more than 65,000 glass trade beads. How did the mission Indians at Santa Catalina obtain some of the world's most valuable beads, imported from Europe, China, and India? How did this tiny settlement on the Georgia coast—the so-called outpost of an impoverished outpost—become enmeshed in a global exchange network?

Food bones recovered from the mission trash heaps told the same story. When the Governor of St. Augustine feasted with the friars and the Guale Indians at Mission Santa Catalina, he may have enjoyed his best meal of the year. So why was the standard of living so much higher in remote Indian country than in the state capital?

As the archaeological evidence accumulated, we began to question the conventional historical wisdom—the tired recitation of supposedly superior European cultures dominating and subjugating the hapless indigenous people. Our suspicions have recently been confirmed by new documentary evidence from a surprising source.

In 1597, the Guale Indians living on St. Catherines Island and the Georgia coast staged an uprising, killing half the Franciscan friars in Spanish Florida—including two living at Mission Santa Catalina. The so-called “Juanillo Rebellion” has long been viewed as an indigenous revolt against Spanish colonial authority and repression. But a new study, *Murder and Martyrdom in Spanish Florida*, published in the *Anthropological Papers of the American Museum of Natural History*, No. 95, says otherwise. Teasing fact from fiction, historians J. Michael Francis and Kathleen Kole have assembled and translated all of the surviving primary documents from the

uprising, and they have completely changed our view of Spanish-Indian interactions in the American Southeast.

The 1597 rebellion was neither anti-Spanish nor necessarily anti-Catholic—and it was never aimed at expelling the Spanish from Florida. Instead, the root causes lay in the underlying tensions between indigenous Georgia chiefdoms, each jockeying for position and astutely playing the Spanish to further their own ends. The documents highlight the sometimes tenuous footing of Spanish rule in Georgia and Florida, underscoring the importance of powerful Indian allies to Spanish ambitions and providing unique insights into the rich and complex nature of Indian society in the colonial southeast.

Taken together, archaeological and documentary evidence from St. Catherines Island offer a new understanding of Spanish-native interrelationships in the missions of *La Florida*. Colonists at St. Augustine relied heavily on the food surplus supplied by the Guale people. Spanish authorities were forced to deal directly with the traditional indigenous chiefs, reinforcing their political power and cementing alliances with diplomatic gifts. At missions like Santa Catalina de Guale, Franciscan friars helped establish and maintain what was essentially an economic and political center, with hereditary Guale chiefs retaining enormous autonomy over secular matters. The paramount chiefs ruled according to age-old lines of inherited authority.

Historians have long emphasized the unique Hispanic agenda—not seeking unoccupied land for immigrants but rather looking for local native groups to create, from scratch, new multiethnic communities. To be sure, military and political forces backed up this strategy, but the vision was to foster communities that were more native than Spanish. Recent ethnohistoric and archaeological investigations clearly demonstrate the degree to which that agenda played out during the 16th and 17th centuries in Spanish Florida. As part of a complex, multiethnic community, the indigenous chiefdoms of *La Florida*—willingly or not—became enmeshed in major global issues of food shortages, epidemic disease, warfare, and climate change. ①

David Hurst Thomas is curator of North American Archaeology in the Division of Anthropology.

Download *Murder and Martyrdom in Spanish Florida* at digitallibrary.amnh.org.

FOUND AT THE MISSION



Pieta Medallion

The medallion, made of solid silver with gold wash, was found near the altar at Mission Santa Catalina de Guale.



Puebla Plate

This Puebla blue-on-white majolica plate dates to between 1566 and 1680. It was made in Mexico and transported to Florida on the treasure galleons.



Puebla Bowl

The bowl has the same provenance. It was found, together with the plate, in Christian burials.

CURIOUS COLLECTIONS

ROTUNDA DELVES DEEP
INTO THE MUSEUM'S COLLECTIONS
TO TELL THE STORIES BEHIND
SELECT SPECIMENS AND ARTIFACTS.

Catalog no. 70.3/5650



CYCLE OF LIFE

From the collections of the Division of Anthropology

Curator Laurel Kendall was visiting Vietnam to collect artifacts for the 2003 exhibition *Vietnam: Journeys of Body, Mind, and Spirit* when she encountered an exceptional artisan near Hanoi. His medium was paper, and his specialty was creating votive offerings used in funeral rituals by the Kinh people, Vietnam's majority population. The Kinh, in common with some other East Asian peoples, believe that a deceased leaves the underworld 49 days after death to begin a new life. Family members burn paper objects—representing clothing, housewares, and other necessities—to equip their loved ones for the transition to the afterlife.

Kendall, who is chair of the Museum's Division of Anthropology, commissioned the craftsman to make a bicycle, a copy of one he'd made for a local family. The seat is made of black paper; the body and tires, cardboard tubing covered in foil and fabric, respectively;

the fenders, stiff white paper; wheel spokes, foil-covered wood skewers; and the chain around a silver-foiled cardboard sprocket, continuous links carefully cut from purple paper. His creation is so remarkably lifelike that, says Kendall, "when it was being conserved for use in the exhibition, the lab had to provide signage to prevent visitors from trying to sit on it." Now the bicycle is tucked away in the Division of Anthropology's collections on the Museum's fifth floor, where it is still turning heads.

"This is one of the most remarked-upon objects in anthropology storage," says Kendall. "Visitors are surprised to see an ordinary-seeming Peugeot bicycle in a glass storage case, and then doubly surprised to discover that it is made of paper and meant to be burned in a funeral rite."

RARE BIRD

From the collections of the Department of Ornithology

Ornithologists generally discover new species by collecting them in the wild. But early in the 20th century, Museum ornithologist James P. Chapin found one on a hat.

In 1913, Chapin, while serving as an assistant on an expedition to the Belgian Congo, came upon a native of the Ituri Forest wearing a headdress with a distinctive feather. To the young naturalist, it suggested a pheasant or peacock, a strange possibility since these birds were native to Asia. Curious, he took it.

Fast forward to 1936. Chapin was visiting the Congo Museum in Tervuren, Belgium, and, by pure chance, found atop a cabinet a pair of taxidermied birds. A label indicated they were familiar Indian or Blue Peacocks, but he suspected otherwise—feathers on these birds matched the one he had collected 23 years earlier. Later that year, in a professional journal, he described *Afropavo congensis*, or the Congo Peacock, a unique species whose closest relatives are the Asian peacocks.

Eager to pursue his discovery in its habitat, Chapin returned to Africa in 1937, and in a forest in what is now the Democratic Republic of the Congo, he observed the birds on the ground and in flight and heard their nighttime call.

Over the years, ornithologists have hypothesized that *Afropavo* is more closely related to African guinea fowls or Old World partridges. However, genetic studies suggest that *Afropavo* is a sister taxon to the *Pavo* species, the bird commonly known as the peacock, and that Chapin's hunch 100 years ago was right. 🦚

Counterclockwise from top,
catalog nos. 61515, 61518, and 61499



A 19TH-CENTURY GIFT

From the collections of the Division of Paleontology

Not long ago, a descendant of John William Draper, a celebrated 19th-century naturalist, gave the Museum Draper's collection of fossils from Whitby, England. The set, mostly ammonites, was neatly stowed in a wooden box along with a handwritten list of contents dated 1844 and a price stamp of 28 shillings.

"It's a lovely cabinet of curiosities," says Neil Landman, curator in the Division of Paleontology, who suspects Draper bought the collection whole, perhaps as a gift for his children or because it was "the kind of thing any respectable naturalist would have owned."

Born in England in 1811, Draper emigrated to the U.S. in 1832 and rose to prominence as a chemist, botanist, historian, and pioneering photographer. He served as president of New York University from 1850 to 1873 and was a founder of the NYU Medical School, where he taught chemistry until a year before his death in 1882.

At the time Draper acquired the set, Europe was the epicenter of fossil hunting. The Jurassic beds of the Whitby area were an especially rich source of ammonites—the *sine qua non* of fossils at the time, says Landman, because paleontologists had only lately realized they could use ammonites to date rocks. But as explorers in the American West began uncovering dinosaur bones and other fossils in the 1850s, the focus began to shift to the New World. Had Draper purchased such a set in the 1880s, says Landman, the fossils would have been American.

Several of Draper's children became scientists: John Christopher (1835–1885), a physician and chemist; Henry (1837–1881), an astronomical photographer; Daniel (1841–1931), a meteorologist who established the New York Meteorological Observatory in Central Park; and Antonia Draper Dixon (1849–1923), an ornithologist. Draper's ammonite collection may have inspired an interest in his granddaughter Carlotta Joaquina Maury (1874–1938), who became a paleontologist. Maury periodically prepared and cataloged fossils and, in the 1930s, published scientific articles in the *Bulletin of the American Museum of Natural History* and *American Museum Novitates*.



Catalog no. 837876

Programs and Events

For more programs and to purchase tickets, visit amnh.org/calendar.

For updates and reminders, sign up for monthly eNotes for Members by sending your membership number and request to subscribe to members@amnh.org. The Museum does not trade, rent, or sell this information.

Tickets

Tickets are available by phone at 212-769-5200, Monday–Friday, 9 am–5 pm, or by visiting amnh.org. Please have your Membership number ready.

Availability may be limited. Please purchase tickets in advance.

Please be aware that ticket sales are final for all Member programs. All programs go ahead rain or shine. There are no refunds unless the program is cancelled by the Museum.

JANUARY

SciCafe
Wednesday, January 4
Wednesday, February 1
Wednesday, March 7
Free
Enjoy cocktails, cutting-edge science, and conversation at this popular after-hours series. 21+ with ID. Visit amnh.org/scicafe for details.

Frogs and Fables Tour
Thursday, January 5
6:30–8 pm
\$8
Learn about frogs in folk stories and fables in this special tour.

A Night at the Museum Sleepover
Friday, January 6
Saturday, February 18
Friday, March 9
Member price is \$119 per person
After-hours adventure for kids ages 6 to 13 and their caregivers.

Live Wolf Encounter
Saturday, January 7
11 am
12:15 pm
1:30 pm
\$12
Meet **Atka**, an Arctic gray wolf from the Wolf Conservation Center in South Salem, NY.

MAT Open House
Saturday, January 7
Noon–4 pm
Free
Learn about the Museum's new Master of Arts in Teaching program. Applications are due January 31. Visit amnh.org/mat for more details.

After-Hours Tour of Beyond Planet Earth: The Future of Space Exploration
Tuesday, January 10
6:30–7:30 pm for families
7–8 pm
Free (Registration required; call 212-769-5200)
See a lunar base, space elevator, and more on a guided tour.

Behind the Scenes in The Butterfly Conservatory
Thursday, January 12
6:30–7:30 pm for families
7–8 pm
7:30–8:30 pm
\$35
Go behind the scenes of the conservatory with Manager of Living Exhibits **Hazel Davies**.

Family-Friendly Highlights Tour
Sunday, January 15
10:30–11:30 am
Sunday, March 18
3–4:30 pm
Free (Registration required; call 212-769-5200)
Join a family-friendly tour of Museum highlights.

SpaceFest!
Sunday, January 15
11 am–5 pm
Free
Enjoy performances and games for all ages with **Story Pirates**, NASA Solar System Ambassador **Laura Venner**, and the **Amateur Astronomers Association**.

Curatorial Tour of Picturing Science
Thursday, January 19
6:30 pm
Free for Insider Members and above (Registration required; call 212-769-5606)
Join Curator **Mark Siddall** on a visit to the Microscopy and Imaging Facility and a tour of *Picturing Science*.

Exhibitions and Attractions

Admission is by timed entry only.

Creatures of Light: Nature's Bioluminescence
Opens **Saturday, March 31**
Free for Members
Be dazzled by the world's variety of bioluminescent creatures and explore how and why they glow and the ways scientists study and use bioluminescence.

Beyond Planet Earth: The Future of Space Exploration
Free for Members
Find out about robotic missions to explore our universe and what it will take to build a lunar elevator, deflect deadly asteroids, travel to Mars, and more.

The Butterfly Conservatory: Tropical Butterflies Alive in Winter
Through **Monday, May 28**
Member tickets are \$12.50 adults, \$8 children
This annual favorite returns with up to 500 live, free-flying tropical butterflies housed in a vivarium that approximates their natural habitat.

Picturing Science: Museum Scientists and Imaging Technologies
Free with Museum admission
More than 20 sets of spectacular large-format images showcase the wide range of research being conducted at the Museum using various optical tools.

One Step Beyond
Friday, January 20
Friday, February 17
Friday, March 16
9 pm–1 am
\$25
This party series features the biggest names in techno, electronica, indie rock, and hip-hop. 21+ with ID

A Universe from Nothing with Lawrence Krauss
Monday, January 23
Hayden Planetarium
7:30 pm
Member tickets are \$13.50
Join physicist **Lawrence Krauss** to learn how the universe could have emerged from nothing.

Field Trip to the Moon for Members
Tuesday, January 24
6–6:45 pm
\$12.50 adults; \$8 children
Take a virtual trip to the Moon from the Hayden Planetarium.

Adventures in the Global Kitchen: Tonics and Tinctures
Tuesday, January 24
6:30 pm
\$30
Join gastronmist **Sarah Lohman** for a look at some of America's historic diet trends.

IMAX Movie Born to be Wild
Opens **Monday, January 9**
Member tickets are \$12.50 adults, \$8 children
Travel to Borneo and Kenya to learn about orphaned orangutans and elephants and the bond they share with their human rescuers.

SpaceJam
Thursday, January 26
6:30–8:30 pm
\$75
Explore *Beyond Planet Earth* after hours and hear **One Ring Zero** perform the album *Planets*. 21+ with ID.

NASA Missions
Tuesday, January 31
6:30 pm
Member tickets are \$13.50
See breathtaking images from NASA missions combined with stunning visualizations from the Digital Universe Atlas.

FEBRUARY

No Bones About It
Thursday, February 2
6–7 pm
\$35
Join Paleontology Collections Manager **Carl Mehling** for this unique tour on the making of the fourth-floor Fossil Halls.

Story Pirates: My Museum Story
Saturday, February 4
11 am and 2 pm
\$12
Enjoy this sketch comedy show based on stories, written by kids, that take place at the Museum.

Dimitar Sasselov
Monday, February 6
7:30 pm
Hayden Planetarium Space Theater
Member tickets are \$13.50
Join **Dimitar Sasselov**, professor of astronomy at Harvard University, as he discusses planets orbiting other stars that could harbor life.

Adventures in the Global Kitchen: Aphrodisiacs
Wednesday, February 8
6:30 pm
\$30
Take an amusing tour of aphrodisiacs through the ages with food historian **Francine Segan**.

Behind the Scenes in Anthropology: Mexico, Central America, and South America
Thursday, February 9
6:30–7:30 pm for families
7–8 pm
7:30–8:30 pm
\$35
See masks, including the Tarahumara mask from this issue, pottery, and other ethnographic artifacts from Mexico, Central America, and South America.

Credits
Creatures of Light: Nature's Bioluminescence is organized by the American Museum of Natural History, New York (www.amnh.org).

Generous support for Creatures of Light has been provided by the Eileen P. Bernard Exhibition Fund.

Beyond Planet Earth: The Future of Space Exploration is organized by the American Museum of Natural History, New York, (www.amnh.org),

Members Highlights Tour
Saturday, February 11
3–4:30 pm
Free (Registration required; call 212-769-5200)
Join a tour of the Museum's most popular displays.

Love on Display
Monday, February 13
6:30–7:30 pm
Free (Registration required; call 212-769-5200)
Celebrate love in this after-hours tour.

Romance Under the Stars
Tuesday, February 14
6:30–9 pm
\$85 per person
Join us for a cocktail hour complete with open bar, appetizers, the music of **The Josh Rutner Quartet**, and a romantic view of the sky.

Lunchtime Winter Bird Walks
Three Thursdays
February 16, 23 and March 1
Noon–1:30 pm
\$40
Catch a glimpse of various birds in Central Park with ornithologist **Paul Sweet**.

in collaboration with MadaTech: the Israel National Museum of Science, Technology, & Space, Haifa, Israel.

Beyond Planet Earth is made possible through the sponsorship of **Lockheed Martin Corporation**.

And is proudly supported by **Con Edison**.

Major funding has been provided by the **Lila Wallace-Reader's Digest Endowment Fund**.

MARCH

Discovery Night
Thursday, February 16
6–8 pm
Free (Registration required; call 212-769-5606)
Roam the Museum and enjoy special exhibitions after hours.

Global Weekend: Celebrate African-American History
Saturday, February 18
2–5 pm
Celebrate African-American History Month with activities and live performances.

February Break: Digital Universe Flight School
Monday, February 20–
Friday, February 24
9 am–4 pm
\$500
Middle school students can explore the technology behind Digital Universe. See page 20 for details.

Scales of the Universe
Tuesday, February 28
6:30 pm
Member tickets are \$13.50
Explore the range of scales in the universe with **Carter Emmart**, director of astrovisualization, and educator **Christina Pease**.

Philadelphia Flower Show
Sunday, March 4
9 am–6:30 pm
\$110
Escape winter at *Hawaii: Islands of Aloha*, the 2012 Philadelphia International Flower Show. Cost includes bus and garden tea.

Museum Inside-Out
Tuesday, March 6
6:30–8 pm
\$20
Explore the stones and fossils in the walls of the Museum with geologist **Sidney Horenstein**.

Carbon: Stardust to Seashells
Saturday, March 10
3–4:30 pm
Free (Registration required; call 212-769-5200)
Discover the amazing story of carbon in stardust, seashells, and beyond. Space is limited.

Milstein Science Series: Extremophiles
Sunday, March 11
11 am–4 pm
Free
Life in extreme environments may hold clues to life on other planets.

Beyond Planet Earth with Michael Shara
Tuesday, March 13
6:30–8 pm
Free for Adventurer Members and above (Registration required; call 212-769-5200)
Blast off into the future of space exploration with **Michael Shara**, curator of *Beyond Planet Earth*.

Family Insider “Night at the Museum” Tour
Saturday, March 17
5–6:30 pm
Free for Family Insider Members (Registration required; call 212-769-5606)
Explore the Museum’s most popular displays and specimens after hours.

Annual Isaac Asimov Memorial Debate
Tuesday, March 20
This year’s topic: “Faster than the Speed of Light.”

Behind the Scenes in Herpetology
Thursday, March 22
6:30–7:30 pm for families
7–8 pm
7:30–8:30 pm
\$35
Learn about fieldwork and collections with Curatorial Associate **David Kizirian**.

DON'T MISS

Whale Watch Weekend
Friday, May 18–Sunday, May 20
\$800 per person, double occupancy
\$900 single occupancy
Please register before May 1
Space is limited on this weekend trip with **Jay Holmes** to Provincetown for whale watching and more.

Credits:
The Museum's youth initiatives are generously supported by the leadership contribution of the **New York Life Foundation**.

The Presenting Sponsor of the Museum’s cultural public programming is
Metlife Foundation.

Support for Global Weekends is made possible, in part, by the Ford Foundation, the May and Samuel Rudin Family Foundation, Inc., the Tolan Family, and the family of Frederick H. Leonhardt.

Milstein Science Series is proudly sponsored by the Paul and Irma Milstein family.

SciCafe is proudly sponsored by Judy and Josh Weston.

Credits continue from page 15

Additional support for Beyond Planet Earth is generously provided by Marshall P. and Rachael C. Levine, Drs. Harlan B. and Natasha Levine, and Mary and David Solomon.

Presented with special thanks to NASA.

Journey to the Stars was developed by the American Museum of Natural History, New York in collaboration with the California Academy of Sciences, San Francisco; GOTO INC, Tokyo, Japan; Paplote • Museo del Niño, Mexico City, Mexico; and Smithsonian National Air and Space Museum, Washington, D.C.

Journey to the Stars was created by the American Museum of Natural History, with the major support and partnership of NASA, Science Mission Directorate, Heliophysics Division.

Made possible through the generous sponsorship of Lockheed Martin.

And proudly sponsored by Accenture.

Supercomputing resources provided by the Texas Advanced Computing Center (TACC) at The University of Texas at Austin, through the TeraGrid, a project of the National Science Foundation.

JANUARY

4
Wednesday
SciCafe: String Theory

5
Thursday
Frogs and Fables Tour

6
Friday
A Night at the Museum Sleepover

7
Saturday
Live Wolf Encounter

MAT Open House

9
Monday
Born to be Wild opens

10
Tuesday
After-Hours Tour of *Beyond Planet Earth: The Future of Space Exploration*

12
Thursday
Behind the Scenes in *The Butterfly Conservatory*

15
Sunday
Family-Friendly Highlights Tour

SpaceFest!

19
Thursday
Curatorial Tour of *Picturing Science*

20
Friday
One Step Beyond

23
Monday
A Universe from Nothing

24
Tuesday
Global Kitchen: Tonics and Tinctures

Field Trip to the Moon for Members

26
Thursday
SpaceJam

31
Tuesday
NASA Missions MAT applications due

FEBRUARY

1
Wednesday
SciCafe: Virus Hunters

2
Thursday
No Bones About It

4
Saturday
Story Pirates: My Museum Story

6
Monday
Dimitar Sasselov

8
Wednesday
Global Kitchen: Aphrodisiacs

9
Thursday
Behind the Scenes in Anthropology

11
Saturday
Members-Only Highlights Tour

13
Monday
Love on Display

14
Tuesday
Romance under the Stars

16
Thursday
Lunchtime Winter Bird Walks

Discovery Night

17
Friday
One Step Beyond

18
Saturday
A Night at the Museum Sleepover

Global Weekend: Celebrate African-American History

20
Monday
February Break: Digital Universe Flight School begins

23
Thursday
Lunchtime Winter Bird Walks

28
Tuesday
Scales of the Universe

MARCH

1
Thursday
Lunchtime Winter Bird Walks

Star Party

4
Sunday
Philadelphia Flower Show

6
Tuesday
Museum Inside-Out

7
Wednesday
SciCafe: Snake Venom Cancer Cures

9
Friday
A Night at the Museum Sleepover

10
Saturday
Carbon: Stardust to Seashells

11
Sunday
Milstein Science Series: Extremophiles

13
Tuesday
Beyond Planet Earth with Michael Shara

16
Friday
One Step Beyond

17
Saturday
Family Insider “Night at the Museum” Tour

18
Sunday
Family-Friendly Highlights Tour

20
Tuesday
Annual Isaac Asimov Memorial Debate

22
Thursday
Behind the Scenes in Herpetology

29
Thursday
Member Preview of *Creatures of Light*

31
Saturday
Creatures of Light opens

A North American Revival: The Conservation of an Iconic Museum Hall



American landscape artist Charles Shepard Chapman captured the Grand Canyon for the mountain lion diorama.

Over the last nine months, a comprehensive restoration project has provided a team of Museum specialists with an exceptionally rare opportunity: to step into the magnificent habitat dioramas of the historic Hall of North American Mammals.

Behind the glass, part of the thrill is seeing the artifice that makes these iconic scenes so real to millions of visitors. Here is crushed marble glistening like snow beneath two wolves,



James Perry Wilson re-created this Colorado scene in the wapiti diorama.

the animals' shadows, a deft dusting of powdered pigment.

Elsewhere, a closer look at the quaking aspens near a group of elk reveals real tree limbs attached to a wood, wire, and papier-mâché trunk. The gorgeous landscapes that usually play the supporting role of seamless backgrounds suddenly pop as paintings in their own right.

It is no less of a thrill to watch the expert team of conservators and Museum artists as they lead a major restoration of these treasured dioramas. A veritable workshop has been assembled and hidden from public view behind temporary plywood walls. The team has corralled specimens within a labyrinthine system of scaffolding to allow conservators and others direct access to the dioramas for a variety of unusual tasks that draw on the latest methods and materials in conservation. These include the labor-intensive process of restoring bison, bears, coyotes, pronghorn, skunks, and elk, whose fur faded over the years, back to their original hues with innovative dye mixtures identified by specialists at the Museum (see "The Natural Look" on page 19). These efforts are part of a comprehensive revival of this historic hall which, set for completion in Fall 2012, also includes bringing the lighting into accord with a citywide greening initiative and updating the interpretive text panels for 21st-century audiences.

Top photo © AMNH/J. Beckett and R. Mickens; bottom photo © AMNH/D. Firmin

The Hall of North American Mammals first opened in 1942 with 10 dioramas. After a wartime hiatus, more were added for a total of 41 displays, large and small, that create a spectacular record of North America's natural heritage. With some of the finest landscape paintings by artists such as James Perry Wilson and Belmore Browne, these dioramas have brought to life the bison of the Wyoming prairie, moose and the brown bears of Alaska, jaguars in Mexico, and the mountain lions in the Grand Canyon for millions of visitors each year. Generations of families have shared the excitement of discovering grizzlies in Yellowstone National Park, coyotes in California, and beavers in Michigan within the confines of this majestic hall. As in all of the Museum's dioramas, each scene has been carefully crafted to represent a snapshot of animals in a real place, cast in the light of a particular time of day or night, and based on precise field observations by scientists and on-site sketches of artists and photographers. The same careful approach—and the hope that these dioramas will continue to stand as a powerful educational force for wildlife conservation—have been the driving forces behind this latest effort to restore and conserve the Hall of North American Mammals for future generations.

As part of the project, new interpretive text panels overseen by Ross D. E. MacPhee, curator in the Division of Vertebrate Zoology, in collaboration with Roland Kays of the New York State Museum in Albany, will be installed to offer visitors an updated picture of the animals and their biological and ecological contexts. In addition to maps denoting each species's range and the exact location of the scene depicted, the new text panels will include illustrations that highlight modern scientific perspectives on these species. For example, recent research has revealed how Alaskan brown bears and otters distribute sustaining nutrients to their coastal ecosystems by consuming salmon, the scene depicted in the brown bear diorama. The panels will also include updated field guides to flora, other fauna, and geological features in the scenes and will call out some "hidden" details. The black bear diorama panel, for instance, will highlight bear claw marks on a cabbage palm in the scene, as well as an ivory-billed woodpecker, an iconic North American bird that is now considered extinct.

To learn more about diorama naming opportunities in the Hall of North American Mammals, please contact Amy Sonnenborn in the Museum's Development Office at 212-769-5176 or asonnenborn@amnh.org.



Belmore Browne painted what would become Alaska's Denali National Park for the Dall's sheep diorama.

Top photo © AMNH/R. Mickens; bottom photo © AMNH/J. Beckett and C. Chesek



Taxidermist George Dante touches up a spotted skunk.

The Natural Look

As far as catering to the client, the toniest hair stylists in Manhattan or L.A. have nothing on the Museum's conservators. To find just the right product to restore faded furs on the specimens displayed in the Hall of North American Mammals, staff members in the Museum's Objects Conservation and Natural History Conservation labs undertook months of painstaking research. The results of their work, which will be published in a scientific paper this year, may set a new standard in the field of conservation.

The challenges were many. The product could not require a final rinse—as do most over-the-counter hair colorings—because water risks introducing mold, shrinking the skins, weakening seams, and even rusting metal armatures that might be inside a specimen. It had to be as light-stable as possible to stay true under Museum display conditions for years to come. It couldn't clump, mat, or bind the fur together in any way.

Through much trial and error—including high-tech scanning of the effects of typical taxidermy paints and accelerated-aging tests of variously dyed samples—the team eventually decided on a relatively inexpensive solvent-delivered dye used commercially in everything from wood stains to ink. But the quest was not complete. Now came weeks of mixing shades of the chosen dye to achieve colors to match pristine study skins of the animals in question as well as the well-preserved background paintings in the dioramas. (It took 15 days for the project taxidermist to formulate the seven colors used on the bison alone.)

Once the colors were mixed, the specimens were cleaned through vacuuming, dry-cleaning with microfiber cloths, and, in some cases, application of an aqueous-solvent mixture. Now, at last, the careful airbrushing could begin, bringing bleached-blond back to brilliant.

Star Turn for Middle School Students

Adventures in Science
Too young for Flight School?
Check out these winter options.

Grades 1 and 2 (with adult)

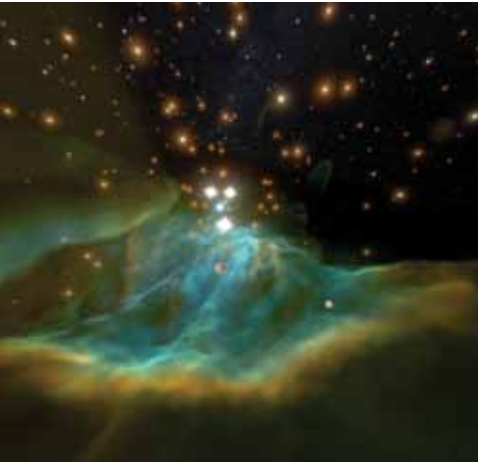
**Twinkling Stars:
Gods and Heroes**
January 23 and 30
4:30–6 pm, \$60
Learn the mythic histories of
stars in this two-class program
that includes observations in
the Hayden Planetarium.

Grades 3, 4, and 5

Inside Your Brain
January 11, 18, and 25
4–5:30 pm, \$90
This three-class program
explores concepts in
neuroscience.

**Beyond Planet Earth
Workshop**
February 2, 9, and 16
4:30–6 pm, \$90
This three-course workshop
focuses on space exploration
and includes exhibition visits.

Imagine creating your very own Space Show—and then seeing it presented on the dome of the Hayden Planetarium. That’s the thrill in store for a select group of 20 middle school students who participate in the Museum’s first-ever Digital Universe Flight School this February. Over the course of one week, 6th-, 7th-, and 8th-grade students will discover how to navigate to planets in the solar system and beyond using the Museum’s Digital Universe Atlas, a three-dimensional, scientifically accurate map of the cosmos, and learn about how the atlas is built. As a final project, students will use sophisticated gaming laptops to create a digital tour to their favorite spot of the universe—Mars, a nebula, the spiral galaxies—which will be shown in a special evening program in the



Create a Space Show in Digital Flight School.

Hayden Planetarium on Friday, February 24. Taught by an earth scientist and an astrophysics teacher, the course will run from 9 am to 4 pm from Monday, February 20, through Friday, February 24, a schedule that coincides with the New York City public school midwinter break. (The program will be repeated from July 9 to 13 to give the same chance to students whose break falls at a different time.) The fee is \$500, and applications are due February 1. To apply, students must submit a recent report card and an essay. “We’re asking kids to really think about why they would be interested,” says Siva Ramakrishnan, manager of the Museum’s Adventures in Science program. Ramakrishnan says she was inspired to develop the program after learning to “fly” with the Digital Universe software herself. “I don’t have an astrophysics background,” she says. “And I thought, if I can learn this, then kids can learn this and, in doing so, learn about how the Museum visualizes data using amazing software.” Not that it’s not a challenge. Says Ramakrishnan, from her own experience, “Landing on a planet is not easy!”

For more information, email Siva Ramakrishnan at sramakrishnan@amnh.org.

The Museum’s Youth Initiatives are generously supported by the leadership contribution of the New York Life Foundation.

Reminders for Members

Discovery Night
Thursday, February 16
6–8 pm
Free for Members
Kindly RSVP to the Membership Office by calling 212-769-5606. Become an explorer and roam the Museum after hours. Take part in self-guided tours and enjoy the major exhibition *Beyond Planet Earth* during this evening reserved especially for Members.

Star Party
Thursday, March 1
6:30–9 pm
Free for Members at the Voyager and Family Voyager levels and above
Kindly RSVP to the Membership Office by calling 212-769-5606. Stargaze on the Arthur Ross Terrace, watch special presentations in the Hayden Planetarium, enjoy activities and crafts for children, and more at this annual event.

**Creatures of Light:
Nature’s Bioluminescence
Member Preview**
Thursday, March 29
4–8 pm; reception begins at 5 pm
Free for Members
Kindly RSVP to the Membership Office by calling 212-769-5606. See *Creatures of Light*, the Museum’s new special exhibition, before it opens to the public. Learn about the variety of bioluminescent creatures on Earth, the different ways in which organisms glow, and the physics and chemistry of natural light.

Member Open House
Thursday, April 19
6–8 pm
For Members at the Adventurer Level and above
Enter at Central Park West
Kindly RSVP to the Membership Office by calling 212-769-5606. See *Beyond Planet Earth* and *Creatures of Light*, learn about current research at the Museum, and enjoy a reception in the Theodore Roosevelt Rotunda.

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Sky’s the Limit in Research Mentoring Program



Katie Bartel, Becky Stoner, and Sophia Wilansky, above, researched multiple star systems with a scientist from the Museum’s Department of Astrophysics.

High school students who participate in the NASA-funded Science Research Mentoring Program (SRMP) at the Museum don’t just have stars in their eyes. They also have their sights set on black holes, comet dust, and the sticky issue of the viscous transport of oxygen through the galaxy. The multi-year education program, which pairs teens with scientist mentors in the Museum’s Departments of Astrophysics or Earth and Planetary Sciences, was launched in September 2009. It is managed by a senior research scientist in the Department of Astrophysics, Sebastien Lepine, and modeled on the successful biology-focused SRMP program funded by the National Science Foundation (for more on that program, see *Rotunda’s* Summer 2011 issue). Students begin by taking any of the five NASA-funded courses offered through the Museum’s After-School Program: Wonderful Universe, Secrets of the Solar System, DIY Astronomy, Stars, or Dynamic Earth. Each of the courses, which are free to high school students, is taught twice a year. Last year, 15 students who excelled in at least three of the five courses were offered the opportunity to apply for a research internship in the NASA SRMP program. Once accepted, the students met with their mentors for four hours a week beginning in September to create computer models to analyze a variety of cosmic puzzles. Last year, for example, Catherine Hong and James Buckland created a model to analyze whether the movement and distribution of oxygen throughout the galaxy could be explained by viscous transport—a process whereby natural turbulence moves material evenly through a system, much the same way as milk diffuses in a cup of coffee. Hong and Buckland discovered that viscous transport

did not sufficiently explain the distribution of oxygen away from the galactic center, where it is produced; a mysterious, “as yet unexplained mechanism” was responsible. “Many high school students are intimidated by scientists and think the work of science is too complicated for them to accomplish,” says Lepine, who last year mentored three students who studied archival Hubble Space Telescope images to hunt for double star systems within 150 light years of Earth. “But the SRMP Program shows them that while science is complicated, it’s something that they can do by themselves if they want to do it—no super powers required.”

For more information about the Museum’s courses in astronomy and planetary sciences, visit amnh.org.

The Science Research Mentoring Programs are supported by the National Science Foundation under Grant No. DRL-0833537, and by NASA under grant award NNX09AL36G.

Generous support for this program is provided by Wells Fargo.

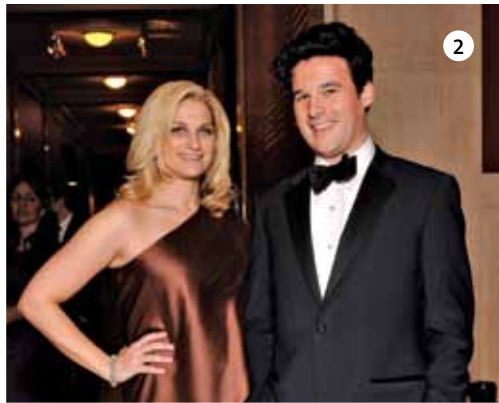
Additional support for this program is provided by the Pinkerton Foundation, the Adolph and Ruth Schnurmacher Foundation, and the Charles and Mildred Schnurmacher Foundation.

Complimentary test preparation and college admissions support for program participants is generously provided by Kaplan Test Prep.

© AMNH/R. Mickens



1. Museum Gala Chairs Kathy Freston and Tom Freston, a Museum Trustee, photographed with Sherri Creighton at the Museum Gala on November 10.
2. Claire and Collin de Rham enjoyed the festivities at the Museum Gala.



3. One of the highlights of the 2011 Museum Gala was a performance by the band Coldplay.
4. Marianne Lafiteau, representing GRAFF, sponsor for the evening, Andres Soriano, and Donya Sabet photographed at the Museum Gala.
5. Museum Trustee Richard LeFrak and Karen LeFrak, Judy Cox, and Muffie and Sherrell Aston, photographed in the Milstein Hall of Ocean Life during the Museum Gala.
6. Museum Trustee Roberto Mignone with Allison Mignone and Jacqueline and Mortimer Sackler, photographed at the Museum Gala.

Photos © AMNH/D. Finnin



1. On October 18, children enjoyed arts and crafts at the annual Family Party, proceeds from which support the Museum's educational and scientific programming.
2. Young guests at the Family Party had the chance to interact with live animals, including a tortoise.

3. At the Member preview for *Beyond Planet Earth* on November 15, Members tried their hand at terraforming Mars at this custom interactive table.
4. Deflecting doomsday asteroids, another popular interactive exhibit in *Beyond Planet Earth*, was a hit during the November 15 Member preview.

Save the Date! Upcoming Events at the Museum



MARCH

3/1 The annual **Star Party** will include a reception in the Rose Center for Earth and Space, star-gazing on the Arthur Ross Terrace, activities for families, and more. Free for Members at the Voyager and Family Voyager levels and above.

3/8 Dance the night away at the annual **Museum Dance**, the social event of the season.

3/20 The annual **Isaac Asimov Memorial Debate** will be on the topic "Faster Than the Speed of Light."

3/29 Members will have the first chance to see the exciting new exhibition ***Creatures of Light: Nature's Bioluminescence*** at this exclusive preview. Free for Members.

3/31 ***Creatures of Light*** opens to the public.



APRIL

4/19 Learn about the latest Museum research at the **Member Open House**. Free for Members at the Adventurer and Family Adventurer levels and above.

4/25 Join us for the **22nd Annual Environmental Lecture and Luncheon**.

MAY

5/18–5/20 Join a **Whale Watch Weekend** in Provincetown with Museum educator **Jay Holmes** and enjoy whale watches, guided bird walks, and more.

JUNE

Enjoy a **Member Breakfast** in the Wallach Orientation Center and tour ***Creatures of Light*** and Fossil Halls during this special morning event. For Members at the Adventurer and Family Adventurer Levels and above.

JULY

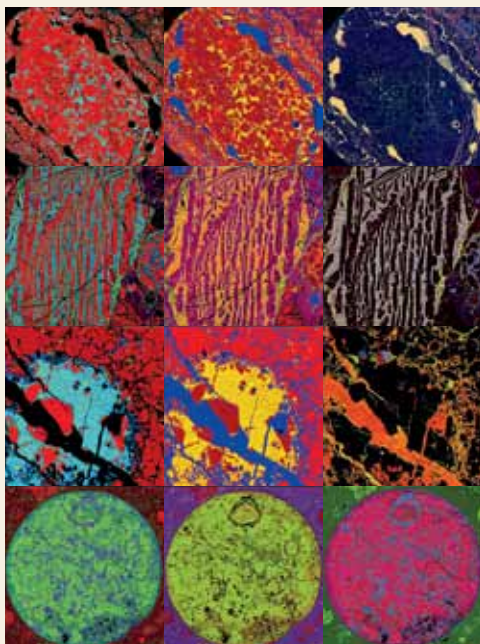
Explore the fascinating world of arachnids in ***Spiders Alive!***, the Museum's new live-animal exhibition, which opens this month.

Central Park West at 79th Street
New York, New York 10024-5192
amnh.org



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Meteoriticist Denton Ebel, curator in the Museum's Department of Earth and Planetary Sciences, uses an electron microprobe to excite the atoms on the surfaces of meteorite samples such as the ones above to reveal their mineral composition. Images from his research, as well as from research by Museum scientists from all major divisions, are exhibited in *Picturing Science: Museum Scientists and Imaging Technologies*, now on view.

General Information

HOURS

Museum: Open daily, 10 am–5:45 pm;
closed on Thanksgiving and Christmas.

ENTRANCES

During Museum hours, Members may
enter at Central Park West at 79th Street
(second floor), the Rose Center/81st Street,
and through the subway (lower level).

RESTAURANTS

Museum Food Court, Café on One,
Starlight Café, and Café on 4 offer
Members a 15% discount. Hours are
subject to change.




MUSEUM SHOPS

The Museum Shop, DinoStore,
Shop for Earth & Space,
Cosmic Shop, Space Shop,
and Online Shop (amnhshop.com)
offer Members a 10% discount.

PHONE NUMBERS

Central Reservations 212-769-5200
Membership Office 212-769-5606
Museum Information 212-769-5100
Development 212-769-5151

TRANSPORTATION AND PARKING

Subway:  (weekdays) or  to 81st Street;
 to 79th Street, walk east to Museum
Bus: M7, M10, M11, or M104 to 79th Street;
M79 to Central Park West
Parking Garage: Open daily, 8 am–11 pm;
enter from West 81st Street. Members can park
for a flat fee of \$10 if entering after 4 pm.
To receive this rate, show your membership card
or event ticket when exiting the garage.