Smithsonian Institution NO. 111 WINTER 2003

Research Reports

TAXONOMY

Smithsonian natural history collections: Critical in fight against invasive species

By Cara Seitchek
Special to Research Reports

A thriving population of snakehead fish, a voracious predator from Eurasia capable of eradicating fish species native to the United States, was discovered last summer in a pond in Crofton, Md.

That same summer, 48 humans and countless mammals and birds fell victim to an outbreak of West Nile virus.

In the Eastern United States, some 7,000 trees have been destroyed by the Asian longhorn beetle. Hundreds of thousands of acres of trees in the United States may be lost if efforts fail to control this beetle.

These are just a few examples of invasive species that threaten lives and natural resources in the United States. In many instances, the Smithsonian has been playing an important part in the constant battle to keep such invasive pests from gaining entry into the country and, if they become established, keeping them in check.

In the fall, Scott Miller, chairman of the Department of Systematic Biology at the Smithsonian's National Museum of Natural History, testified before the U.S. House of Representatives Committee on Agriculture about invasive species and the Smithsonian's role in studying these invasive organisms.

"I wanted to raise the profile of what the Smithsonian does and how science is basic to so much in American life," Miller says. "If a species shows up in our back yard, it can be a hazard or benign. Our scientists can identify the species and put it in a classification that reflects its relationship to other organisms, called phylogeny, and allows prediction of its biological traits."

Smithsonian entomologists are studying many invasive species, including the Asian longhorn beetle, shown here.

Identifying foreign species and knowing their natural enemies can help eradicate them and prevent them from becoming established in this country.

The hearing was sponsored by the House Subcommittee on Department Operations, Oversight, Nutrition and Forestry, chaired by Rep. Robert Goodlatte of Virginia.

Structured as an informational briefing, other presenters included representatives from the U.S. Department of the Interior, the U.S. Department of Agriculture, the Maryland Department of Natural Resources, and the Florida Department of Agriculture and Consumer Services.

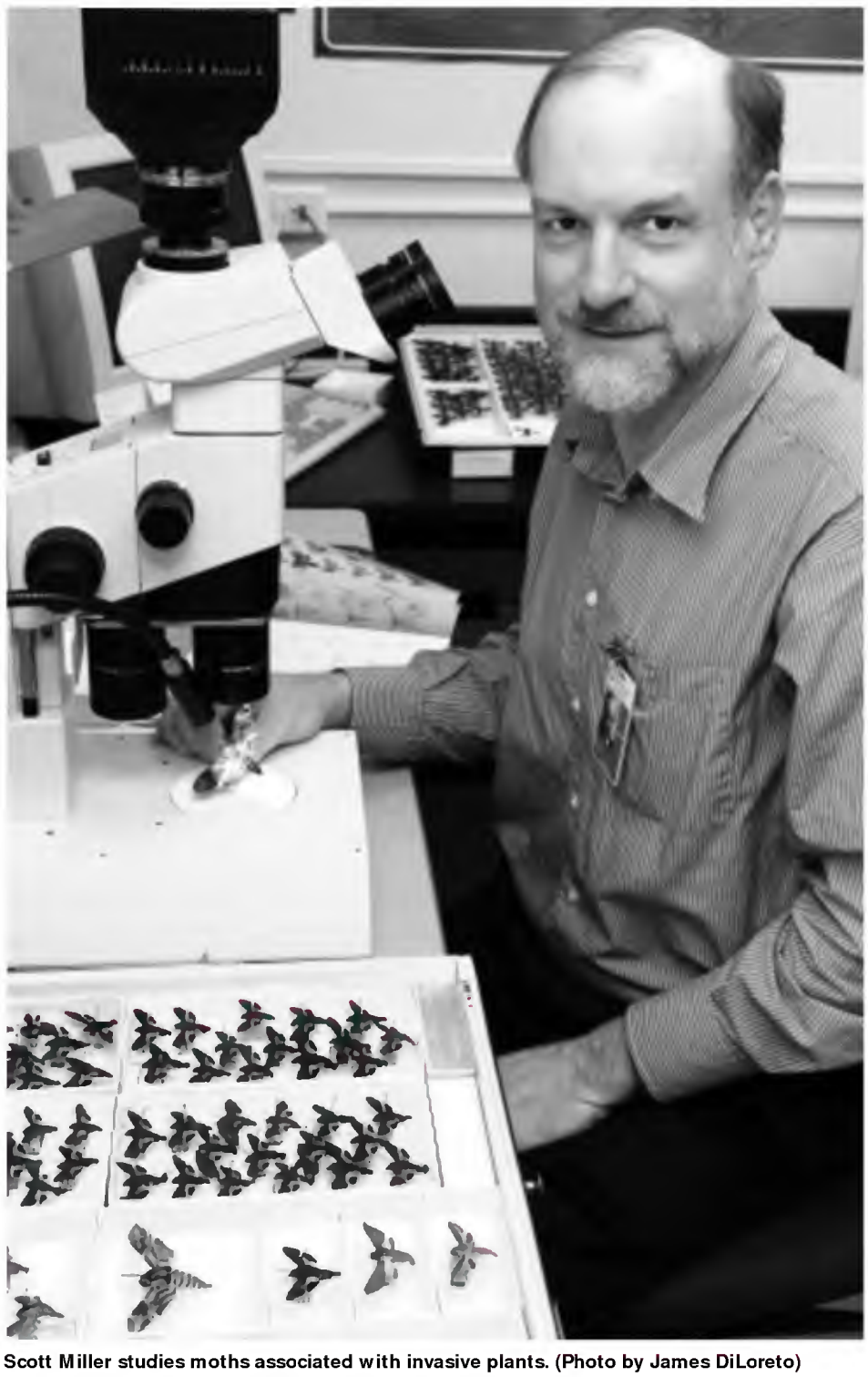
A century of collections

Smithsonian scientists have been involved with invasive species since the 1880s, "before they were even called invasive species," Miller said during his testimony.

Since that time, the Smithsonian has joined with other agencies studying the introduction of pests into the United States. Utilizing the invasive species expertise of Smithsonian scientists is an integral part of the activities coordinated by the National Invasive Species Council, created by an executive order in 1999.

"One reason the Smithsonian has so much information on these organisms is that many scientists have worked on invasive species over the years," Miller said. "All their research information is archived in the collections."

For the hearing, Miller took along a display of invasive species specimens, including examples from the national biological collections stored at the National Museum of Natural History. "I took real examples of what people see in the news," he adds. Miller's specimens included a snakehead fish in a jar of alcohol, a Hawaiian tree frog, a brown tree snake and an Asian longhorn beetle.



Scott Miller studies moths associated with invasive plants. (Photo by James DiLoreto)

Critical resources

Miller's congressional testimony stressed the importance of the collections and resources at the museum in identifying species as they are discovered in new places. This information often helps determine whether a foreign species threatens native plants and animals or agricultural crops.

"The resources at the Smithsonian are so critical to this effort," Miller pointed out at the hearing. "Invasive species can be any

'Invasive species,' continued on Page 6

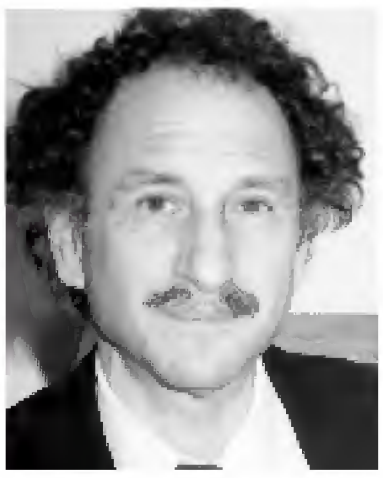
Profiles in Research

Solving mysteries ■ If Harry Rand weren't an art historian, you might mistake him for a detective. When researching paintings and sculptures, he asks seemingly unassuming questions, looks for clues and then puts it all together to solve mysteries.

Rand has always had an inquisitive mind. He describes his research as curiosity-driven and goal-oriented. "But research doesn't always follow a straight line," says Rand, a senior curator of cultural history at the Smithsonian's National Museum of American History, Behring Center. "I'm probably working on a dozen projects right now," he says, which explains why he has never taken a "real" vacation. "I'm always working," he adds, which is easy to believe about this author of more than 50 articles and 30 museum catalogs and author or co-author of 13 books.

Although a published poet since age 17, Rand didn't pursue a literary career. Instead, he chose art history. It was a young field, little more than a century old, "and there were many unanswered questions," he says. "It was like getting into physics at the time of Galileo." Besides, renowned poet Paul Blackburn, one of Rand's most influential teachers at the City College of New York, told him: "If you want to be a poet in America, join a strong union." The best way to join a "union," Rand says, was to become a professor. He could continue publishing poetry while paying the bills.

After receiving his doctorate in art history from Harvard, Rand taught for several years, until 1977, when he traded the academic world for museum life at the Smithsonian's National Museum of American Art, where he became chairman of the Department of 20th-Century Painting and Sculpture. He joined the National Museum of American History in the late 1990s, where, as an art historian, he traces the evolution of human development in man-made forms.


Harry Rand

One of Rand's research interests is understanding how religion influences modern art. For example, in his analysis of a Johannes Vermeer (1632-1675) painting, "The Kitchen Maid," Rand published previously uncited references to the bible and contemporary cooking practices.

He also is interested in the connection that folklore has to religion. "Both religion and folklore," Rand says, "attempt to explain the universe from an emotional perspective." In his published analysis of "Rumpelstiltskin"—the character from the classic tale of the little man who helps a miller's daughter spin straw into gold—Rand realized that the story's meaning depended on knowing who first composed the tale and who was the intended audience: "spinners amusing other women at the expense of men."

Rand also has been studying Horatio Greenough's sculpture of George Washington, displayed on the second floor of the National Museum of American History. After exhaustive research, he has unfolded an intriguing story, beginning in 1783, when Congress resolved to create a monument, and continuing to its commissioning a generation later. Rand traces the carving of the statue to Italy, its transport to America for installation in the U.S. Capitol and reactions to its placement in the center of the Capitol's dome. The statue, he says, was removed from the Capitol and eventually came to the Smithsonian in 1908.

"In its time, Greenough's imagery was not widely appreciated," Rand says of the sculpture. The upraised hand, the proferred sword and the partially draped Washington all mystified viewers. "Every day, I find new mysteries concerning this work," he says, looking at the sculpture. "The opportunity to discover and actually make contributions to knowledge" is what his research is all about, Rand adds.


This oil-on-canvas painting, "The End of the Beginning," is by Alexander "Skunder" Boghossian, an Ethiopian artist considered a guiding force on the Ethiopian arts scene.

AFRICAN ART

Contemporary Ethiopian artists fuse homeland traditions with modernism

By Janice Kaplan
Special to Research Reports

When Elizabeth Harney, a curator in the Smithsonian's National Museum of African Art, embarked on an in-depth investigation to study local Ethiopian artists in Washington, D.C., who, until now, have not been well-researched, she uncovered a much broader and more complex community than she had imagined.

Harney began her research in the summer of 2000 by looking at the community of Ethiopian artists centered around Howard University in Washington, D.C. She intended to tell a focused story about the special relationship that the university has had with these young artists since the 1970s, when artist Alexander "Skunder" Boghossian arrived in Washington, D.C., from the Ethiopian capital of Addis Ababa. Instead, she found an artistic community that spans media, gender, generations and continents.

The result is "Ethiopian Passages: Dialogues in the Diaspora," the first major exhibition to examine the diversity and significance of contemporary visual arts of the Ethiopian diaspora. The exhibition will be on view at the National Museum of African Art May 2 through Oct. 5, 2003.

The role of Howard University

One of the most significant diaspora communities of contemporary artists from Africa can be found at Howard University. This vibrant artistic group has been of interest to the National Museum of African Art for many years.

More than a decade ago, the museum's founding director, the late Sylvia Williams, acquired for the museum's permanent collection several contemporary paintings by Boghossian, a Howard University professor who is considered the granddaddy of the Ethiopian arts scene.

One of the first Ethiopian artists to receive a scholarship to study in Europe, Boghossian also was the first of his genera-

'Ethiopian artists,' continued on Page 6

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Buried beads hold important clues for dating archaeological sites

By Brenda Kean Tabor
Special to Research Reports

Beads played a major role in 19th-century trade between Europeans and Native Americans across large areas of North America. As beads were introduced by Europeans, they dominated the trade and were wholly incorporated into Native American culture. They were stitched onto hide shirts, leggings and dresses; used on cradleboards and bags; and strung on strips of hide or sinew.

Now these beads, which were culturally valued objects buried with their Native American owners, are being used to help establish the dates that archaeological sites were in use, Ar ogist Laurie Burgess says. Burgess is a spe cialist in 19th-century glass trade beads in Department of Anthropology the Smithsonia National Muse Natural History. She studies and documents trade beads, among other historical materials, that are housed in the museum's collections.

These ridged, wound beads, made of red and clear glass, were shaped by turning them against an open mold. (Jane Beck photo)

Glass trade beads are made of a durable material that tends to survive well in archaeological contexts. They are good "markers" for helping archaeologists date sites. "We know that if glass beads are found at a site, the site postdates European contact," she explains. Such a site would have been in use after 1492, when Columbus arrived in the New World, and during later centuries. "The types of beads present at a site also help us narrow the time frame of occupation even more," Burgess says.

The beads housed in the National Museum of Natural History's collection were recovered from Native American grave sites by 19th- and 20th-century archaeologists and brought to the Smithsonian for study.

Because of the 1989 National Museum of the American Indian Act, researchers are working to document the important information the objects contain. The act, Burgess explains, mandates that the Smithsonian, upon request, repatriate culturally affiliated human remains and funerary objects, including beads, to federally recognized, contemporary Native groups that are entitled to them. The act requires that objects be inventoried and documented before they are repatriated.

Sullivan's Island beads

Burgess recently completed study of an unusually large collection of trade beads known as the Sullivan's Island Bead Collection, which is scheduled to be repatriated to Native American tribes in the Plateau Region of the northwestern United States within the next two years.

This collection of 50,000 beads was brought to the Smithsonian by Herbert Krieger in 1934 from a burial island on the Columbia River in Washington state. Krieger was a Smithsonian archaeologist sent to the site to recover archaeological materials before the area was to be flooded by the completion of the Bonneville Dam in 1938.

Burgess' findings were presented at the 2002 annual meeting of the Society for American Archaeology, held in Denver, Colo.

"The Sullivan's Island Bead Collection," he says, "is one of the most significant 9th-century trade bead collections, ecause almost every known bead type is ere. It's unusual to have such a range in ne collection." A significant portion of he beads are large, ornate and valuable.

Burgess compared this collection with one found at Fort Vancouver, a major trading post 50 miles down the river. Beads found at the fort were, in general, smaller and much plainer than the beads found on the island. Burgess believes this indicates that the beads at the fort were lost, dropped or scattered, making the Fort Vancouver collection "unintentional." Since the beads found on Sullivan's Island were more valuable, traders were less likely to drop or lose them.

"The two collections," Burgess adds, "are from the same region and time period, which makes them valuable, comparative collections." However, the differences between the two collections are significant.

The beads at the fort show a selection of beads that were available for trade, but they do not wholly reflect the richness of the bead trade, Burgess says. "The collection found at Sullivan's Island represents beads in use—the beads that were actively chosen by the Native Americans in the area."

Classifying beads

"One of the goals of bead research is to record information in a standardized way," Burgess says. When information is collected in standardized or systematic ways throughout the field of archaeology, it allows archaeologists to compare different collections to see what patterns emerge over time.

This cluster of highly decorated, large, ornate glass beads found on Sullivan's Island are known as lampworked beads and thought to be from Venice. (Photo by Jane Beck)

Working in a laboratory at the Smithsonian's Museum Support Center in Suitland, Md., Burgess analyzed the beads found on Sullivan's Island using a zoom microscope, which provides the high levels of magnification needed to properly identify characteristics such as the shape and orientation of tiny air bubbles in the glass.

She also used digital calipers, which look like high-tech pliers with a tiny digital screen, to record the length, width, thickness and diameter of the beads. An extensive reference library of texts and journals was used to obtain dates or date ranges of the beads.

The beads were classified and categorized based on manufacture type, degree of opacity or translucency, shape, presence or absence of decoration, color and size. The findings are logged into a database, Burgess says, so that the museum will still have access to this valuable information after the objects are returned to their tribes.

The origin of beads

Most of the world's 19th-century trade beads were made in Venice and Bohemia. Chinese beads, referred to in historical records as "canton" beads, were brought to North America from China by Euro-American traders and are concentrated on the Pacific Coast. Beads made in Bohemia

'Beads,' continued on Page 6

Laurie Burgess analyzes glass beads using a zoom microscope. (Photo by William Billeck)

Lifespan of desert tortoise may depend on its everyday dietary choices

By Michael Lipske
Special to Research Reports

Observing desert tortoises hunt for food must be a little like watching paint dry. Cruising speed for the animal is only around 8 feet per minute—although who knows what a tortoise can do with the wind at its back.

But learning which foods a hungry tortoise shuns and which it stops to eat is an important part of efforts to keep the reptiles from disappearing from their range in the Mojave Desert of the Western United States. Much of the work to save the tortoise, by understanding what it puts in its stomach, is being led by researchers from the Smithsonian National Zoological Park's Nutrition Laboratory in Washington, D.C.

A declining population

Tortoises in the Mojave, which includes parts of Nevada, California, Utah and Arizona, have been listed by the federal government as a threatened species since 1990. Once abundant, desert tortoises have suffered local population crashes of as much as 90 percent.

Loss of wild living space, due in large part to development, is only partly to blame for tortoise declines. These days, tortoises must share their limited food with livestock. On top of that, the food supply itself is changing. In addition, scientists are concerned that these changes may have left tortoises prone to widespread disease.

During an 80- or even 100-year lifespan, a desert tortoise eats almost nothing but plants—but not just any plants. In a desert where rainfall is scarce-to-nonexistent, the tortoise's vegetarian diet must provide enough water and protein, in the form of nitrogen, for survival. At the same time, tortoises need to avoid accumulating too much dietary potassium, lethal levels of which occur in many desert plants.

"They're doing a balancing act between getting enough water and protein in their food and avoiding too much potassium," says Olav Oftedal, a research nutritionist at the National Zoo. "As a consequence, we predict that the tortoises will be very selective in what they eat."

As head of the Nutrition Laboratory, Oftedal has studied the dietary requirements of animals, from bears to bats. For the last decade, he has been researching the nutritional ecology of desert tortoises in two different parts of the Mojave.

Pellets with a purpose

At the Desert Tortoise Conservation Center, a 240-acre site near Las Vegas, Oftedal and other scientists work with temporarily captive tortoises—animals that have been displaced by local development projects and are awaiting relocation to appropriate wild habitat.

"We do controlled feeding studies," Oftedal says, in which tortoises in pens are fed carefully formulated pellets that reflect varying nutritional values. "The make-up of these pellets is based on our research on the composition of the plants we collect in the wild." So far, about 400 species of Mojave Desert plants have been analyzed at the Nutrition Lab.

By looking at how dietary variations affect tortoise growth, reproduction and overall health, the researchers are providing wildlife managers with information that can help in evaluating the quality of habitat that may be used for tortoise reserves.

Roy Averill-Murray, left, of the Arizona Fish and Game Department, and Olav Oftedal examine a desert tortoise that they are tracking as part of a foraging study. After feeding on young grasses and spurges, the tortoise sought shelter in a cavity to protect itself from midday summer temperatures of nearly 110 degrees Fahrenheit. (Photo by T. Christopher)

Eyeing every bite

How tortoises feed themselves is being studied in California, at the U.S. Army's Fort Irwin Training Center. Juvenile desert tortoises, hatched in fenced outdoor enclosures, are observed while they forage for food. "We watch them and keep a tally of which plants they pass, which they stop and bite, how many bites they take and what parts they're eating," Oftedal explains.

A study of 15 juveniles in spring 2001 recorded more than 33,000 bites for leaves, flowers, fruits or the occasional piece of gravel or scat. That kind of detailed observation is necessary because the nutritional composition of plants varies widely according to the life stage at which a plant is eaten and the plant part that a tortoise selects.

Juveniles with PEP

Watching 2- to 3-inch-long juvenile tortoises munch on evening primrose, desert dandelion and other plants allows researchers to evaluate what they call the PEP index, or Potassium Excretion Potential, of the reptile's diet. A measure of the relative amounts of potassium, nitrogen and water in foods, the PEP index provides one scale for rating the nutritional value of desert tortoise food plants. For example, a diet with a high PEP index has a surplus of nitrogen and water and relatively low amounts of potassium.

In a paper presented in March 2002 at a meeting of desert tortoise researchers, Oftedal discussed research results, which suggest that juvenile tortoises seek out a high PEP diet when it is available, such as when winter rains encourage the growth of a broad range of annual plants in the desert.

Because such a diet provides protein and water beyond what is needed to excrete excess potassium, it encourages growth of the young tortoise's shell, muscles and internal organs. A bigger, stronger shell provides protection from being eaten by ravens, one of the chief predators of juvenile tortoises. Muscle and internal organs can store nutrients that enable tortoises to survive when food is scarce. Thus, a high PEP index diet should enhance survival of juvenile tortoises.

Increasing threats

Over the years, the bulk of funding for the National Zoo's tortoise nutrition research has come from the U.S. Bureau of Land Management because vast stretches of desert tortoise habitat are on federal land that ranchers use for grazing livestock.

"One of the political issues in the conservation of desert tortoises has to do with restrictions on livestock grazing," Oftedal says. "Based in part on our study results, the Bureau of Land Management has restricted grazing in southern Nevada."

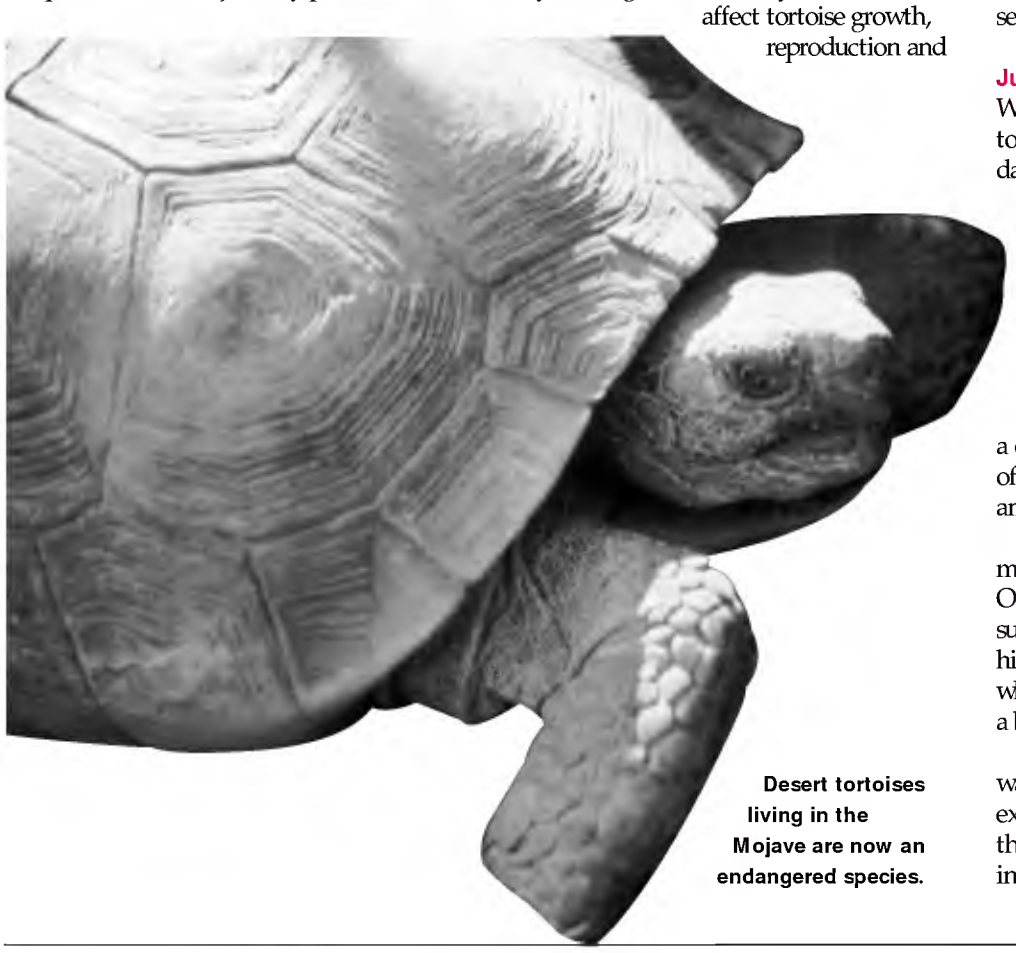
Annual wildflowers and grasses that are choice tortoise foods are heavily consumed by cattle and sheep. Cattle also trample the slow-moving tortoises and the burrows in which the reptiles spend more than 90 percent of their lives.

For desert tortoises, modern life has meant a host of troubles. Off-road vehicles racing across the desert flatten tortoises and their burrows. Over the course of the 20th century, hundreds of thousands of desert tortoises were plucked from the wild to become pets.

One of the most serious current threats to tortoises is the spread of nonnative grasses and other alien plants that "are outcompeting the native wildflowers that the tortoises eat," says Kristin Berry, a U.S. Geological Survey biologist who has long studied tortoise population declines.

"We're seeing more and more ill tortoises," says Berry, who worries that changes in the plants that are available to tortoises may be partly to blame. "I think what Dr. Oftedal has been doing for the last 10 years is very significant."

In the long run, whether the desert tortoise maintains a foothold in the Mojave depends, in part, on what scientists like Oftedal learn about what the reptile eats and about what it will take to keep the tortoise's desert garden growing.



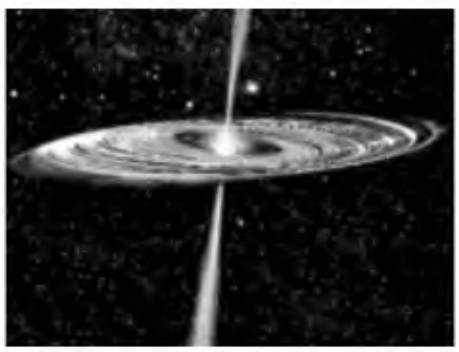
Desert tortoises living in the Mojave are now an endangered species.

Massive black holes could be key to determining size, age of the universe

By Christine Lafon
Harvard-Smithsonian Center for Astrophysics

An international team led by astronomers at the Harvard-Smithsonian Center for Astrophysics in Cambridge, Mass., is using the National Aeronautics and Space Administration's Deep Space Network to locate and study black holes that sit at the centers of galaxies millions of light-years away. These black holes are more massive than a million suns.

Astronomers use the network, which is an array of very large radio dish antennae, to locate these "super-massive" black holes. When conditions are just right, investigations are conducted to calculate accurate distances to the black holes using relatively simple geometry.



This image shows materials spiraling around a black hole, broadcasting radio signals like a cosmic radio station. (Photo by John Kagaya, Hoshi No Techou)

Three years ago, the first so-called geometric distance to a galaxy was found to disagree significantly with what had been measured earlier using the Hubble Space Telescope. This finding, in part, drove astronomers to "shrink" the claimed size of the universe. The team is now seeking more black holes to confirm their result that the universe is smaller and younger than formerly thought.

Utilizing down time

To find geometric distances, astronomers must locate black holes that have the right conditions—strong radio signals aimed at Earth. Researchers are able to identify these signals by using the network during NASA's down time.

They peer into deep space to locate water vapor in gas clouds that orbit supermassive black holes. Once such watery clouds are found, researchers study them more closely, using powerful, transcontinental arrays of radio telescopes.

"The Deep Space Network was created to communicate with space probes sent into our solar system, not to observe other galaxies," Lincoln Greenhill, Smithsonian astronomer and team leader, says. However, the network contains some of the world's most sensitive radio antennae, making them excellent instruments for studying other galaxies in deep space, he adds. "We successfully made our case to our colleagues in charge of the network and built the specialized equipment that we needed to do astronomy. We installed it and, after a lot of long days, we are discovering black holes."

Hunt for deep-space water

The universe is filled with galaxies such as the Milky Way, and each one contains billions of stars. Most, if not all, galaxies have giant black holes lurking at their centers. In many cases, spinning disks of water vapor and other gases surround these black holes. As the matter in these disks slowly spirals inward, friction heats the matter, causing it to glow.

These warm gases "glow" by sending out radio signals like a cosmic radio station. The signals start out weak, but are strengthened within the watery clouds, or masers, spinning around the black hole. These clouds boost the initially weak radio emission in much the same way that a laser boosts visible light to blinding intensities. The signals then become strong enough to travel across millions of light-years and reach the Earth, where the NASA network "dials in and listens."

Measuring extragalactic distances

The Smithsonian Astronomical Maser and Black-hole All-sky, or SAMBA, Survey tries to locate black holes with rapidly rotating disks that are rich in water vapor and that have just the right geometry to allow measurement of their distances. The disks might be seen at any orientation, from face-on looking down on top of the disk to edge-on looking at the side of the disk. When a disk is viewed edge-on, astronomers can measure both the speed of the orbiting material, from the Doppler shift, and its "proper" motion, or speed across the sky.

"Using a speed and a proper motion, we can calculate how far away a galaxy is," Greenhill says. "If I know a ship on the horizon is steaming at 20 knots, and I measure how long it takes to traverse 30 degrees of a circle, I know just how far away it is. At a given speed, twice the time means twice the distance. Our result for galaxies is very accurate and completely independent of the complex ways in which astronomers normally measure distances."

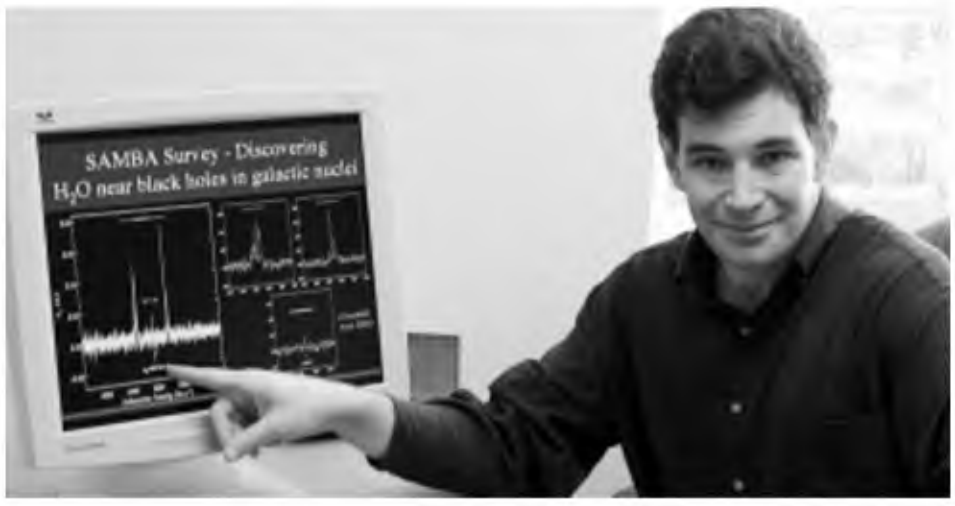
Astronomers at the Harvard-Smithsonian Center for Astrophysics are using the National Aeronautics and Space Administration's Deep Space Network to locate and study massive black holes in neighboring galaxies. (Photo courtesy of NASA)

Unfortunately, such cosmic alignments are rare. Of the approximately three dozen water masers known to sit in the hearts of other galaxies, only about 10 come from edge-on disks around massive black holes. And so far, only one has been used successfully to calculate an accurate distance.

"We definitely need luck to find disks that are oriented edge-on and beam their water maser emission toward us," Greenhill says. "We have to look at hundreds of galaxies to find the best cases. That's why our time on the Deep Space Network has been so valuable."

Other distance surveys, including a so-called Key Project Survey conducted with the Hubble Space Telescope, study stars to calculate distances. If a star's intrinsic brightness is known, then the fainter the star appears, the farther away it must be.

However, this method can suffer from a number of uncertainties. It can be affected by small differences between stars. For example, is the composition of nearby stars the same as for those far away? The measurements also suffer if undetected dust clouds lie between the Earth and the star. The star will appear fainter and farther away than it actually is. The maser method avoids these complications entirely.



Lincoln Greenhill leads the team that is finding massive black holes in order to calculate the size and age of the universe. (Photo by Christine Lafon)

A younger universe

Greenhill and collaborators in the United States and Japan previously measured an accurate distance to one nearby galaxy and discovered that the distance measured by the Hubble Key Project was about 15 percent too large. Put simply, it looked as if the universe was smaller and younger than had been previously thought.

Re-analysis of the Hubble numbers brought the measurements into better agreement. But if Greenhill's team can measure distances to other more distant galaxies, much more precise testing of the size and age of the universe will be possible. The ultimate goal is to measure distances to galaxies far enough from the Milky Way that they can tell us how fast the universe is expanding.

In the summer of 2002, Greenhill and his colleagues discovered seven faraway galaxies that contain new water masers in faraway galaxies. The team is now determining which ones will be targets in attempts to measure distances.

"Based on past experience, we suspect there remains much to be learned about the extragalactic distance scale and the age of the universe," Greenhill says.

'Ethiopian artists,' continued from Page 2

African modernism combining what he learned in Europe with the traditions of his homeland.

For decades, students hoping to follow in his footsteps traveled far from home to study with the master teacher at Howard University. To this day, Howard continues to enroll Ethiopian students interested in the arts.

Surprising discoveries

But while Boghossian has clearly been a guiding force and Howard University remains an important hub, young people also have flocked to other cities throughout the diaspora for a variety of reasons. In fact, Harney's research ultimately took her far from Northwest Washington, D.C., to Ethiopia, France, California and New York.

"The movements of these artists are rarely a story of chain migration but rather of multiple moves, homecomings and fluctuating affinities to place, space and identity," Harney says. "By highlighting the connections with and movement between the artistic scene in Addis Ababa and abroad, the exhibition and accompanying catalog will make clear that diaspora means more than simply an outward expansion of homeland.

"Diaspora," Harney continues, "means a complicated and varied set of movements, whereby artists cross borders that are physical, psychological and aesthetic—bridging notions of traditions, ancestry and home with the here-and-now and forging powerful expressions."

Finding common ground

During her research, Harney reviewed the work of many Ethiopian artists. Several recurring themes allowed her to divide the exhibition into three sections—personal, artistic and shared identity; cultural authenticity; and imagined homelands. All of these concerns come from the common experiences of movement and exile, displacement and making a place for yourself, she says.

Elizabeth Harney, left, discusses artwork with one of the Ethiopian artists who will be featured in the exhibition "Ethiopian Passages: Dialogues in the Diaspora."

Seven of the 10 artists in the exhibition are women, reflecting the increased number of female artists who have left Ethiopia in the last 20 years. Historically, Ethiopian artists who came to study at Howard University were male painters.

One of the featured artists, for instance, is Julie Mehretu, who was born in Addis Ababa and now lives and works in New York City. Harney first saw her work at the Studio Museum in Harlem. Mehretu, who works in acrylics on canvas, as well as in mural form, produces stunning images of imploding and exploding architectural configurations. Artnews magazine recently named her one of the top 10 artists to watch.

The artists practice across the media, ranging from paintings, mixed media, photography and digital prints to ceramic and papier-mâché sculptures, murals and installations.

"'Ethiopian Passages' is not intended to be a comprehensive survey," Harney says, "but a profile of a select group of artists who are finding their voices within a larger global art discourse and practice."

A new generation

Other artists in the exhibition are: Elisabeth Tariqua Atnafu, Boghossian, Achamyeleh Debela, Wosene Kosrof, Aida Muluneh, Etiye Dimma Poulsen, Mikael Bethe Selassie, Kebedech Tekleab and Elisabeth Wold.

With Boghossian as the senior figure in the exhibition, Muluneh represents a new generation of Ethiopian artists living and working in the diaspora. Harney met Muluneh when the 28-year-old artist organized an exhibition of works by young artists.

Born in Ethiopia, Muluneh grew up in the Middle East, Europe and Canada before coming to Howard University, where she recently finished her bachelor's degree in radio, television and film. Her works bring together a number of fields, from photojournalism and fine arts to promotional and fashion photography.

Beyond Ethiopia

Although Harney's research and the exhibition have focused on a small number of artists within a specific community, she hopes her efforts will serve more broadly as an important model for future exhibitions that seek to address the processes of diaspora in the works of artists from Africa, Asia, Latin America and the Caribbean. Her aim is to attract broad audiences who have experienced similar histories of movement and resettlement.

In conjunction with her research, Harney has written a scholarly catalog that addresses the theoretical and historical debates surrounding diaspora visual practices in general and the Ethiopian story in particular. The catalog, *Ethiopian Passages*, will be available in 2003.

'Invasive species,' continued from Page 1

kind of organism and can come from any place on the planet. In order to respond to this challenge, we must have the depth and breadth of collections, such as we have here, to serve as a reference. More people work on taxonomy at the National Museum of Natural History than anywhere else," he said. "People come here for our expertise."

Miller highlighted a few examples of research at the Smithsonian related to invasive species. At the Smithsonian Environmental Research Center, scientists are analyzing marine organisms that are regularly transported around the world in the ballast water of cargo ships.

"If a ship travels from the Baltic to the Great Lakes, then dumps its ballast water, suddenly there are bizarre fish and invertebrates populating the Great Lakes," Miller said.

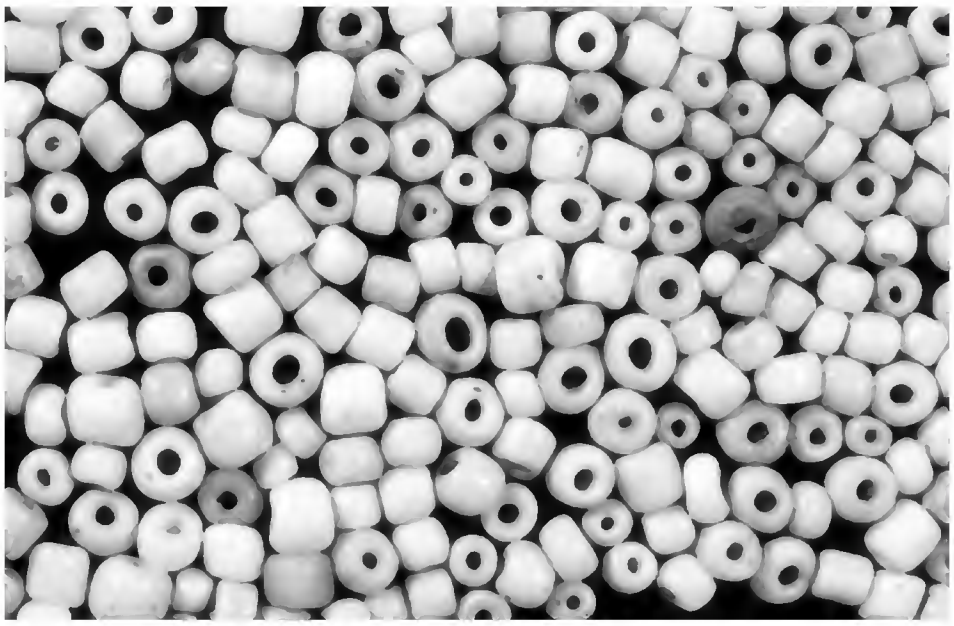
Similarly, Smithsonian Tropical Research Institute scientists have spent more than 80 years studying the movement of marine organisms between the Pacific and the Atlantic oceans and terrestrial organisms between North and South America.

Almost every day, the Department of Agriculture calls upon the expertise of the entomologists working with the National Museum of Natural History insect collection. If the entomologists determine that insects found on agricultural products being imported into the United States pose a hazard, the shipment can be denied entry.

"The Smithsonian is very involved in these activities," Miller said. "We are being called upon more and more to provide information about invasive species."

Correction

An article on Page 3 of the Autumn 2002 issue of Research Reports incorrectly reported the date of Michelangelo's death. He died in 1564.



Native Americans often used white seed beads, such as the ones shown here, for decorative beadwork. Seed beads are frequently found at archaeological sites. (Photo by Jane Beck)

'Beads,' continued from Page 3

generally had facets ground by hand, giving them more reflective surfaces.

One particularly popular type of Bohemian bead was a large, heavily faceted cobalt blue bead, which was and still is misleadingly referred to as a "Russian Blue" because it was traded by Russian fur traders.

Sullivan's Island had more than 2,000 of the blue beads and many other large, highly decorated ones, which seemed to have been particularly valued, as they were deliberately chosen as funerary objects.

Twelve of the Sullivan's Island beads were wound-on-drawn beads, the rarest type of beads in North America, formed by a combination of two common bead manufacturing techniques. They are made of translucent red glass wound around a drawn white bead. "Only three other wound-on-drawn beads have ever been recovered," Burgess says. "At this point, the rare beads raise more questions than they answer."

Why are there so few of them? Where do they come from? Why are they made this way? Questions such as these prod Burgess to further research and understanding of the beads and the role they played in Euro-American and Native American interactions.

Jo Ann Webb contributed to this article.

Research Highlights

Tropical insects. One of the world's largest and highest quality set of observations on live tropical insects and their host plants has led Smithsonian scientists and other researchers to reinterpret the structure of tropical insect communities. The study, "Predictably Simple: Assemblages of Caterpillars (*Lepidoptera*) Feeding on Rainforest Trees in Papua New Guinea," used 35,942 live caterpillars that were carefully handpicked from the foliage in a lowland rain forest in Papua New Guinea. The caterpillars were then reared to adults, which allowed solid identification of species. The team of scientists who collaborated on this analysis included Scott Miller, chairman of the Department of Systematic Biology at the Smithsonian's National Museum of Natural History; Yves Basset, a postdoctoral fellow at the Smithsonian Tropical Research Institute in Panama; Vojtech Novotny of the Czech Academy of Sciences; and George Weiblen of the University of Minnesota. The findings were published in the Proceedings of the Royal Society of London journal.

Galactic collision. The orbiting Chandra X-ray Observatory has discovered two supermassive black holes—each millions of times the mass of the sun—lurking in a single galaxy that eventually could spiral together in a catastrophic merger. That joining, several hundred million years from now, could result in a monumental release of radiation and gravitational waves that should stretch across the universe, according to astronomers. The black holes were discovered in galaxy NGC 6240, 400 million light-years from Earth.

Enhanced research. The donation of a CT scanner to the Smithsonian's National Museum of Natural History by Siemens Medical Solution has given the museum, as well as other Smithsonian museums and facilities, a new and fascinating research tool that allows for comprehensive study without destructive analysis. Most recently, the scanner has enhanced the collaborative study of 18th-century violins by the Smithsonian Center for Materials Research and Education; the Smithsonian's National Museum of American History, Behring Center; and the National Museum of Natural History. The scanner is effective in revealing basic construction techniques, as well as details of repairs. For the first time, researchers can evaluate densities of the wood and create a precise topographical map of curvatures and thicknesses of violin tops and backs—critical elements in controlling the sound of the instruments.

Using a CT scanner, researchers can study fragile objects, such as this rare 18th-century Stradivarius cello, in a noninvasive way.

Museum director. Brent Glass, 55, former executive director of the Pennsylvania Historical and Museum Commission in Harrisburg, Pa., is the new director of the Smithsonian's National Museum of American History, Behring Center. He came to the museum in December. Glass is well-known in museum communities for his scholarship in American history, particularly the history of industry and technology, urban history and the history of cultural organizations. During his 15 years as executive director of the commission, Glass managed the largest and most comprehensive state history program in the country. He also oversaw 25 historical sites and museums, the state Historic Preservation Office, public history programs and historical publications.

Brent Glass

West Nile virus. Peter Marra, a terrestrial animal ecologist at the Smithsonian Environmental Research Center in Edgewater, Md., is leading a research project on the West Nile virus and its impact on birds in the Mid-Atlantic region. The research group collects blood samples from birds to determine how many have the West Nile virus or have been exposed to it. Marra also is conducting another survey on migratory birds in Jamaica, Mexico, Puerto Rico and Florida in an attempt to track the movement of the West Nile virus as it heads south into the tropics. The Environmental Research Center is planning an international workshop to look at how to study, understand and measure the impact that the West Nile virus is having on all wildlife populations.

Books & Recordings

Drinking the Waters: Creating an American Leisure Class at 19th-Century Mineral Springs, by Thomas A. Chambers (Smithsonian Institution Press, 2002, $39.95). How Americans negotiated and defined class and sectionalism at mineral springs resorts in New York and Virginia.

The Smithsonian Book of Mars, by Joseph M. Boyce (Smithsonian Institution Press, 2002, $37.95). The most current and comprehensive book on what we know about Mars and how we know it.

Flight: 100 Years of Aviation, by R.G. Grant (DK Publishing, 2002, $50). Published to commemorate the 100th anniversary of flight, this book is a narrative of humankind's quest to conquer the skies and explore space. To order copies, call 1 (877) 342-5357, fax requests to 1 (877) 781-5131 or order online at us.dk.com.

Lion Tamarins: Biology and Conservation, edited by Devra G. Kleiman and Anthony B. Rylands (Smithsonian Institution Press, 2002, $45). An international team of experts offers a definitive work on these Brazilian monkeys.

Music in the Mind: The Concepts of Music and Musicians in Afghanistan, by Hiromi Lorraine Sakata (Smithsonian Institution Press, 2002, $34.95). An insightful study of the paradox of music in the Islamic world.

The Hold Life Has: Coca and Cultural Identity in an Andean Community, by Catherine J. Allen (Smithsonian Institution Press, 2002, $19.95). In this second edition, the author provides updated and new information based on her visits to Sonqo in 1995 and 2000.

Genetics in the Wild, by John C. Avise (Smithsonian Institution Press, 2002, $27.95). Using genetics, the award-winning geneticist and author examines intriguing mysteries of nature that have long baffled scientists.

Patton's Air Force: Forging a Legendary Air-Ground Team, by David N. Spires (Smithsonian Institution Press, 2002, $32.95). The first comprehensive analysis of the successful working relationship between Gen. George Patton's troops and the tactical air command that supported them.

To Reach the High Frontier: A History of U.S. Launch Vehicles, edited by Roger D. Launius and Dennis R. Jenkins (University Press of Kentucky, 2002, $49.95). A look at the primary concerns of the exploration and development of space. To order copies, call 1 (800) 839-6855.

The Mystery of Flight 427: Inside a Crash Investigation, by Bill Adair (Smithsonian Institution Press, 2002, $25.95). A definitive account of the 1994 crash in which all 132 passengers aboard died, as well as the investigation of that crash.

Tiwanaku and Its Hinterland: Archaeology and Paleoecology of an Andean Civilization, Vol. 2, Urban and Rural Archaeology, edited by Alan L. Kolata (Smithsonian Institution Press, 2002, $110). The most comprehensive archaeological record of an Andean culture.

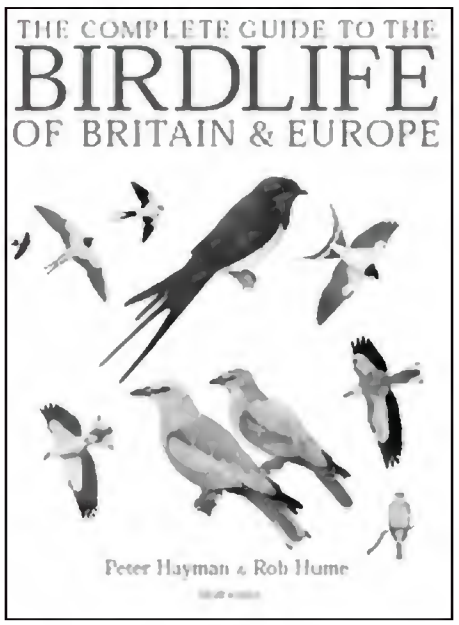
Cold War Laboratory: RAND, the Air Force and the American State, 1945-1950, by Martin J. Collins (Smithsonian Institution Press, 2002, $34.95). How a key group of RAND—a groundbreaking "think tank" designed to link leaders in the military and the aircraft industry—and Air Force leaders sought to adapt post-World War II American society to the threat of total war.

North American Owls, by Paul A. Johnsgard (Smithsonian Institution Press, 2002, $49.95). Included in this updated book is new information on 12 species of Mexican owls, new maps and modified figures.

Above and Beyond: The Aviation Medals of Honor, by Barrett Tillman (Smithsonian Institution Press, 2002, $29.95). A definitive collection of heroic true stories from some of the most famous airmen in history and lesser-known fliers.

Seaweeds, by David Thomas (Smithsonian Institution Press, 2002, $18.95). An engaging look at the aquatic versions of trees, bushes and lawns.

The Complete Guide to the Birdlife of Britain and Europe, by Peter Hayman and Rob Hume (Smithsonian Institution Press, 2002, $50). This comprehensive, richly illustrated guide offers information on every species of bird that regularly breeds in or visits Britain and Europe.



***The Complete Guide to the Birdlife of Britain and Europe* is available from Smithsonian Institution Press.**

¡Viva el Mariachi! (Smithsonian Folkways Recordings, 2002, $12 CD). In this collection of newly released material, Nati Cano and Los Camperos, the group he founded and directs, perform some of mariachi's most beloved songs.

Classic Mountain Songs From Smithsonian Folkways (Smithsonian Folkways Recordings, 2002, $12 CD). A handful of the greatest mountain ballads performed by some of the most influential folk singers and songwriters of the 20th century.

Pete Seeger: Folk Songs for Young People (Smithsonian Folkways Recordings, 2002, $12 CD; $9 cassette). This recording, first released in 1959, captures and conveys Seeger's engaging style in educating young people through music.

'Recordings,' continued on Page 8

Off the Shelf

We Have Capture: Tom Stafford and the Space Race

By Thomas P. Stafford, with Michael Cassutt (Published by Smithsonian Institution Press, 2002, $29.95)

Many may know that Thomas Stafford attained the highest speed ever by a test pilot, that he led the team that planned the sequence of missions leading to the original lunar landing and that he drafted the original specifications for the B-2 stealth bomber on a piece of hotel stationery. But few are aware of his role as America's unofficial space ambassador to the Soviet Union during the darkest days of the Cold War.

In his memoir, *We Have Capture: Tom Stafford and the Space Race*, Stafford recounts his early successes as a test pilot, a Gemini and Apollo astronaut, and a general in the U.S. Air Force, where he served as deputy chief of staff for research and development.

He also discusses how he opened the door to the possibility of cooperation in space between the Russians and the Americans. As President Nixon's stand-in at the 1971 funeral for three Russian cosmonauts, "I suggested to several of the senior cosmonauts and a few political leaders that perhaps someday we could have a cooperative effort in space between the Soviets and the Americans," Stafford says. It eventually happened.

Stafford's Apollo-Soyuz team was the first group of Americans to work at the cosmonaut training center and also the first to visit Baikonur, the top-secret Soviet launch center, in 1975. His handshake in space with Soviet commander Alexei Leonov on July 17, 1975, proved to the world that the two opposing countries could indeed work together.

At first, Stafford says, the American-Russian relationship was somewhat constrained. Yet, as the two countries worked together to accomplish a common goal, it became obvious to each team that their professional flying backgrounds were similar and that each approached tasks with the same outlook and with a common goal. The friction began to dissipate.

In fact, Stafford says, he and Leonov became lifelong friends. Leonov's granddaughter is named Karin after Stafford's daughter, and Stafford's youngest grandson is named Aleksei after Leonov.

Stafford says he hadn't given much thought to writing about his astronaut experiences until his second wife, Linda, and others encouraged him to do so. "To think that only 24 people on nine missions have ever gone to the moon, and I was one of them," he says. "It was an exciting time for me."

At the time, the space program was all-consuming, Stafford says. In eight years and two months, "we went from a speech—by President Kennedy to Congress, committing the United States to landing a man on the moon and returning him safely to Earth—to actually doing it. We started from scratch. It was an unbelievable era," he says.

When Stafford heard about President Kennedy's commitment to putting a man on the moon, "I was really charged up about the idea, and for the first time, I got interested in joining the space program," he says. "But NASA [the National Aeronautics and Space Administration] wasn't hiring new astronauts."

However, a few months later, he learned that NASA was going to select a new group of astronauts for the Gemini and Apollo programs. He applied to the program and met all the criteria. But there were many other qualified applicants.

In the meantime, Stafford, who was ending his tour of duty at Edwards Air Force Base in California, decided to enroll in graduate school at Harvard under the U.S. Air Force sponsorship. Three days after classes started, he received the long-awaited phone call—he was about to become an astronaut. Within days, he was headed to Ellington Air Force Base in Texas.

"The telephone call that I received from NASA's Deke Slayton at my neighbor's house, because our phone wasn't hooked up yet, was so exciting," Stafford says. "When I returned home from the neighbor's house, the look on my face said it all. My wife and children could tell by my expression that I had been chosen as an astronaut. Needless to say, my dreams were beginning to come true."

Stafford would go on to fly four missions, spend 507 hours in space and head the Apollo-Soyuz astronaut group.

Even today, the 72-year-old former astronaut still marvels at his accomplishments. "I am somewhat amazed," he writes, "that the only child of a dentist and a schoolteacher from a small town in Oklahoma was able to attend the Naval Academy, serve in the Air Force and fly in space four times."

—*Jo Ann Webb*

Thomas Stafford, right, is shown here in the Smithsonian's National Air and Space Museum with Museum Director John Dailey. (Photo by Eric Long)

'Recordings,' continued from Page 7

Latin Jazz: La Combinación Perfecta (Smithsonian Folkways Recordings, 2002, $15 CD). Released in conjunction with the book and the Smithsonian traveling exhibition of the same name, this compact disc is a collection of classic Latin jazz from some of its most important innovators.

Growing Up With Ella Jenkins (Smithsonian Folkways Recordings, 2002, $12 CD; $9 cassette). A recording of songs, chants, rhymes, rhythms, dances and games with children.

Visions From the Past: The Archaeology of Australian Aboriginal Art, by M.J. Morwood (Smithsonian Institution Press, 2002, $39.95). A look at how archaeologists study prehistoric art to better understand ancient societies.

Traditional Music of Peru 8: Piura (Smithsonian Folkways Recordings, 2002, $15 CD). The eighth and final volume of the "Traditional Music of Peru" features the musical and cultural diversity of this region.

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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