Smithsonian Institution

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Research Reports

AMERICAN HISTORY

Commemorative exhibition on Sept. 11 allows visitors to remember, reflect

By Janice Kaplan
Special to Research Reports

A day after the Sept. 11 terrorist attacks, curators at the Smithsonian's National Museum of American History, Behring Center began to discuss the museum's role in documenting the national tragedy. While the Smithsonian had sent staff to collect artifacts during the Spanish-American War in 1898 and, more recently, during the anti-Vietnam War protests of the 1960s, there was little precedent for responding to a contemporary event.

"It is important to balance our need to document what happened on Sept. 11 with a historical perspective," Bill Yeingst, a museum specialist in the Division of Social History, says. "As a curator, you have to be able to look forward 50 years from now, 100 years from now."

The sometimes heated discussions that took place in the days following the attacks were "some of the best we've ever had about what we at the National Museum of American History do," says Yeingst, who has worked at the Smithsonian for 23 years.

How and what to collect

The collections committee, made up of staff from many of the museum's units, met several times last fall to discuss what and how the museum should collect and to establish overall guidelines relating to Sept. 11, since the event fell outside the existing collecting framework.

Ultimately, the committee determined that their efforts should extend to all three sites related to the attacks—the World Trade Center, the Pentagon and Shanksville, Pa.—and that the focus of their collecting should be not only on the attacks but also on the rescue efforts and the recovery operation. Throughout the discussions, one point was made over and over: Any efforts must be respectful of the survivors and families directly affected by the attacks.

Passage of a public law, signed by President Bush, giving the Smithsonian the authority to collect artifacts relating to Sept. 11 was useful in opening doors, especially at agencies such as the U.S. Department of Defense and police organizations that are not accustomed to sharing information. Personal contacts at the Pentagon helped the Smithsonian staff penetrate that usually closed culture.

This approximately 2-by-4-foot American flag, which was recovered amid World Trade Center debris at the Fresh Kills Landfill, is now in the National Museum of American History's permanent collection and on view in the "September 11" exhibition. (Photo by Hugh Talman)

What kinds of artifacts were of interest to the Smithsonian? "We were looking for objects that allow us to tell stories," Yeingst says. There were certain artifacts the curators hoped to acquire: pieces of the damaged structures in New York and Virginia, parts of the airplanes and objects associated with the rescue and recovery efforts.

"Our greatest challenge," Yeingst adds, "was finding ways to represent the human element. It's easy to collect a piece of a building, but how do you find ways to represent thousands of people who lost their lives and thousands of surviving victims? How do you represent the more than 2,000 people who died in the upper floors of the World Trade Center? Is it with their business or ID cards?"

Research, word of mouth and press accounts led curators to a variety of witnesses. They met with members of the fire and police departments of the City of New York, Department of Defense officers, the FBI, representatives of United and American airlines, families of victims, survivors, rescue workers and politicians. The staff visited ground zero in New York, which was once the sight of the World Trade Center, and the personal effects depots at the Fresh Kills Landfill on Staten Island in New York and at Fort Meyer in Virginia, the Pentagon and the crash site in Pennsylvania.

Collecting artifacts

Among the items donated to the museum was the baseball cap New York Mayor Rudolph Giuliani wore in the days following the attack. It was donated by Sen. John Warner of Virginia who went to visit ground zero, where he and Giuliani traded caps in a gesture of solidarity. The New York mayor's cell phone also is part of the collection.

So is the standard desk phone used by Solicitor Gen. Ted Olsson, who received several calls from his wife, Barbara, who was on the plane that crashed into the Pentagon. "We wanted to represent the phone calls made between passengers and their loved ones on the ground," David Shayt, a museum specialist in the Cultural History Division, says.

Giving 'voice' to objects

One of the most dramatic artifacts is a piece of twisted steel from the World Trade Center. As the pieces of the World Trade Center buildings were removed from ground zero, they were taken by barge to a scrap yard in New Jersey or by truck to the Fresh Kills Landfill. In the scrap yard, the Smithsonian curators searched for a piece of the World Trade Center "that was big enough to represent the calamity but small enough to fit through our doors," Shayt says. They selected a piece 10 feet high that, according to markings, is from the 70th floor of the South Tower.

Every object collected by the curators has a story to tell, representing tales of resilience and survival, as well as stories of tragedy and enormous losses of life. For instance, an ordinary squeegee donated to the museum by Jan Demczur was used by the window washer to break out of an elevator and exit the World Trade Center.

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A window washer used this squeegee to break out of a World Trade Center elevator and helped save his own and others' lives.

Profiles in Research

Veterinary care ■ In the same week that an adorable Sumatran tiger cub named Berani was making his debut in the Great Cats outdoor habitat at the Smithsonian's National Zoological Park, a nameless armadillo was admitted to the National Zoo's hospital.

As the supervisory veterinary medical officer, or head veterinarian, in the National Zoo's Department of Animal Health, Suzan Murray is responsible for all aspects of animal heath care for the entire collection, from the high-profile tiger cub to the ailing armadillo. Murray joined the National Zoo in 2000, after Lucy Spelman was promoted from head veterinarian to director. But Murray is no newcomer to the National Zoo. She did her fourth-year rotation in veterinary school there, as well as her residency, and has worked with many of the staff off and on for a decade.

Spelman, Murray says, has been very supportive. "Since Dr. Spelman has an acute sense of an animal's medical needs, she is often in a position to provide support," Murray says. "If the hospital needs a new piece of equipment or a certain drug, she's in a good position to assess the impact it will have on the collection."

That collection numbers 3,700 animals of 450 species. It includes all creatures great and small: primates, carnivores, hoofstock, reptiles, tropical fish, birds, invertebrates, elephants and rhinoceroses. For Murray, there is no such thing as a typical week. She begins most days with rounds in the National Zoo's hospital, followed by a discussion about issues that have come up overnight with several vets and animal keepers, a technician, a nutritionist and, sometimes, a representative from pathology. Her job description includes everything from preventive health care to diagnosis and treatment of a wide range of illnesses.

Suzan Murray listens to an emu.

While the public is frequently aware of animals such as giant pandas Mei Xiang and Tian Tian, Asian elephant Kandula and young gorilla Kojo, Murray must also focus her attention on animals that are not in the spotlight. Recently, she has followed the progress of an ailing Micronesian kingfisher—one of only 60 in the world—that is suffering from a fungal infection of the lungs. She treated a beaver suffering from inflammation of the perineum, looked after a red tail hawk with hepatitis and arranged for a consult with an ophthalmologist on a bear with a degenerative eye condition.

Any parent who has ever accompanied a child to the pediatrician for blood work can appreciate what a feat it was when Murray recently drew blood from a 3,000-pound rhinoceros without anesthetizing her. She is especially proud of that team effort, which was achieved after keeper Erin Jewell trained the rhino to extend her leg and hold still.

The mother of a 4-year-old and 18-month-old twins, Murray grew up on Long Island. She met her future husband in the cafeteria at Amherst College when she asked if any of her tablemates wanted to travel to Africa after graduation. He volunteered. They returned a year later so she could attend veterinary school at Tufts in Boston.

"In school, they say that 98 percent of vets knew they wanted to be a vet for as long as they can remember," she says. "I'm one of those people." Murray grew up on National Geographic specials, summers at her grandparents' farm in Germany and caring for the family cats, guinea pigs and hamsters. As a child, she says, Jane Goodall—the world's foremost authority on chimpanzees—was her role model.

Research for her graduate school thesis took Murray to Gombe, Tanzania, where she studied parasite transmission between chimps and baboons. Goodall served as her adviser. "That," she says, "was the realization of a dream."—*Janice Kaplan*

Surrounded by satellite images are, from left, Dave Leverington, Ted Maxwell, Ross Irwin and Robert Craddock of the Center for Earth and Planetary Studies at the Smithsonian's National Air and Space Museum. (Photo by Carolyn Russo)

GEOLOGY

Evidence of a lake suggests Mars was warmer, wetter than previously thought

By Peter Golkin
National Air and Space Museum

By studying detailed satellite images of the surface of Mars, a team of geologists at the Smithsonian's National Air and Space Museum have discovered a large former lake in the highlands of Mars that overflowed to carve one of that planet's largest valleys. On Earth, the lake would cover Texas and New Mexico combined. Their findings were published in the June 21 issue of the journal Science.

The flood channel, known as Ma'adim Vallis, is more than 550 miles long and up to 6,900 feet deep, making it larger than the Grand Canyon.

"Imagine more than five times the volume of water in the Great Lakes being released in a single flood, and you'll have a sense of the scale of this event," Geologist Ross Irwin of the museum's Center for Earth and Planetary Studies says. Irwin was lead author of the paper on which the Science article was based.

Mars is now a cold desert planet, but its many dry valleys could indicate that water once flowed on its surface. Recent results from the National Aeronautics and Space Administration's Mars Odyssey spacecraft found evidence of water ice trapped near the surface of the polar regions.

"The size of this lake—1,400 miles long—suggests Mars was warmer and wetter than previously thought," Robert Craddock, a geologist in the National Air and Space Museum's Center for Earth and Planetary Studies, says. Craddock; Ted Maxwell, associate director for collections and research at the museum; and Dave Leverington, a geologist in the center, also were co-authors of the paper.

A road map

Former lakes are considered the most likely places to preserve the record of past Martian life. Calm water would allow sediments to be deposited slowly, preventing small organisms from being destroyed.

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Evelyn Lieberman, *Director of Communications and Public Affairs*
Kathryn Lindeman, *Associate Director*
Jo Ann Webb, *Editor*
Colleen Hershberger, *Assistant Editor*

Telephone: (202) 357-2627
E-mail: researchreports@publicaffairs.si.edu
Internet: www.si.edu/researchreports

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A Michelangelo drawing is found in Smithsonian design museum collection

By Jo Ann Webb
Smithsonian Office of Public Affairs

Who would have thought that an inconspicuous box sitting in storage for decades in a design museum would contain a black chalk drawing that would rock the art world? Certainly not the museum officials at the Smithsonian's Cooper-Hewitt, National Design Museum in New York City, where the drawing was found.

Sir Timothy Clifford, an Italian Renaissance scholar and director of the National Galleries of Scotland in Edinburgh, was in New York City on vacation when he stumbled upon an unsigned drawing of an elaborate candelabrum by Italian master Michelangelo (1475-1547) at the museum. He had been rummaging through a box of drawings of lighting fixtures at the Cooper-Hewitt when his eye caught a particular drawing of a candelabrum. Instantly, he knew that he had found a "buried treasure."

Although acquired in 1942 from Colnaghi's as part of a group of decorative drawings that sold for $60, the almost 500-year-old work may now be worth as much as $10 million to $12 million. There are fewer than a dozen Michelangelo drawings in the United States.

"Such a discovery occurs once in a museum's lifetime," Cooper-Hewitt Director Paul Thompson says.

An art hound at work

Not your typical vacationer who opts for lazy days and casual evenings, Clifford enjoys spending his leisure time looking for art treasures, whether sorting through undisturbed boxes of drawings in museums and galleries around the world, checking out art dealers' "back rooms" or scouting out flea markets. His vacation to New York City this summer, with its host of museums and galleries, wouldn't be any different.

Thus, he made an appointment at the Cooper-Hewitt to snoop through its storage boxes of drawings. Box by box, he studied each drawing, looking for telltale signs of a masterpiece. But after several weeks and hundreds of boxes, there were no real finds.

So when he began sorting through "Box 366, Light Fittings II," there were no high expectations. Inside, he found several 18th- and 19th-century drawings by little-known artists. But when he came across a black chalk drawing, attributed to the 16th-century Italian painter Perino del Vaga (1501-1547), Clifford stopped, took a good look and knew instantly that it had been mislabeled. The drawing was not by Perino; instead, the artist was Michelangelo.

Having seen and studied an enormous number of Michelangelo drawings and paintings, Clifford was certain of his discovery. "It is just as you would recognize an old friend on the street," he said in news reports.

The real McCoy

After Clifford attributed the drawing to Michelangelo, the Cooper-Hewitt had to decide whether it was going to support his claim. If so, research needed to be done.

"I am completely skeptical about these things," says Sarah Lawrence, acting director of the Cooper-Hewitt master's program in the history of the decorative arts, who also is a scholar of the Italian Renaissance period.

Scholars have different approaches to authenticating works of art, she adds. "While the most gifted can have a strong intuitive reaction and then go about the work of demonstrating that the attribution is correct, my approach is different. I was looking at how the drawing was made. Just because it looks like a Michelangelo doesn't mean that it is. It could have been done by one of his shop assistants or by a follower who copied his style."

Michelangelo, Lawrence explains, had a very idiosyncratic style. His drawings were laid out using a stylus, a tool used to mark out ruled lines. When she looked at the drawing of the candelabrum, a stylus had been used to make one of the sketchings in the lower left-hand corner. Perino, to whom the drawing was credited, had never used the stylus in any of his works.

This 17-by-10-inch drawing of a candelabrum was recently attributed to Michelangelo.

The museum followed up on Clifford's claim and invited in scholars from the Metropolitan Museum of Art in New York City and the J. Paul Getty Museum in Los Angeles. They confirmed Clifford's opinion of the drawing.

The drawing was then hand-carried to London to be studied by noted Michelangelo scholars there. To avoid one scholar from influencing the decision of another, Cooper-Hewitt officials had each look at it individually and at different times.

By carefully comparing it with other signed Michelangelo drawings, each scholar agreed that the drawing was indeed the real McCoy.

"I was just amazed and delighted," Lawrence says.

Sarah Lawrence hand-carried the Michelangelo drawing to London for further study by noted Michelangelo scholars. (Photo by Jill Bloomer)

Corrections

A photo caption about lunch boxes on Page 6 of the Summer issue of Research Reports states that the miners pictured were from the 19th century. The image is actually from the 20th century.

In the same issue, an article on Page 3 about Navy silver identified the USS Long Beach as a nuclear submarine. In fact, it was a nuclear-powered guided missile cruiser.

Native American pictorial calendars reveal an interest in sequential time

By Colleen Hershberger
Smithsonian Office of Public Affairs

Before the 20th century, most Native Americans did not keep track of time or recount events in terms of years. However, this was not the case for many Plains Indians. "They were very much concerned with time," says Candace Greene, an anthropologist in the Smithsonian's National Museum of Natural History.

Instead of using numbers to mark years, they associated each year with a memorable event. A drawing depicting the event was then added to an animal hide that contained pictures representing all the previous years. These records are called winter counts, as most of the Plains tribes, which included the Lakota Sioux, the Kiowa, the Mandan and the Blackfeet, started their years in winter.

The drawings served as a mnemonic device for the year's name. For instance, the year "They Had Much Meat" on one Sioux calendar is represented by a rack loaded with meat hung to dry.

The name of the year was then used as a way of placing other events within a timeframe. Recounting an important battle, a storyteller might say it happened the "Year the Woman's Feet Froze."

What's in a name?

The "Year the Woman's Feet Froze" referred to the year that a Kiowa named Big Bow convinced another man's wife to elope with him. She waited in the woods while he went home to collect gear. His suspicious father delayed him for hours. When Big Bow returned to the woman, her feet were frozen.

"Whenever this year name was mentioned, people would remember the story," Greene says. This year's name is an example of one that helped support social mores.

To determine the name, leading men of each tribe would gather to discuss and choose an event from the last four seasons to be the year's reference. "It had to be memorable and unique, but the reference was not necessarily of great importance or a historical landmark," explains Greene, who is studying the Smithsonian's collection of Native American calendars.

Greene also has noticed that the names of the years refer to events that everyone in the community was allowed to discuss. "Noticeably absent are events that only one individual may have had the prerogative to talk about, such as their particular battle deeds," she adds. "These are the events pictured on personal possessions, including buffalo hides and books of drawings."

Picking out patterns

Scholars can deduce historical information by comparing the events referenced among different calendars. "You look for patterns," Greene explains. "For example, one can track major occurrences, such as astronomical or climatic events, epidemics or the movement of tribes across geographic locations and among bands.

"There is one event that every calendar refers to," Greene continues. "There was a major meteor storm in November 1833, and many called this something like the 'Year the Stars Fell.'" In addition to astronomical events, other happenings that show up in calendars include deaths, epidemics, battles and location changes.

Political history may also be extracted. If two calendars recorded corresponding events and then suddenly began to reference different events, "one might extrapolate that the tribal bands had separated and were in less interaction," Greene says.

While the calendars are valuable in studying Plains history, Greene is most interested in what they can relate about Plains culture.

Calendar keepers

"We know relatively little regarding the calendar keepers themselves," Greene says. Calendar keeping was usually the responsibility of one man for each tribe or band.

Librarians Mona Grey Bear, left, and Vivian High Elk, right, hosted Candace Greene when she gave her presentation on the winter counts project at the Si Tanka Huron University library on the Cheyenne River Sioux Reservation in South Dakota. (Photo by Christina Burke)

"We do know that they were respected individuals who participated widely in society," she says. "We also know that they were all men, which is consistent with the Plains Indians' practice of men creating representational art and women producing geometric art. And we know that calendar keepers trained apprentices, often sons or nephews, to ensure that their knowledge was preserved."

Researchers today are able to "read" the pictorial calendars largely because of interpretive documents in the National Museum of Natural History's National Anthropological Archives. "Some collectors of the 1870s and 1880s recorded explanations of the pictures and their stories," Greene explains. "The texts as dictated by the calendar keepers themselves are a rare treasure of the Smithsonian."

Calendar keepers often permitted collectors to make a tracing of the calendar, or the keeper made a copy, sometimes drawing it in the collector's notebook. It was common for calendars to be copied, especially since they were painted on perishable items, such as animal hides or muslin.

Sharing old with new

The Smithsonian has the largest and most documented collection of Lakota winter counts, Greene says, with a total of 16 calendars in the National Anthropological Archives and at the Smithsonian's National Museum of the American Indian. She is editing a volume on the collection, with support from the Smithsonian's Repatriation Review Committee and Ann McMullen, a curator at the National Museum of the American Indian.

In June, Greene visited several Sioux reservations in South Dakota to discuss plans for the publication. "I wanted to let Lakota people know about the materials in the collection and how they were acquired," Greene says. Their response to the publication was overwhelmingly positive.

"They knew about winter counts and were enthusiastic about having the information published," Greene adds. "I also asked them how we could best serve them, make the information more accessible to them. Unanimously, I heard, 'Put it on the Web.'"

Despite poverty and rural locales, these reservations are completely Internet-wired to

'Native calendars,' continued on Page 6

These images are from a winter count that Lakota calendar keeper Cloud Shield copied into a notebook in 1879. This page from the notebook covers the winters of 1802/1803 through 1806/1807. The events shown include war and peace with the Omaha and the coming of various white traders, including a man known as Little Beaver—as shown by the small drawing of a beaver above his head.

The National Zoo: On the frontline of conservation in the 21st century

By Margie Gibson
Smithsonian's National Zoological Park

The *Cynisca bifrontalis* was last spotted in Africa in 1906. The self-tunneling, blind, wormlike reptile lives underground, using its head to burrow through various types of soil. The odd, pink, 4- to 6-inch creature, known as an amphisbaenid, is just one of the finds that researchers in the Monitoring and Assessment of Biodiversity program at the Smithsonian's National Zoological Park have turned up in the Gamba Complex of Gabon.

Gabon, located in Central Africa, between Cameroon and the Republic of Congo, is a rich storehouse of biodiversity—from its insects, amphibians and reptiles to birds and mammals. One of Africa's most prosperous nations, it is about the size of Colorado and has a population of 1.2 million.

Francisco Dallmeier, director of the Monitoring and Assessment of Biodiversity program, and a team of biologists from the Smithsonian and other research institutions, is working to ensure that *Cynisca bifrontalis*, along with thousands of other species, will survive in the wild. The program is in the midst of a field project to document the status of rain-forest habitat in the Gamba Complex.

Gamba riches

The Gamba Complex is an expanse of extensive, relatively undisturbed tropical rain forest. With more than 4,250 square miles of tropical forests bordering the Atlantic Ocean and extending about 60 miles inland, the Gamba Complex contains a largely functional rain-forest ecosystem, despite oil extraction and commercial logging.

The region covers about 4 percent of Gabon's territory and is home to about 8,000 people, most of them linked to oil operations by Shell, Elf and Perenko. Shell Gabon and the Shell Foundation are cosponsoring the Monitoring and Assessment of Biodiversity program in the region.

Hidden treasures

To document the region's wildlife and to better understand the health of the ecosystem, the Monitoring and Assessment of Biodiversity program established research teams to study vegetation, aquatic systems, insects, amphibians, reptiles, birds and mammals.

"Establishing an initial biological baseline is an essential step in securing long-term *in situ* conservation," Dallmeier says.

"The degree of variety among the vegetation in the Gamba Complex provides the foundation for the rich diversity of species in the area," he adds. "We are just beginning to understand the ecological puzzle and to help create a long-term conservation and management strategy."

The first stage of research, which focused on the upland, nonflooded forests around Rabi in the northern part of the region, indicated that of Gabon's 10,000 plant species, more than 3,000 grow in the Gamba Complex. Early evidence gathered from the study shows that the forests are dynamic, old-growth stands. Specimens sampled are now being studied at Gabon's National Herbarium and the Smithsonian's National Museum of Natural History.

In nine months, according to Alfonso Alonso, the Monitoring and Assessment of Biodiversity program director for conservation and development, the entomology team examined more than 280,000 insects, prepared 13,000 specimens and added samples from nearly 200 different families to the program's reference collection. The collection is housed in the Vembo Biological Laboratory, which was established last fall and is becoming an important regional processing and learning center.

"Hundreds of new species may be identified from the specimens found during the field research," Oliver Missa, manager of the Vembo Biodiversity Laboratory, says.

The entomology team is sorting specimens according to body shape and structure, and sending them to specialists around the world for proper identification or description as a new species. The findings will help develop the most complete reference collection in Central and West Africa.

The large swaths of contiguous forests—a rich habitat for reptiles and amphibians—provide a wealth of information for the herpetofauna team. Many reptile and amphibian species have been found, including a rare snake, the *Grayia caesar*, known from only about 30 specimens found in museums.

"Our initial surveys indicate that the Gamba Complex may contain up to 70 percent of amphibian and reptile species reported in Gabon," Michelle Lee, Gabon project coordinator, says.

The forests also are home to hundreds of bird species. To date, the ornithological team has documented more than 200 different species in the study area. Birds are important in a forest habitat because of their roles as pollinators, seed dispersers and consumers of plants and insects. Since many species are highly vulnerable to human-induced changes to the environment, they are vital in biodiversity assessments.

"We are working to provide a complete species account for the area, as well as to identify critical human-induced changes in the habitat that may affect bird species composition," says George Angehr, a researcher at the Smithsonian Tropical Research Institute in Panama and team leader for bird research.

Mammals are the best known and most familiar group of animals, and they abound in the Gamba Complex. Plant-eating animals, such as elephants, can have a big impact on vegetation while carnivorous animals, such as leopards and jackals, help regulate populations of other animals. At least 30 species of medium and large-size mammals, including lowland gorillas, chimpanzees and forest elephants, have been identified. Most show little fear of humans.

"By examining every niche of the forest," says Bill McShea, researcher at the National Zoo and the mammal team leader, "our comprehensive survey is unveiling some of the secrets of this rain forest—a complex community of mammals with several degrees of specialization."

The Monitoring and Assessment of Biodiversity program is now preparing for initial assessments in the Petit Loango area, a region considered a jewel of biodiversity. Evaluation of the area, west of the Gamba Complex, offers the teams an opportunity to gather baseline data that will be used to make plans for the area's management and potential designation as a national park.

Using a field guide, field assistants and trainees Landry Tchignoumba, left, and Hervé Omva Ovono, center, assist Brian Schmidt, a museum specialist in the Smithsonian's National Museum of Natural History. (Photo by Carlton Ward Jr.)

The benefits of training

Training local people in conservation and biological sciences is as much a part of the Monitoring and Assessment of Biodiversity program's mission as preserving biodiversity. The program's staff have already created a network of more than 300 biodiversity monitoring sites around the world. The sites are maintained by more than

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'Mars,' continued from Page 2

The source of the water that carved the flood channel had been a mystery to scientists, who knew little about Mars' topography prior to NASA's Mars Global Surveyor mission, which has been orbiting Mars since 1997.

Detailed elevation data from the Mars Global Surveyor shows that the large valley originated nearly full-size at a ridge, much like the spillway of a dam. Late in the lake's history, rising water overflowed the lake basin rim, releasing the huge flood as the river cut into this former dividing ridge.

What remained was "some of the best geological evidence for a lake found to date on Mars, including clear indications of the former shoreline," Irwin says.

Two smaller lake basins were identified in the region by paper co-author Alan Howard, a University of Virginia geologist. All three lakes had the same water level prior to the flood, indicating an ancient water table and suggesting the locations of other dry lake basins on Mars.

Looking for clues

At the time of the discovery, Irwin and the research team were not specifically looking for lakes. "We knew that Ma'adim Vallis existed," he says. "However, the origin of the valley had been an issue of debate since it was first imaged in the early 1970s."

Without a clear source of the valley, the researchers were puzzled. "It was a mystery," Irwin adds, "because we knew very little about the topography of Mars. Good data did not exist before 1998, when we started getting data from the Mars Global Surveyor mission."

The origin of the huge valley at a dividing ridge suggested that a lake was its source, because water must pond behind a ridge before it can overflow. To test the possibility of a former lake, the researchers measured the elevation of the spillway and traced that elevation around the interior of a large, closed drainage basin.

Above the spillway level, there were many smaller valleys carved into the highlands by running water, but below that level were smooth plains that appeared to be layered lake sediments.

The spillway was originally at 3,609 feet of elevation, but the flood waters cut it down to 3,116 feet. Thus, by knowing the highest level that the lake occupied and the level of the spillway after the flood, the team could calculate the volume of the flood.

"The 24,000 cubic miles of water released from this lake was enough to carve Ma'adim Vallis, but despite that outflow, the source lake was so large that it was still almost full," Ross says.

The researchers calculate that the lake and flood occurred more than 3.5 billion years ago, when Mars probably had a warmer, wetter climate.

For details, go to www.nasm.si.edu/ceps/research/mars/irwin_lakes.htm.

—Jo Ann Webb contributed to this article.

Firefighter Mark Skipper, left, donated to the Smithsonian's National Museum of American History the uniform he was wearing on Sept. 11 as he assisted with rescue operations at the Pentagon. On hand to pick it up were Jennifer Jones, a museum specialist in the National Museum of American History's Armed Forces Collection, and Bill Yeingst. (Jeff Tinsley photo)

'Sept. 11,' continued from Page 1

Curators also collected a door panel from one of the Pentagon fire trucks; an elevator marker from the 105th floor of the World Trade Center; and the singed uniform of Navy Capt. David Thomas, a Pentagon survivor and rescuer.

Shanksville, where the third plane crashed, proved a challenge for the collecting team. Little remains there of the plane and personal items that belonged to the passengers; much of what exists is part of the ongoing criminal investigation by the FBI. Items from the memorial created there are on loan to the Smithsonian but will eventually be part of a permanent memorial near the crash site.

Honoring heroes

On the one-year anniversary of the attacks, the museum opened a commemorative exhibition, "September 11: Bearing Witness to History," with about 50 objects, many from the permanent collection. The presentation includes Demczur's squeegee, Giuliani's cap and the piece of steel collected from the World Trade Center. Visitors are invited to touch a smaller piece of the New York landmark that was recovered from ground zero. The exhibition continues through Jan. 11.

"There is a high personal cost to collecting artifacts associated with Sept. 11," Marilyn Zoidis, co-curator of the exhibition, says. "As historians, we are usually able to have some distance, but this project has had an emotional dimension like no other."

Collecting will continue even after the exhibition closes. The museum's staff is in touch with the FBI about items relating to the terrorists, which are currently considered evidence, but that may be available in the future.

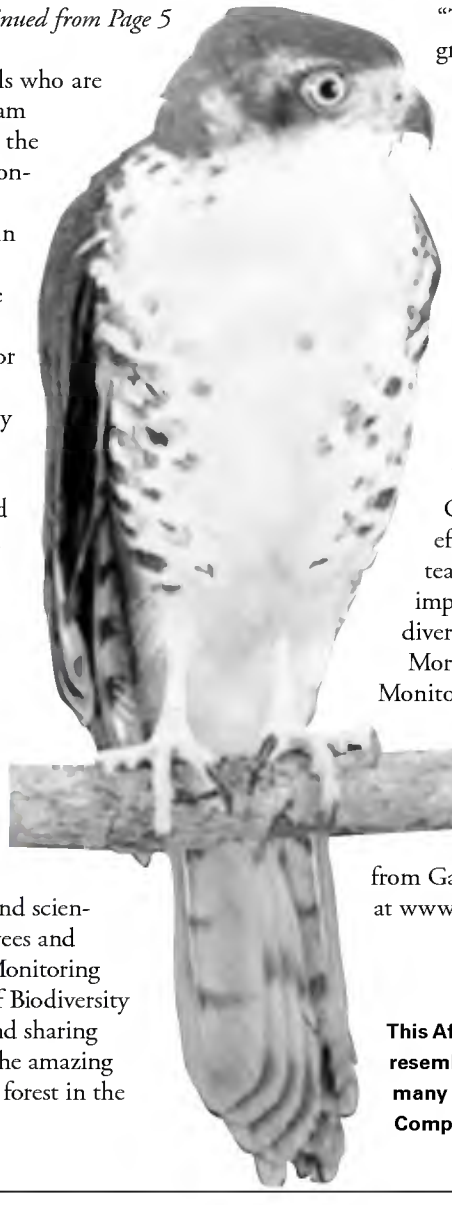
'Biodiversity,' continued from Page 5

1,200 professionals who are enrolled in program courses offered at the National Zoo's Conservation and Research Center in Front Royal, Va.

In addition, the Vembo Lab is a central location for the program's reference biodiversity collection, where specimens are studied, processed and stored. Much of the lab work is done by parataxonomists, local people who were specially trained.

Conservation through partnerships

On any given day in the lab, Gabonese locals and scientists, Shell employees and members of the Monitoring and Assessment of Biodiversity teams can be found sharing their insights on the amazing secrets of the rain forest in the Gamba Complex.



This African goshawk, which resembles an owl, is one of the many birds found in the Gamba Complex. (Photo by Carlton Ward Jr.)

"These may seem like odd groupings," Dallmeier says, "but from the beginning, we have focused on building strong, diverse partnerships to conserve biodiversity. Our field projects link exhibits at the National Zoo to the ground research, conservation and education programs that will secure the wild habitat where these species live. And in Peru, Ecuador, the Caribbean, Southeast Asia, Canada, the United States, Madagascar, Cameroon and Gabon, the efforts of our international teams are succeeding in the important job of conserving biodiversity in the wild."

More information about the Monitoring and Assessment of Biodiversity program, including field reports from Gabon, is available on the Web at www.si.edu/simab.

'Native calendars,' continued from Page 4

high-speed connections, Greene says. "But the teachers lament the content. They say it's not information the kids can relate to, or that they want them to relate to. They are starving for culturally relevant content."

Greene says the teachers also expressed an enthusiasm for access to primary source documents rather than interpretive scholarly text.

After hearing this feedback, she decided to add an online database to the project. For the database, each calendar will be broken down into its individual year pictures, each of which will be accompanied by all associated available data. This may include the corresponding numerical year, the name of the year, the original collected descriptive text and the names of the keepers, collectors and translators.

"The teachers are excited to use these documents to teach counting and mapping skills, social studies and computer science," Greene says. "They are looking for an interesting database to incorporate into their curricula."

The teachers also saw this material as the basis for a curriculum that would encourage discussions between elders and young people.

Greene's expectation is that, once Sioux people have access to the material, it will precipitate the recollection of other stories of winter counts that will be shared among the communities.

Research Highlights

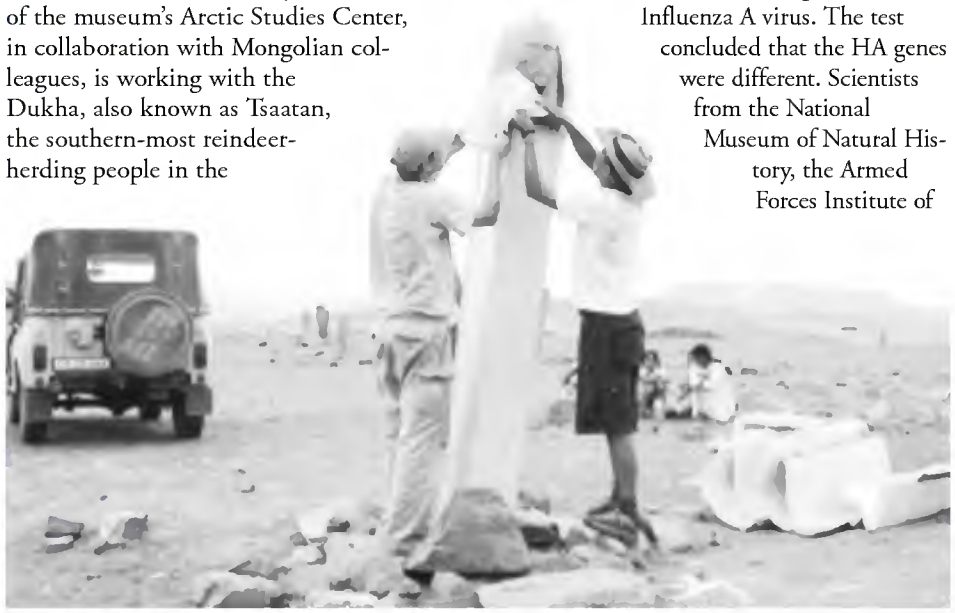
Chandra discoveries. Astronomers have discovered evidence of a web of hot gas snaking through the universe along "rivers of gravity" that might contain most of the matter in the cosmos. Four independent teams of researchers, using the National Aeronautics and Space Administration's orbiting Chandra X-ray Observatory, administered by the Smithsonian Astrophysical Observatory in Cambridge, Mass., detected intergalactic gas with temperatures ranging from 540,000 to 9 million degrees Fahrenheit. The discovery may allow astronomers to map the distribution of so-called dark matter, which makes up most of the matter in the universe. The findings were reported in the Astrophysical Journal.

Under Secretary for Science. Oceanographer David Evans was appointed Under Secretary for Science at the Smithsonian, effective Sept. 9. He had been the National Oceanic and Atmospheric Administration's assistant administrator for research since 1998. In one of his most important contributions to NOAA, Evans, 56, led the White House Global Climate Change Initiative, coordinating related activities of some 12 federal agencies. He holds a bachelor's degree in mathematics from the University of Pennsylvania and a doctorate in oceanography from the University of Rhode Island. His areas of specialty include physical oceanography, small-scale dynamics and the climate.

David Evans

Printing. Printing from moveable type essentially began with the invention of a practical means of casting individual letters in metal. The type mold was the primary tool used in this process, and it was exclusively employed in the manufacture of type for nearly 400 years. While type molds have been mentioned and illustrated many times in printing literature, only one book has been exclusively devoted to this essential tool. And this very slim volume, written in German, hardly begins to explore the subject. Stan Nelson, a museum specialist in the Smithsonian's National Museum of American History is investigating the many structures found in molds over those four centuries, the methods used to cast them, and the many related tools and equipment associated with the hand casting and finishing of printing type.

Reindeer herding. William Fitzhugh, a curator in the Smithsonian's National Museum of Natural History and director of the museum's Arctic Studies Center, in collaboration with Mongolian colleagues, is working with the Dukha, also known as Tsaatan, the southern-most reindeer-herding people in the world, in an attempt to clarify the significance, function and cultural relationships of the Bronze Age sculptures called deerstones. These sculptures are scattered throughout northern Mongolia. The Dukha's circumpolar connections may hold a key to the artistic similarities between their deerstones and those from other artistic traditions, including Scythians to the west and North Pacific peoples to the east.



Smithsonian researchers are studying the cultural significance of deerstone sculptures, such as the one shown here, which are scattered throughout Mongolia. (Photo by Carolyn Thome)

The Milky Way. Peering from a South Pole telescope into the heart of the Milky Way, a team of astronomers from the Smithsonian Astrophysical Observatory in Cambridge, Mass., has found that our galaxy is headed for a spectacular fireworks show. In about 300 million years, gases now collecting in a ring hundreds of light-years across will collapse toward the giant black hole lurking in our galaxy's center. Thousands of new stars will ignite, live fast and die young, lighting up the sky with distant supernova explosions. Some gas that reaches the black hole will spray out in two long jets like water from a garden hose. These dramatic findings were reported at the summer meeting of the American Astronomical Society.

Volcanoes. The Smithsonian's National Museum of Natural History has launched a newly renovated Web site for its Global Volcanism Program. The site provides data, photos and first-hand accounts of current volcanism never before available to the general public. The new site is at www.volcano.si.edu/gvp and features the most comprehensive databases of active volcanoes and their eruptions in existence. Information on each volcano includes location, elevation, volcano type and a summary of its eruptive history. Photos of more than 800 volcanoes are available.

A different culprit. The Smithsonian's National Museum of Natural History historical bird collection was critical in determining that the 1918 influenza pandemic that killed 20 million to 40 million people worldwide did not originate from birds, as previously thought. Wild waterfowl collected between 1915 and 1919 were tested for the same hemagglutinin, or HA, subtype as that of the 1918 pandemic Influenza A virus. The test concluded that the HA genes were different. Scientists from the National Museum of Natural History, the Armed Forces Institute of Pathology and Ohio State University examined the Smithsonian's collection of liquid-preserved birds. The research was reported in the August issue of the Journal of Virology.

Series Publications

The following publication on research was issued during the period June 1 through Aug. 31, 2002, by Smithsonian Institution Press in the regular Smithsonian series. Diane Tyler is managing editor. Requests for series publications should be addressed to Smithsonian Institution Press, Series Division, Victor Building, Suite 4300, MRC 953, P.O. Box 37012, Washington, D.C. 20013-7012.

Smithsonian Contributions to Anthropology

- 44 *Anthropology, History and American Indians: Essays in Honor of William Curtis Sturtevant,* by William L. Merrill and Ives Goddard, editors. 357 pages, frontispiece, 86 figures, 13 tables.

Books & Recordings

The Smithsonian National Air and Space Museum Directory of Airplanes, Their Designers and Manufacturers, edited by Dana Bell (Greenhill Books, 2002, $49.95). Every aircraft manufacturer and designer and aircraft produced in the last 100 years. To order copies, write to Stackpole Books, 5067 Ritter Rd., Mechanicsburg, Pa. 17055, or call 1 (800) 732-3669.

The Columbia Documentary History of the Asian American Experience, by Franklin Odo (Columbia University Press, 2002, $65). A collection of key documents compiled by the director of the Smithsonian Asian Pacific American Program presents a rich heritage. To order, call 1 (800) 944-8648, or fax requests to 1 (800) 944-1844.

Galápagos, by John Kricher (Smithsonian Institution Press, 2002, $34.95). A detailed natural history of this archipelago.

Rocky Mountains, by Scott A. Elias (Smithsonian Institution Press, 2002, $34.95). The natural history of the Rockies' entire 2,000-mile range.

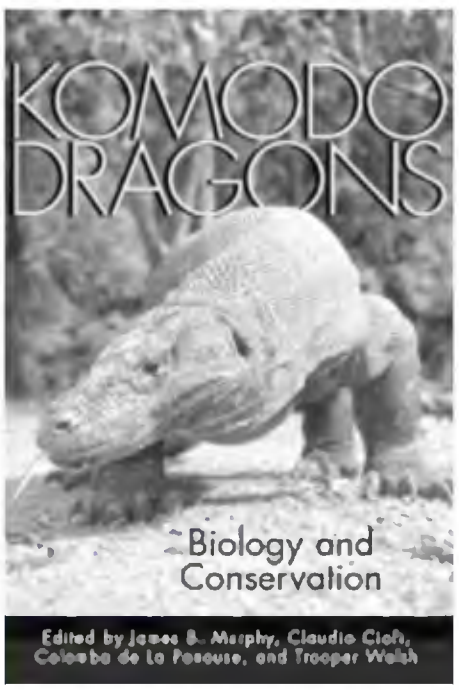
Juan Rulfo's Mexico (Smithsonian Institution Press, 2002, $59.95). A comprehensive collection of 175 photographs by this celebrated Latin American artist.

Fishes of Chesapeake Bay, by Edward O. Murdy, Ray S. Birdsong and John A. Musick (Smithsonian Institution Press, 2002, $29.95). A guide of coastal fishes, from southern New England to North Carolina.

Brotherhood of the Bomb: The Tangled Lives and Loyalties of Robert Oppenheimer, Ernest Lawrence and Edward Teller, by Gregg Herken (Henry Holt & Co. Inc., 2002, $30). An in-depth look at the three American scientists most responsible for creating weapons of mass destruction. To order, call 1 (888) 330-8477.

Comic Strips and Consumer Culture, 1890-1945, by Ian Gordon (Smithsonian Institution Press, 2002, $50). The author examines how comic strips contributed to the expansion of a mass consumer culture driven by visual images.

Komodo Dragons: Biology and Conservation, edited by James B. Murphy, Claudio Ciofi, Colomba de La Panouse and Trooper Walsh (Smithsonian Institution Press, 2002, $45). A comprehensive book on this endangered species presents new information and important findings.



This book offers a comprehensive look at one of nature's endangered species.

The Smithsonian National Air and Space Museum Story of Flight, by Judith Rinard

'Books,' continued on Page 8

Off the Shelf

An Odyssey in Print: Adventures in the Smithsonian Libraries

By Mary Augusta Thomas (Published by Smithsonian Institution Press, 2002, $29.95)

Books have always had a magical way of taking readers to places that they may never actually visit or see. Such is the case with *An Odyssey in Print: Adventures in the Smithsonian Libraries*. Readers can "come" to the Smithsonian and peruse the Smithsonian Institution Libraries' expansive collection of books and manuscripts, yet never leave the comforts of home.

This richly illustrated book by Mary Augusta Thomas, associate director for reader services at SI Libraries, is a testament to the marvelous library collection and its close association with artifacts and specimens in the Smithsonian museums.

The book, Thomas says, is an outgrowth of an SI Libraries exhibition that first opened last year at the Grolier Club in New York City before coming to the Smithsonian's National Museum of American History, Behring Center last May. The show, curated by Thomas, will remain on view through December 2003.

"Writing the book," she says, "was a chance to talk about the Libraries' history, its different collections—1.5 million books, 40,000 of which are rare—and to introduce the public to an entity that is integral to Smithsonian research, but which cannot be readily accessed by the casual visitor."

An Odyssey in Print is divided into three sections—"Journeys Over Land and Sea," "Journeys of the Mind" and "Journeys of the Imagination."

The first takes a look at books, some of which date back to the 1400s, that recorded travelers' voyages, maps and drawings of the places they visited; their recorded stories; recordings of scientific findings; and more.

Science and the history of science have been an important part of the Smithsonian, even from the beginning. Thus, in the middle section, Thomas focuses on books in the collection that portray how scientists have used them to extend our understanding of the world.

Books from the 1700s and 1800s are the centerpiece of the Libraries' collection of natural history books. Many continue to be invaluable to scientists.

For example, *Metamorphosis*, written by Maria Sibylla Merian (1647-1717), is a masterpiece of both art and science. Using a vivid, pleasingly ornate artistic style, she was the first to record the full life cycle of many species of butterflies and moths. Having left her husband to join a Protestant sect, the artist traveled, at age 50, to the Dutch colony of Surinam. There, she spent two years in the jungle observing, collecting, and drawing insects and plants. The book remains a valuable reference to scientists.

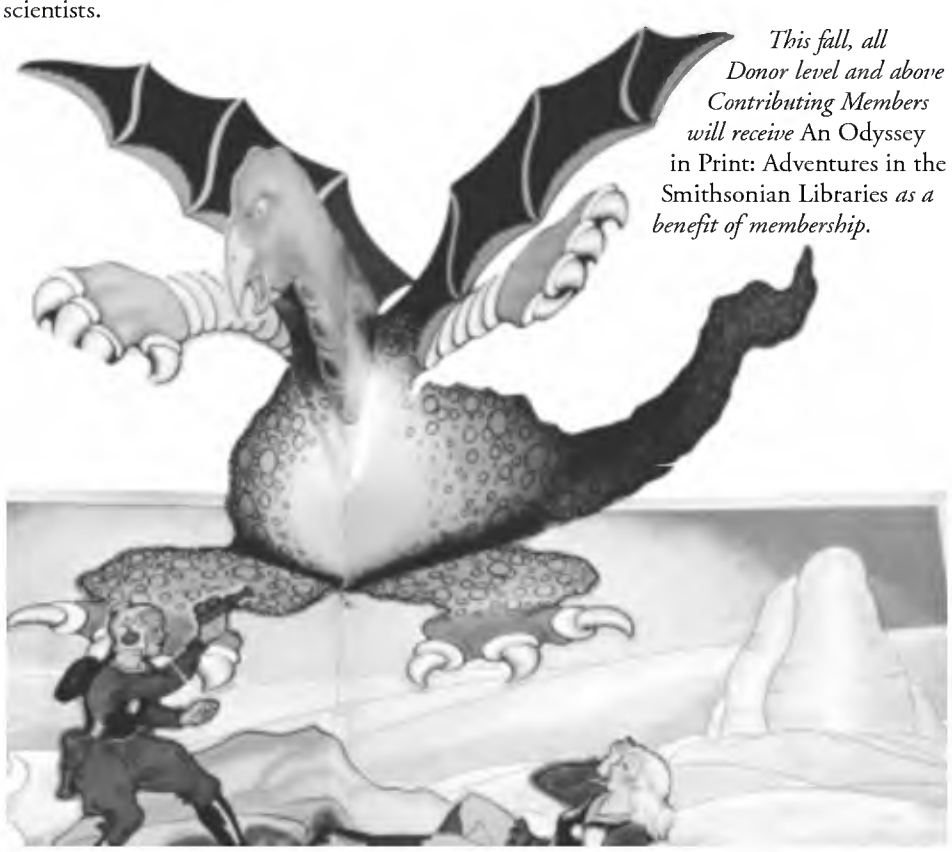
"Books are absolutely necessary to everything we do as scientists," writes Storrs Olson, one of the essayists in the book and a senior curator in the Division of Birds at the National Museum of Natural History. "Books and libraries are as essential to a researcher as land and a plow to a farmer, flour and an oven to a baker, or stays and quiddities to a lawyer.... Museum research begins and ends with books."

The final section of *An Odyssey in Print* looks at the imagination of artists, architects and book designers. "Classic works at the Smithsonian come from the fields of architecture, the decorative arts and design and include world's fair and exposition literature and early trade catalogs," Thomas says.

Thomas hopes that the book, through text and display, will help audiences better understand and appreciate the rich collections SI Libraries preserves as part of our national heritage.

—Jo Ann Webb

This fall, all Donor level and above Contributing Members will receive An Odyssey in Print: Adventures in the Smithsonian Libraries *as a benefit of membership.*



***An Odyssey in Print* gives readers a glimpse of the Smithsonian Institution Libraries' historically valuable works, including this 1930s Buck Rogers pop-up book. It illustrates how the world has been seen, imagined and recorded by Europeans and Americans.**

'Books,' continued from Page 7

(Firefly Books, 2002, $16.95 cloth; $8.95 paper). A children's book of remarkable people who turned the dream of flight into reality. To order, call 1 (800) 387-5085.

Living Santería: Rituals and Experiences in an Afro-Cuban Religion, by Michael Atwood Mason (Smithsonian Institution Press, 2002, $35 cloth; $18.95 paper). A contemporary analysis of this religion.

First Through the Gate (Smithsonian Folkways Recordings, 2002, $15 CD). In his solo debut, Irish American fiddler Brian Conway showcases his artistic range.

Pete Seeger: American Favorite Ballads, Vol. 1 (Smithsonian Folkways Recordings, 2002, $15 CD). Songs first recorded during the heart of the great "folk song revival" of the 1950s and 1960s.

Raices Latinas (Smithsonian Folkways Recordings, 2002, $15 CD). Some of the finest Latino roots music in the Smithsonian Folkways archive.

Badenya: Manden Jaliya in New York City (Smithsonian Folkways Recordings, 2002, $15 CD). A distinctive contemporary Afro-pop sound, the performers are all "jalilu"—practitioners of ancient African performance traditions.

Books published by Smithsonian Institution Press can be ordered from P.O. Box 960, Herndon, Va. 20172-0960. To order by phone or for more information, call 1 (800) 782-4612. There is a $3.50 postage and handling fee for the first book ordered and $1 for each additional book.

Smithsonian Folkways Recordings can be ordered from Smithsonian Folkways Mail Order, Victor Building, Suite 4100, MRC 953, P.O. Box 37012, Washington, D.C. 20013-7012. To order by phone or for more information, call (202) 275-1143 or 1 (800) 410-9815. There is a $5.50 fee for shipping and handling of the first 15 recordings ordered; call for other shipping prices.

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