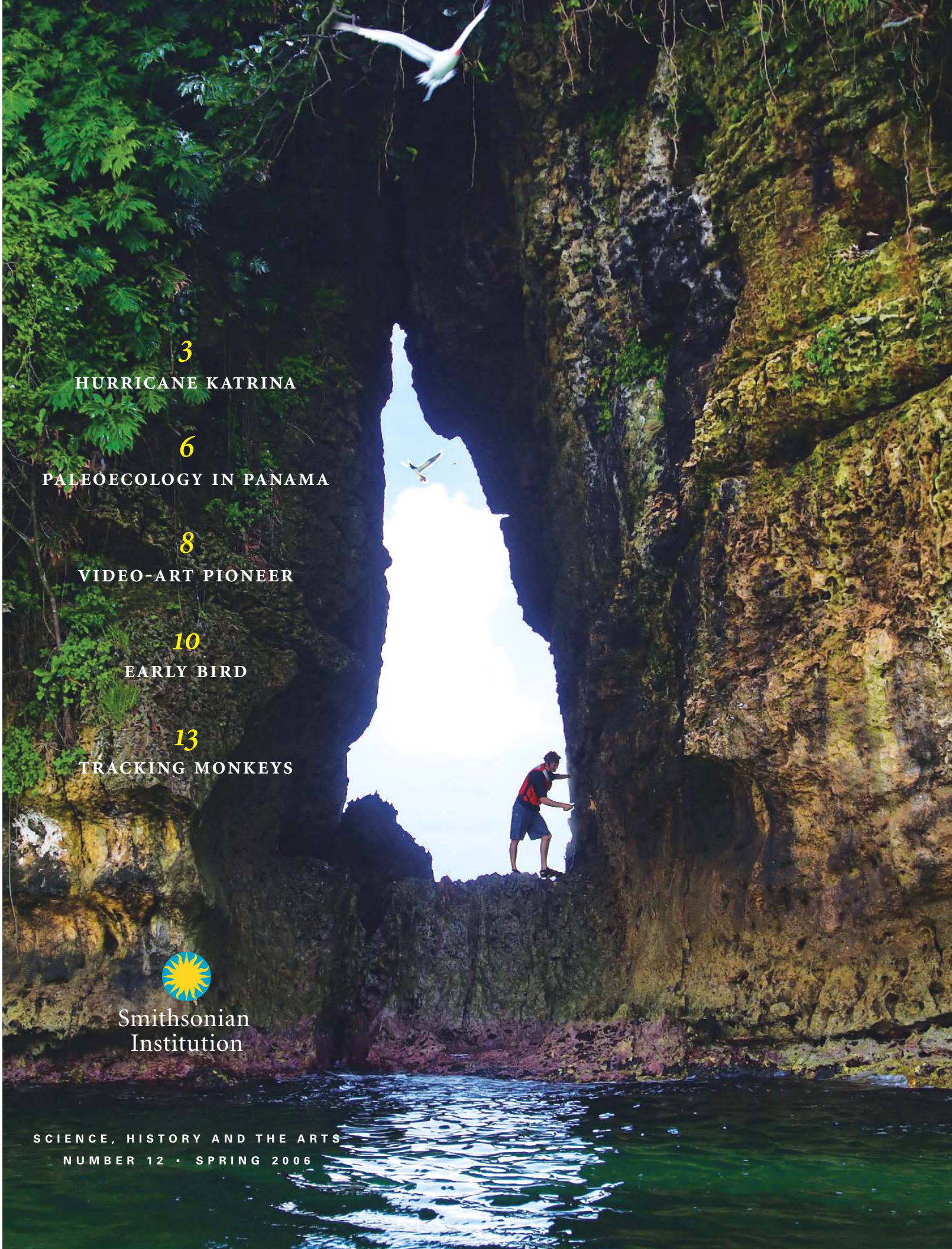

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Smithsonian Institution

SCIENCE, HISTORY AND THE ARTS
NUMBER 12 • SPRING 2006

SMITHSONIAN ONLINE

Legendary coins. Mistakes happen. But when one occurs in the minting of a coin, it can give that coin legendary status. Coins also become legends through their beauty or links to historic events. Collectors are intrigued by these rarities and haunt coin stores, shows and auctions seeking the odd and unusual. "Legendary Coins & Currency," a new Web site from the Numismatics Division of the Smithsonian's National Museum of American History, highlights some of the most noteworthy coins and currency in the Smithsonian's National Numismatic Collection. Included in this online exhibition are images and information on such legendary coins as the 1652 pine tree shilling, the 1913 Liberty head nickel, the 1906 Barber pattern double-eagle and the stunning 1907 Saint-Gaudens ultra-high-relief double-eagle. Paper currency also is highlighted here, with such rarities as a $15 note issued by the Colony of Virginia in 1776 and a 2 shilling, 6 pence note from Connecticut that someone stitched to a piece of newspaper to keep it from falling apart and going out of circulation.**—americanhistory.si.edu/coins**

This 1848 "quarter eagle" was minted from California "gold rush" bullion.

Nature's inspiration. Hank Nelson grew up in a logging camp in Oregon and worked felling timber for more than 30 years. He is now employed part-time as a bus driver, raconteur and guide for cruise-ship passengers in Wasilla, Alaska. His poems and songs about loggers often are "stories of people that are facing hard times," he says, but there are "good times, too." Nelson is one of the artists featured on "Inspirations From the Forest," a new Web site that explores the ways our national forests—timberlands, grasslands, mountains and waterways—have inspired and continue to inspire painters, poets, craftspeople and musicians. Other artists featured on the site include Hopi wicker basket weaver Leona Pooyouma, photographer Francisco Valenzuela, poet Gary Snyder, painter Sidne Teske and guitar maker Jack Holcomb. Video and audio components, as well as a comprehensive learning guide for teachers, parents and students, make this Web site perfectly suited for teaching children. "Inspirations From the Forest" is a collaboration of the Smithsonian's Center for Folklife and Cultural Heritage, the U.S. Department of Agriculture's Forest Service and the National Endowment for the Arts.
—www.folklife.si.edu/explore/features/inspirations.html

"In Town Tailings," a landscape done in pastels by Sidne Teske

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John Barrat, *Editor*

Colleen Perlman, *Assistant Editor*

Evelyn S. Lieberman, *Director of Communications and Public Affairs*

Kathryn Lindeman, *Publications Director*

Telephone: (202) 633-2400
E-mail: insideresearch@si.edu
Internet: www.si.edu/insideresearch

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On the cover: Digging into a section of preserved sediments on Swan's Cay Island in Panama's Bocas del Toro region, Smithsonian Tropical Research Institute Paleoecologist Aaron O'Dea searches for 2 million-year-old fossils of cupuladriid bryozoans, tiny filter-feeding marine animals. Using these fossils, O'Dea and other Smithsonian scientists are piecing together the ancient geological and biological history of the Isthmus of Panama. See story, Page 6. (Photo by Marcos Guerra)

Smithsonian Institution

In Hurricane Katrina's wake, a historian searches for objects with stories to tell

By Donald Smith
Special to Inside Smithsonian Research

The odor was oppressive: water-soaked vegetation baking in the midday sun. The perfume of decay. It reminded David Shayt of the tropical outposts where he'd been stationed as a young Marine. But there was something else in the air that warm fall day last year, as he walked up to the two-story brick town house in New Orleans' flood-drenched Seventh Ward. It was the sickly sweet smell of mold, and mud and crushed dreams.

Shayt, a curator in the Division of Work and Industry at the Smithsonian's National Museum of American History, Kenneth E. Behring Center, was in Louisiana for five days late last September, the first of two trips to collect artifacts associated with Hurricane Katrina. By his side, making a visual record, was Smithsonian photographer Hugh Talman.

By the time they reached this particular house at 6420 Bridgehampton Drive, they had already carefully selected a few items from a number of communities through which the hurricane had passed. Now, as Shayt and Talman approached the former home, they pulled on gloves and surgical masks to protect themselves against harmful microbes. Nothing, however, could have shielded the two from what they felt after crossing the threshold.

"For the first time, we were alone in someone's private house," Shayt recalls. "We were rifling through their personal belongings, things they had fled from as waters climbed around them. We felt in a certain sense that we were violating their privacy again."

David Shayt holds a plastic toy castle that was found in a New Orleans neighborhood destroyed by Hurricane Katrina. The toy is now in the collections of the National Museum of American History. (Photos by Hugh Talman)

They weren't. Shayt had received permission from the owner of the house, Bryan Williams, whom he had met at an emergency shelter in nearby Houma, La. Shayt and Talman also were working with local authorities. Clearances were obtained. They even had a police escort. Everything was in order.

For a moment, they stood in the silence and overpowering odor, resisting the urge to turn and walk away. Shayt reassured himself that what he was doing was justified, sanctioned in the end by the human need to hold onto memories of colossal events by collecting and preserving physical reminders of them—even small ones. He was in the right place, at the right time, doing the right thing.

Then he and Talman went to work.

National consequence

Generally, museums don't deal with disasters. "From the dawn of antiquity, museums have been celebratory," Shayt says. "Rarely have they focused on calamities: failures, losses, destruction, sadness, sorrow. When the Titanic went down, the Smithsonian didn't seek any objects, despite the many lives that were lost."

The terrorist attacks of Sept. 11, 2001,

(continued)

In addition to collecting objects, David Shayt and Hugh Talman interviewed and photographed many New Orleans residents. Shown here, from left, are Curtis Thomas, Al Green, John Aubert and Steve Robinson, standing on the foundation of Robinson's former home at 2415 Forstall St. in the Ninth Ward. Below: This mailbox at 2005 Lizardi St. in New Orleans, which was missing its house, was one of a number of objects collected for the Museum of American History.

triggered a debate over that tradition. After much discussion, the National Museum of American History staff decided that the strikes on the World Trade Center and the Pentagon and the downing of the jetliner apparently headed for a target in Washington, D.C., were catastrophes of such national consequence that they merited the museum's attention. Teams were dispatched to collect artifacts.

"It's a subjective matter," Shayt explains. "We—as a museum—basically have to read the event and make a judgment as to whether it rises to the level of transcendent national significance."

Clearly, Katrina qualified. Striking the central Gulf Coast near Slidell, La., on the morning of Aug. 29, 2005, the hurricane left a landscape of ruin along the coastlines of Louisiana, Mississippi and Alabama.

The storm surge caused Lake Pontchartrain to rise, breaching levees and flooding roughly 80 percent of New Orleans. Katrina caused at least $80 billion in damages and killed some 1,300 people. Thousands more fled to other parts of the country.

Individual stories

Before leaving for New Orleans, Shayt studied maps of Louisiana, contacted local authorities, and brainstormed with other museum staff about where to go and what to collect.

He especially wanted objects that told individual stories of survival and rescue. Among the 17 objects collected on his first trip was a battery-operated, mud-spattered kitchen clock. It had stopped at 9:25—the hour it surrendered to the battering it must have been taking inside a house as flood waters rushed back and forth.

Three items came from the New Orleans Superdome, where many residents first took shelter after the levees broke. One was a well-used cot, representing both the sense of rescue and the discomfort that the evacuees experienced. The other two were reminders of the sports teams based at the Superdome before the deluge: a vinyl New Orleans Hornets basketball banner and a cast-metal fleur-de-lis about the size of a dinner plate—a symbol not only of the New Orleans Saints football team but also of the city and its French heritage.

Other collected items included fishing gear from a Vietnamese shrimp boat in Biloxi, Miss., and a leather halter from a horse rescued from a flooded field.

From the brick town house in the Seventh Ward, they took away the valances from two front windows. The hand-made lacework bore a unique Katrina autograph: a line of stain near the top showing the flood's high-water mark.

Pompeii

"We were up to our ears in evidence of Katrina," Shayt recalls of the daunting challenge of choosing specific objects from a sea of carnage. "It made me think of Pompeii, the buried city.... I was only dipping into the material remains of the region and making a small extraction."

Because of this, Shayt considered it critical to try to locate owners of objects. Where possible, he tracked these people down and interviewed them, learning names, occupations, contact information, how an object was used, its personal significance and stories of the owner's Katrina experience. For each item, Shayt also wrote a detailed explanation as to why he deemed it important enough to be added to the Smithsonian collections.

His notes will be placed on file in the Museum of American History as documentary support for each object. In addition, each file will hold maps and Hugh Talman's photographs pinpointing where an object was collected, deeds of gift signed by the owners and other related information.

"In decades to come, the question, 'Why did this Shayt fellow collect this item?' hopefully need not be asked," Shayt explains. "When collecting objects that are associated with a natural disaster like Katrina, support information is essential. The documentation and photography give objects context and make them authentic evidence of America's social and cultural history."

Plastic castle

A second trip to New Orleans in December concentrated on the heart of the city. It yielded 41 artifacts, including a 1930s clarinet in its blue case from the home of jazz historian Michael White; water-stained photographs of jazz musicians by photographer Herman Leonard; a hurricane evacuation route sign from one of the city's emergency escape routes; a blue Federal Emergency Management Agency staff shirt; a window with an orange spray-painted X indicating a house that had been searched for bodies; a basket and hoist used by the U.S. Coast Guard for helicopter rescues; and a green mailbox with a butterfly decoration and hand-painted address—2005 Lizardi St. They found the mailbox on a post in the Lower Ninth Ward. It was still standing tall, flag up, even though the house it served was a pile of debris.

But the object that tugged most at Shayt's heart was a plastic Fisher Price toy castle. He found it, during the first trip, lying in a field near some destroyed homes.

"It was right at the 17th Street Canal break in the Lakeview District," Shayt recalls. "To me, it just captures the poignancy of a child dreaming of living in a castle someday, surrounded by all the comforts of home while playing with that castle. You've got your soldiers at the battlements. There's a big fire in the fireplace. And you're secure.

"Of course, that's not true," he adds. "Any house can be destroyed. And here was this child's castle, lying in the mud. Another reminder that we are always dancing on the surface of catastrophe."

Someday, Shayt intends to track down the young owner of the castle, learn his or her story and add it to the many other Hurricane Katrina stories on file at the Smithsonian. ❖

They found the mailbox on a post in the Lower Ninth Ward...still standing tall, flag up, even though the house it served was a pile of debris.

David Shayt inspects a chunk of floodwall from the collapsed London Avenue Canal levee before acquiring it for the Museum of American History.

Small animals help scientists unveil secrets of Panama's prehistoric past

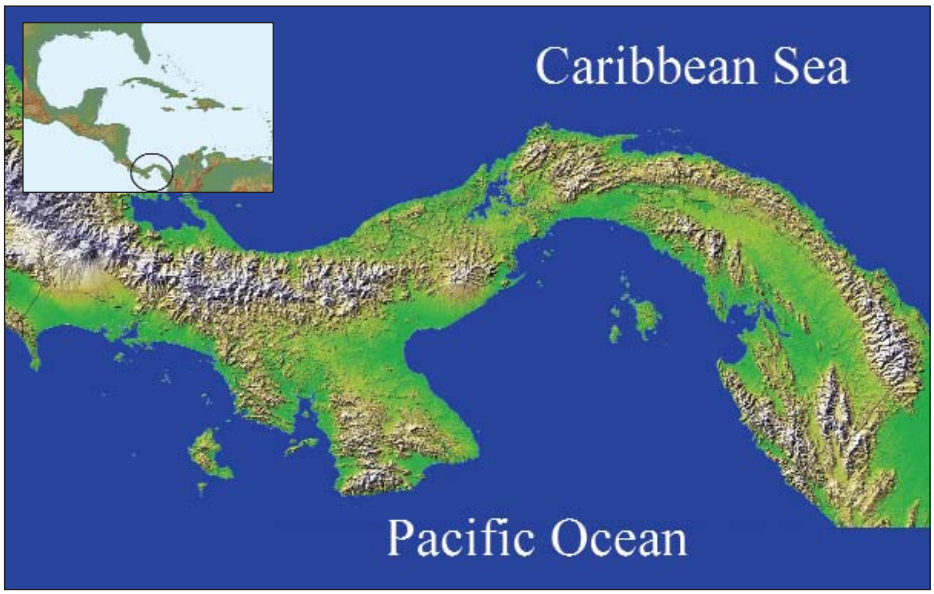
By John Barrat
Smithsonian Office of Public Affairs

Under a blazing Caribbean sun on a beach at Swan's Cay, Panama, Aaron O'Dea lifts a magnifying lens to his eye to study a dime-size shell he's dug from an exposed cliff. A delicate lacework of hundreds of tiny holes span the shell's surface. Each hole, called a zooid, represents the apartment once occupied by an odd little animal known as a cupuladriid bryozoan. The shell housed an entire colony of these filter-feeding creatures, which, in the animal kingdom, fall somewhere between mollusks and worms.

O'Dea, a paleoecologist at the Smithsonian Tropical Research Institute in Panama, is working to piece together the ancient environmental and biological history of the Caribbean. To him, the millions of cupuladriid fossils that lie scattered through geologic deposits across Panama dating back millions of years represent a rich archive of data waiting to be unlocked.

By studying living cupuladriids and how environmental conditions influence their morphology, O'Dea is developing a key by which this fossil record can be read. His recent work showing how seasonal changes in water temperature influence shell formation in cupuladriids has already opened a new window into Panama's dynamic geologic past.

"What we have here is an exceptional opportunity to test how evolution actually takes place over many millennia," O'Dea explains. "Among the questions I'd like to answer are: Do animals evolve immediately after environmental change, or does it take millions of years for them to respond? What factors, other than the environment, are at play in controlling evolution?"



Strong currents of deep, cold, nutrient-rich water that flowed between the Pacific and Atlantic oceans were cut off around 4 million years ago by the rising of the Isthmus of Panama, shown here in this satellite map.

Two different environments

"Because of its biological history, Panama is one of the most important areas of the world," O'Dea continues. Slowly, over millions of years, the Isthmus of Panama pushed upward out of the sea to create a narrow bridge of land connecting Central and South America. Strong currents of deep, cold, nutrient-rich water that flowed between the Pacific and Atlantic oceans here were cut off around 4 million years ago by this newly formed piece of land. On opposite sides of the isthmus, two very different marine environments emerged.

"Today, waters on the Pacific side of Panama still experience a high degree of seasonal variation in temperature, due to the upwelling of deep, cold, nutrient-rich water," O'Dea says. "Conversely, in the Caribbean, on the Atlantic side, there is no upwelling," and its waters remain warm year-round.

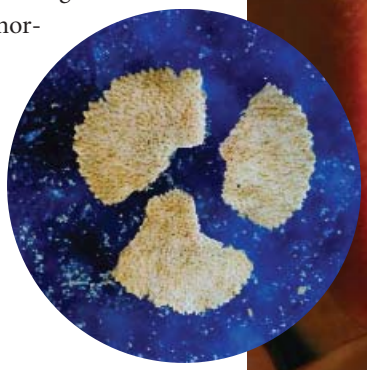
Tree rings

To determine how quickly the Caribbean environment and its ecology changed to its present state after the isthmus closed, O'Dea turned to living cupuladriids. He and Smithsonian Tropical Research Institute Biologist Jeremy Jackson collected live cupuladriids from both sides of the isthmus and examined under a microscope the zooids—the small holes—that dot their surface.

Earlier research had shown that in cold

water, cupuladriids create slightly larger zooids. "Cupuladriids grow new zooids very slowly, increasing the shell circumference of their colony only a few millimeters each year," O'Dea adds.

In cupuladriids collected from the Pacific, O'Dea and Jackson discovered that zooid size varied cyclically "in synchrony with the seasonal changes in water temperature," O'Dea explains. "Very much like the seasonal rings of trees, cupuladriids record the strength of seasonal changes in temperature in the morphology of their skeletons."



Atlantic cupuladriids, from Caribbean waters with little seasonal temperature variation, showed no such zooid pattern.

O'Dea and Jackson immediately used this new-found knowledge to look more closely at cupuladriid fossils collected from Caribbean sediments laid down at the time the Isthmus of Panama was rising and closing off the seaway between the Pacific and the Atlantic.

Zooid patterns in fossil cupuladriids show that, as the seaway closed, a profound change in the environment occurred as upwelling of cold, nutrient-rich water stopped in the Caribbean, O'Dea says.

Before O'Dea and Jackson's zooid study, "this rate of climactic change was unknown," O'Dea explains. "We had no good technique to investigate it and so could not be entirely clear about when the Caribbean coast actually responded to the closure of the seaway."

Further study of cupuladriids and other marine fossils revealed that "the ecological structure of the Caribbean also changed in response to the closure of the seaway, but surprisingly, did so slowly over at least a million years," O'Dea says.

Sexual vs. asexual

In a second study focused on cupuladriid shells, O'Dea and Jackson examined the way living cupuladriids reproduce on both sides of the Isthmus of Panama today. Cupuladriids can make new colonies both sexually, using a larvae, and asexually, by colony growth, fragmentation and then regeneration of the fragments.

They found that "asexual reproduction is more common on the Pacific side of the Isthmus of Panama, where strong upwelling brings up high levels of nutrients. High nutrient levels means faster growth, which means more fragmentation and better regeneration," O'Dea says. "In the Caribbean, where nutrient levels are lower, sexual propagation becomes more advantageous because growth is much slower and regeneration more difficult."

Many marine animals can choose to reproduce sexually or asexually, but cupuladriids are unique in that their reproductive origin can be determined by markings on their shells. This makes it possible for researchers to measure the levels of sexual and asexual reproduction in populations of these animals millions of years old. O'Dea is now surveying thousands of fossil cupuladriids collected from different geologic strata across the Isthmus of Panama to determine their ratios of sexuality and asexuality. Studying how cupuladriids have switched between using sexual and asexual reproduction during the last 15 million years can help scientists understand the extent to which environmental change drives large-scale evolutionary patterns.

By studying the big picture of evolution through these small animals, important chapters are being added to Panama's paleontological history. ❖

On a beach in Panama's Bocas del Toro region, Aaron O'Dea inspects a live bryozoan with a hand lens. (Photo by Marcos Guerra) Inset: The three fragments of this bryozoan colony can regenerate asexually into three new colonies. (Photo by Aaron O'Dea)

Resurrecting video-art pioneer Nam June Paik's paean to America

By Michael Lipske
Special to Inside Smithsonian Research

When Nam June Paik arrived in the United States in 1964, its wide open country and boundless highways made a big impression on the Korean-born artist.

Thirty-one years later, in 1995, Paik—a video-art pioneer—created a paean to the glowing motels and restaurant signs that once beckoned Americans out to the open road. His "Electronic Superhighway: Continental U.S., Alaska, Hawaii" is a mesmerizing sculpture made up of 336 televisions; 50 DVD players; 3,750 feet of cable; and 575 feet of multicolor neon tubing.

Powered-up, it is a 32-foot-wide glowing map of the United States. Televisions in the space for Oklahoma and Kansas ceaselessly play the musicals "Oklahoma" and "The Wizard of Oz." The Mississippi is a blinking baby-blue neon band. Iowa, famous for its caucuses, has four televisions broadcasting footage of 20th-century American presidents, the face of one morphing into the next. A complex skeleton of wood-and-steel scaffolding and iron armature support it all.

Acquired by the Smithsonian American Art Museum in 2002 as a gift from Paik, who died in January 2006, "Electronic Superhighway" arrived in Washington, D.C., as four crates of neon tubing (some broken); an iron armature in eight pieces; and less than 50 states worth of state-themed video content on laser disc.

With this electronic marvel slated to occupy a prominent place in the American Art Museum's third-floor Lincoln Gallery when the museum opens, after extensive renovation, on July 1, the challenge of resurrecting "Electronic Superhighway" fell to Museum Specialist Adam Rice.

Pre-flight

Rice first transported the pieces to an off-site warehouse in Largo, Md., for a test assembly. In unpacking "Electronic Superhighway," Rice noticed that "a lot of the parts were missing." The prolific Paik was known to recycle components, such as televisions, from his old works for new ones.

Consulting with longtime Paik assistant Jon Huffman of New York, American Art Museum Collections Coordinator Betsy Anderson had all the media content for the individual states updated. "Laser disc players don't really exist anymore," so Paik's movie and video footage was transferred to DVD, Anderson says.

Video footage for New York was missing entirely, so Huffman shot replacement footage of the Empire State Building. Hundreds of televisions in a variety of sizes had to be purchased.

1995 footage

What Rice would have liked most to find in the boxes and crates that came from Paik's studio were some instructions. None existed. So he worked with the next best thing: video footage of the artwork shot when "Electronic Superhighway" debuted in 1995 in New York City.

By watching the video over and over, Rice was able to determine what size television monitors Paik had used in his original work, as well as their sometimes peculiar positioning.

"The thing gets pretty complicated," Rice explains. "Some of the TVs are upside-down or on their sides." Screen sizes of the televisions ranged from 5 inches to 27 inches. Paik also incorporated nine 2-inch televisions with liquid crystal display screens.

Rice's task was made all the harder because the video he was

studying had been shot too near to the artwork. "It's close-up, panning over it," Rice says. His work was like trying to get a sense of the real United States from footage shot from a low-flying airplane.

Alternating his gaze between the video and his computer screen, Rice began the arduous task of making a computer blueprint of "Electronic Superhighway" with architectural drafting software.

He began by designing the steel scaffold with wooden decks on which the 336 televisions are arranged. He also mapped the precise placement of each television inside the iron armature that stands in front of the scaffold.

Still studying the 1995 gallery footage—"I looked at the tape so long and so many times, I thought I was going to go nuts," he recalls—Rice next re-created the neon layer on his computer. Local neon artists were called in to consult.

Finally, using his blueprint, Rice assembled "Electronic Superhighway," with Huffman's guidance, in the Largo warehouse. "Jon, who was aware of Paik's intent, got his jeans on, and we lifted all the TVs and placed them," he says.

After he successfully powered it up, Rice brought in his four kids, ages 5 to 11, for a glimpse. "They were amazed," he says.

A month after assembling the piece, Rice took it all apart. He is now reassembling it at the American Art Museum.

Future upgrades

Even after "Electronic Superhighway" goes on display, it may present challenges for Smithsonian American Art Museum staff. Betsy Anderson has ordered a back-up set of DVDs, and Rice has extra televisions at the ready "for when the tubes go," he says.

Decades from now, it may be impossible to repair or replace the curved screen, cathode-ray-tube monitors that give "Electronic Superhighway" its 1990s look. However, as other late 20th-century electronic components disappear from repair shop shelves, further technological upgrades may be needed to keep artworks such as "Electronic Superhighway" alive for museum visitors. "We won't really know until we play this thing for however many years on end," Rice adds. ❖

Top: Adam Rice at the Smithsonian American Art Museum (Photo by Harold Dorwin)

Left: The main body of "Electronic Superhighway" as it looked during its test assembly in a Largo, Md., warehouse. Hawaii and Alaska are not shown in this image. The artwork will occupy a prominent place in the American Art Museum's third-floor Lincoln Gallery when the museum opens July 1. (Lea Christiano photo)

Using genetic technology to chart the bird family tree

By Michael Lipske
Special to Inside Smithsonian Research

Since the 19th century, Charles Darwin's concept of a great tree of life covering the Earth "with its everbranching and beautiful ramifications" has inspired biologists to chart the relationships that link all living things. Now, a suite of new tools is helping scientists get better answers to the many questions about relationships among known species.

One of those tools, molecular genetic technology, came on the scene back in the 1960s. "But just in the last 10 years, we've gone through a couple of generations in how we collect gene sequence data," explains Michael Braun, an evolutionary geneticist in the Department of Vertebrate Zoology at the Smithsonian's National Museum of Natural History. "It's a very rapidly improving set of technologies. We can sequence DNA cheaply and easily now and get very large amounts of DNA sequence information that is immediately comparable across different lineages."

To that progress in gene sequencing—determining the order of nucleotide base pairs that make every gene unique—add recent advances in how scientists analyze data about genetically related groups of organisms. Also mix in our era's huge leaps in information technology and processing, and suddenly, scientists are equipped for the first time to construct a robust vision of Darwin's tree.

One surprising find that the Early Bird project revealed is a close relationship between the owlet-nightjars and the swifts and hummingbirds. Shown here are an Australian owlet-nightjar (*Aegotheles cristatus*), left, and a crimson topaz hummingbird (*Topaza pella*). (Photos by Ian Montgomery, left, and Daniel Guthrie)

Early Bird

Braun's laboratory is one of six in the United States—the other labs include two at the University of Florida and one each at the Field Museum of Natural History in Chicago, Louisiana State University and Wayne State University in Detroit—working together to map a major part of the tree of life by determining the evolutionary relationships between all major groups of birds.

Called Early Bird, the project is part of a broader endeavor to flesh out a tree of life that encompasses plants, animals and microorganisms, ranging from algae and fungi to spiders, ants, dinosaurs and jellyfish.

Launched by the National Science Foundation, the projected 10- to 15-year, multimillion-dollar Assembling the Tree of Life Program has been described as a "megascience initiative" to rapidly chart most major branches, extinct and living, of life on Earth. This initiative involves a number of Smithsonian scientists from different areas of expertise.

The Early Bird segment of the Tree of Life Program will generate gene sequence data for all major avian lineages from a series of carefully selected genes.

"We think we will need data for 30 or more genes to get a good estimate of phylogeny for all living birds," Braun says. Phylogeny is the study of the evolutionary relationships of a group of organisms. "We've divided those 30 genes among the labs, so that every lab is sequencing different genes, but for the same species of birds."

Exemplars

All told, Early Bird collaborators aim to produce gene data for about 200 of the world's 9,000 or so bird species. Braun calls those 200 species "exemplars of each of the major groups of birds"—species chosen to represent all the branches of the bird family tree.

Hummingbirds, for example, are a major group of birds, with all 375 living species thought to have derived from a single evolutionary branch of the bird family tree. "We think that all of the current diversity of hummingbirds goes back into one branch that connects to all the other kinds of birds," Braun says. "Our goal is to find out exactly how that branch connects to the other major branches."

To adequately represent the hummingbird branch, the Early Bird labs will need sequence data from three to five exemplars of the many hummingbird species.

Flamingos, loons, grebes, egrets, ostriches and other familiar groups of birds similarly represent other major branches of the family tree. "So we only have to sample those lineages a few times to represent that branch of the tree, even though there may be hundreds of species," Braun explains. "We're just working on the base of the tree, working out the main branching structure.

"The biological diversity that we're working on in the Early Bird project represents fissions of species that occurred many millions of years ago," he continues.

Some surprises already have turned up. One novel DNA sequence element links the swifts and hummingbirds with the owlet-nightjars, a little-known group of night birds from Australia and New Guinea, Braun says. "A close relationship between these groups was a real surprise when we discovered this element a few years ago, but it has been corroborated by a number of studies."

Conservation decisions

Tree of Life data will be of value to scientists tracking the origin and spread of disease, developing new medicines and controlling invasive species. Scientists trying to save endangered species of birds also will benefit from Early Bird's enhanced view of the avian family tree.

"Phyletic diversity, how much depth of the family tree a particular lineage represents," can be a key factor in making conservation decisions, Braun says. "If you could save only one species, would you rather save a species of warbler when there are 25 species in that genus, or would you want to save the oilbird, a bizarre echo-locating nocturnal bird" dwelling in South American caves, a one-of-a-kind creature that conservationists already worry about?

"Phyletic diversity is something that people need to take into account in managing populations," Braun says. Thus, the knowledge that Early Bird is assembling "comes into play in a real way. The better you understand the world around you, the more informed are the decisions you can make." ❖

"The biological diversity that we're working on in the Early Bird project represents fissions of species that occurred many millions of years ago," Braun says.

Christopher Huddleston, a laboratory technician in the Museum of Natural History's Laboratory of Analytical Biology, removes from the lab's liquid nitrogen cryosystem tissue samples of birds for genetic testing. (Photo by James Di Loreto)

New museum site. The site for the National Museum of African American History and Culture was selected in January by the Smithsonian Board of Regents. The nearly 5-acre parcel of land in Washington, D.C., near the Washington Monument is bounded by Constitution Avenue, Madison Drive, and 14th and 15th streets N.W. It is estimated the museum will open in about a decade and will cost between $300 million and $500 million. It will be funded equally by Congress and Smithsonian-raised private donations. The museum was established on Dec. 19, 2003, when President George W. Bush signed into law legislation establishing it as a part of the Smithsonian.

***Paedocypris progenetica*, the world's smallest known vertebrate**

Smallest fish. Raif Britz, a staff member of the Natural History Museum in London and a research associate at the Smithsonian's National Museum of Natural History, was on the team of researchers who recently described a new species of fish, *Paedocypris progenetica*, that ranks as the smallest known backboned animal. Discovered by ichthyologists in highly acidic peat swamps on the Indonesian island of Sumatra, *P. progenetica* belongs to the carp family, and females mature at three-tenths of an inch in length.

Moon radar. Scientists have been aiming at the moon long radio wavelength radar that can penetrate rock and dust to create revealing images of the moon's hidden volcanic geography. Led by Bruce Campbell of the Smithsonian's National Air and Space Museum and scientists from the Smithsonian Astrophysical Observatory, the researchers have collected a nearly complete radar map of the Earth-facing side of the moon. The new map reveals the location of ancient volcanic material that has long been buried by the thick layer of dust and debris that covers the moon. Long wavelength radar allows scientists to probe much deeper beneath the moon's surface than do optical or infrared telescopes.

This aerial photograph of the National Mall shows the site where the National Museum of African American History and Culture will be built. (Photo by Jeff Tinsley)

Hip-hop. In February, the Smithsonian's National Museum of American History launched a major initiative to collect objects from all aspects of hip-hop music, including vinyl records, handwritten lyrics, boom boxes, clothing and costumes, videos, posters and photos. This multiyear project will trace hip-hop from its origins in the 1970s, as an expression of urban black and Latino youth culture, to the present. During a special ceremony in New York City to announce the program, many hip-hop pioneers—including Ice T, Cool Herc, Afrika Bambaata and Grandmaster Flash—donated personal objects to the Smithsonian. An advisory panel of artists, producers and scholars will assist in defining and refining the project.

This illustration of Samoan flying fox bats is from the *United States Exploring Expedition: Atlas of Mammalogy and Ornithology,* by John Cassin, 1858.

Biodiversity literature. Eight of the world's major natural history institutions and botanical libraries—including the Smithsonian Institution Libraries and the National Museum of Natural History—are working together to digitize the published literature on biodiversity that they jointly hold and make it freely accessible on the Internet. The project, the Biodiversity Heritage Library, will establish a central resource of biodiversity publications drawn from their combined collections—some 2 million volumes collected during 200 years. Other participants include the Royal Botanic Gardens, England; the Harvard Museum of Comparative Zoology and Harvard University Botany Libraries; the Natural History Museum, London; and the American Museum of Natural History, New York.

Scientists find Polaris is three stars in one

The North Star, also called Polaris, is a familiar sight to stargazers. For centuries, it has served as a celestial guidepost for sailors at sea and other nighttime wayfarers. Now, astronomers have discovered that there is more to Polaris than meets the eye. The familiar nighttime object is actually three stars in one: one bright star and two faint stars.

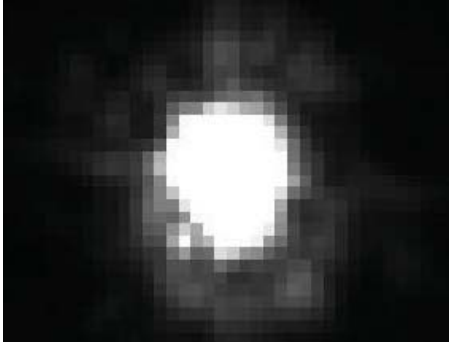
The brightest star in the system is Polaris, which is visible to the unaided eye. In 1780, English astronomer William Herschel discovered a second, fainter star very close to Polaris. It can be seen through small telescopes.

Recently, astronomers deduced that yet another star lurked nearby, because the pull of its gravity made Polaris wobble slightly back and forth along our line of sight—a wobble detectable with telescopic instruments. However, this third star was too faint and too close to Polaris to be visible...that is, until the Hubble Space Telescope trained its lens on the North Star.

"With Hubble, we've pulled the North Star's companion out of the shadows and into the spotlight," Astronomer Nancy Evans of the Smithsonian Astrophysical Observatory explains. "The star we observed is so close to Polaris that we had to stretch Hubble to the limit of its powers."

The newfound star lies some 2 billion miles from Polaris. Although that gap is about the size of our solar system, the two stars are so far away from Earth that this distance seems small, and the stars appear incredibly close together. Polaris and its newfound companion orbit each other once every 30 years. To learn more about this triple-star system, Evans and her colleagues have asked for more observing time with Hubble.

In particular, they plan to sharpen their measurement of the North Star's mass.



The faint companion of Polaris is visible at the 7 o'clock position in this image from the Hubble Space Telescope.

Pinning down that number is key to understanding how the star will change over its lifetime. Astronomers want to achieve a full understanding of Polaris because it is the nearest Cepheid variable star—a type of star used to measure the distances to other galaxies and the rate of expansion of the universe.

"This discovery goes to show that even a familiar friend like the North Star can still hold surprises," Evans says. "Thanks to Hubble, we've added a new page to the photographic album of Polaris."

—Christine Pulliam

Mapping foraging patterns may reveal intelligence in howler monkeys

When not snoozing, the howler monkeys on Panama's Barro Colorado Island perpetually forage in the rain-forest canopy, on the hunt for wild figs, tender leaves and other edibles. Staying inside a home range of 80 acres, the monkeys, over time, should develop a good memory of where to find each food tree in their part of the forest—or so it would seem.

A howler monkey on Barro Colorado Island

Since June 2005, Mariah Hopkins, a doctoral candidate from the University of California, Berkeley, working at the Smithsonian Tropical Research Institute in Panama, has been monitoring the movement of howler monkey troops to gain insight into the logic behind their foraging and ranging behavior, she says.

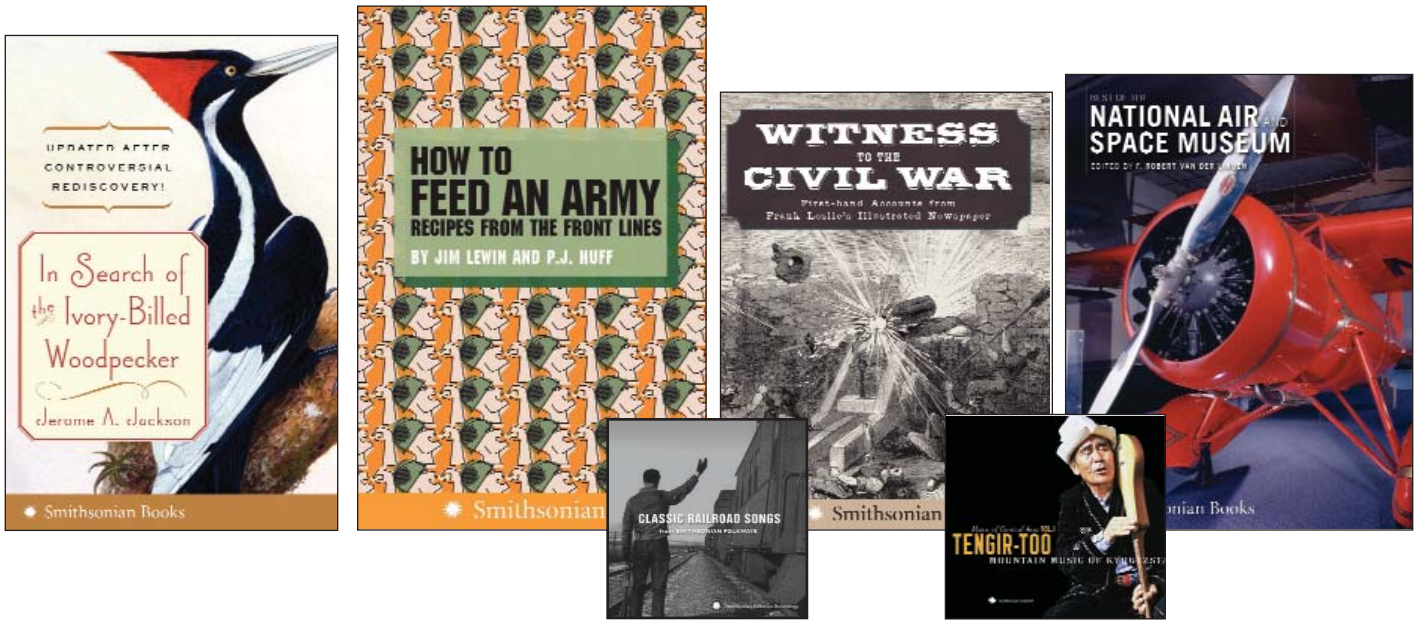
"A primary part of my study is to try to determine if the monkeys are using rule-based foraging decisions," Hopkins explains. "For example, do they know the exact location of a specific fig tree they want to visit and are they moving in the most efficient way to that tree. If their movements indicate that they have a mental picture of the different food trees in their rain-forest environment...that implies a significant intelligence."

Hopkins is collecting data on eight howler monkey troops whose home ranges overlap a 124-acre rain-forest plot on Barro Colorado Island where, since 1981, Smithsonian botanists have carried out a comprehensive census and mapping of tree species.

Using radio collars and a high-tech tracking system that records a troop's position every 10 minutes, Hopkins is amassing a year's worth of troop movement data. Using a computer, she will then analyze troop movement patterns against a map of tree species on the 124-acre plot. The monkeys use many of the trees located inside the plot for food. Hopkins also follows the monkey troops on foot. Her field observations of their behavior are a critical element in evaluating her computer models.

In addition to a better understanding of primate intelligence and memory, Hopkins' research has other applications. For example, she says, "some trees rely on monkeys to disperse their seeds. Knowing howler movement patterns may lead to new insight into how monkeys affect the forest structure."

—John Barrat



Best of the National Air and Space Museum, by Robert Van Der Linden (Collins, 2006, $29.95). Rich text and extravagant photos highlight the most important air- and spacecraft in the history of aviation in one of the greatest collections in the world.

Hope Diamond: The Cultural History of a Legendary and Cursed Gem, by Richard Kurin (Collins, 2006, $24.95). A fascinating narrative that moves across three continents and spans centuries to tell the history and curse of the legendary Hope Diamond. In 1958, the Hope Diamond was given to the Smithsonian and is a premier attraction of the National Museum of Natural History.

In Search of the Ivory-Billed Woodpecker, by Jerome A. Jackson (Collins, 2006, $15.95). This natural history of the ivory-billed woodpecker takes readers across the United States and into Cuba to search out this mysterious bird.

How to Feed an Army: Recipes From the Front Lines, by Jim Lewin and P.J. Huff (Collins, 2006, $15.95). More than 100 military recipes spanning American military history, from the Revolutionary War through the war in Iraq, with commentary, facts, cartoons and trivia on the role of food in a soldier's daily life.

Witness to the Civil War: First-Hand Accounts From Frank Leslie's Illustrated Newspaper, by Jim Lewin (Collins, 2006, $29.95). A history of the Civil War with more than 50 images from America's first illustrated periodical. Contemporary commentary and analysis further adds to the descriptions from artists and journalists working in the battlefields.

Cheating Death: Combat Air Rescues in Vietnam and Laos, by George J. Marrett (Collins, 2006, $15.95). A compelling tale of heroism and passion, describing some of the most dangerous rescue missions carried out during the Vietnam War.

747: Creating the World's First Jumbo Jet and Other Adventures From a Life in Aviation, by Joe Sutter with Jay Spenser (Collins, 2006, $27.95). Firsthand accounts tell the story behind the creation of the largest, fastest jet airplane of the 1960s.

Classic Railroad Songs From Smithsonian Folkways (Smithsonian Folkways Recordings, 2006, $12).Twenty-nine tracks by various artists capture 19th-century railroad culture in work songs, ballads and instrumentals.

Music of Central Asia, Vol. 1: Tengir-Too, Mountain Music of Kyrgyzstan (Smithsonian Folkways Recordings, 2006, $12). Tengir-Too, a musically diverse seven-member ensemble that takes its name from the mountain range linking Kyrgyzstan and China, performs songs with strong narrative and spiritual dimensions.

Books listed on Pages 14 and 15 can be ordered through online book vendors or purchased in bookstores nationwide.

Recordings can be ordered from Smithsonian Folkways Mail Order, Smithsonian Folkways Recordings Dept. 0607, Washington, D.C. 20073-0607. To order by phone, call (800) 410-9815 or (202) 275-1143.

Smithsonian Intimate Guide to Human Origins

By Carl Zimmer (Collins, 2005, $29.95)

The scientific study of human evolution is perpetually in flux. We continue to adapt and evolve genetically, while researchers almost daily unearth clues that force the rewriting of the fascinating story of how *Homo sapiens* has triumphed as a species.

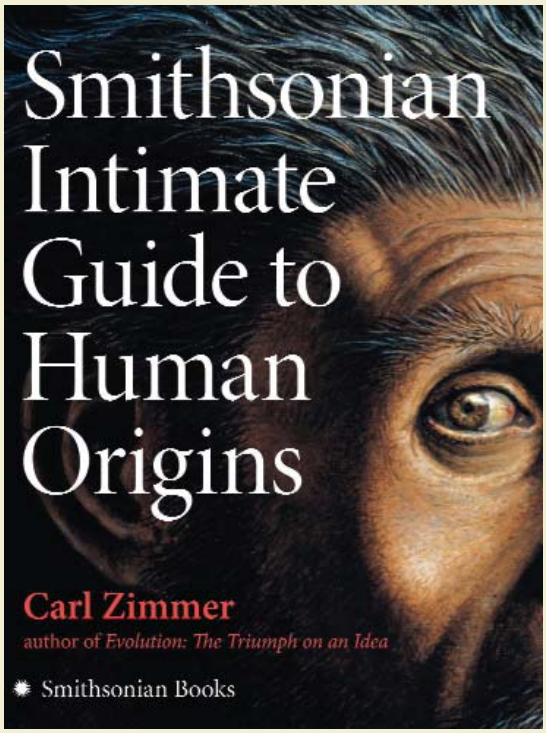
Fossils no longer are the sole source of information about humans' ancient beginnings. Much of the story of our evolutionary journey is inscribed in our DNA.

In *Smithsonian Intimate Guide to Human Origins*, science writer Carl Zimmer offers readers a compelling, accessible and up-to-the-minute guide to the evolutionary history, present and future of our species. From Charles Darwin's *The Origin of Species* to today's DNA analysis by robots at the National Human Genome Institute in suburban Maryland, Zimmer re-examines the major steps in human evolution.

Using humor and down-to-Earth anecdotes, Zimmer tackles this complex subject with clarity. In terms anyone can understand, he outlines the differences between us and our close European relatives, the Neanderthals: "Their faces were long, their noses huge," he writes. "They were stocky and muscular; paleoanthropologists estimate that a Neanderthal weighed 30 percent more than a living human of the same height. Picture an Olympic shot-putter with Cyrano de Bergerac's nose."

Smithsonian Intimate Guide to Human Origins also examines *Homo sapiens*' genetic relationship to chimpanzees, orangutans, bonobos, and the now-extinct *Gigantophitheuc blacki*, an enormous Asian ape that stood 10 feet high and weighed 1,200 pounds.

Zimmer spells out how *Homo sapiens*' cognitive reasoning sets us apart from other primate branches. He delves into the fascinating theory that all living humans can trace the ancestry of their mitochondrial DNA to a single female. Studies of DNA from people around the world assert that she lived in Africa less than 200,000 years ago.



Zimmer also highlights the stunning 2004 discovery on the Indonesian island of Flores of the bones of tiny hominids that stood only 3 feet tall and had brains the size of our own. These fossils—dubbed *Homo floresiensis*—are now the subject of one of the fiercest controversies in human evolution. The hominids lived as recently as 18,000 years ago. Some scientists believe they were actually *Homo sapiens* pygmies. Others contend the small beings are more closely related to *Homo erectus*. Zimmer's book outlines the debate in rich detail.

With some 100 color photographs and illustrations, each of the book's eight chapters is highlighted by a sidebar that explores such topics as "Myth of the Missing Link" and "Genetic Engineering: A New Kind of Evolution?"

Zimmer also reveals how evolution has changed humans in just the last few thousand years. For example, a number of cultures have taken up cattle herding, such as the Maasai of East Africa. As a result, natural selection favored mutations in their genes that allowed them to digest cattle milk.

The guide also looks to the future to imagine how evolution may affect the human race in centuries to come. For instance, humans have been subject to malaria for thousands of years, and the disease's deadliness has driven the evolution of many adaptations to fight the parasite. Unless the spread of HIV is stopped, Zimmerman concludes, this virus also will probably have an impact on the evolution of our species.

The second in a series of Smithsonian Intimate Guides, this clear and concise overview of the latest discoveries in human evolution will appeal to the general reader and expert alike. —*Daniel Friend*

Rare North Island brown kiwi is hatched at the National Zoo

Their bones are solid, not hollow like those of most birds. Their feathers resemble hair, and their nostrils are located at the tip of their long beaks. Nocturnal, New Zealand kiwis live by smell. At night in the outback, one can hear them sniffing for earthworms.

In February, the National Zoo welcomed this "most unbirdlike of birds," with the hatching of a rare North Island brown kiwi, Bird Keeper Kathy Brader says. "This hatch bumps the number of kiwis in America up to 17."

Fewer than 40 of these odd flightless birds exist outside New Zealand. Of those, the majority can't—or won't—breed, making each new captive birth something to, well, crow about.

The egg was laid by Nessus, the Zoo's adult female kiwi, on Dec. 11. After allowing male kiwi, Maori to sit on the egg for 29 days, Brader removed it and began nurturing the egg herself in an electric incubator.

Following New Zealand's protocol for kiwi eggs, Brader drew pencil lines on the shell, dividing it into quarters along its oblong axis. She rotated the egg a quarter turn four times each day in the incubator. Twice a week, she candled the egg, shining a bright light behind it and illuminating the yolk to document the growth of the air sac—an indicator of fertility and health. Each day, she cooled the egg for one hour, as the protocol recommends. A healthy chick hatched Feb. 13.

Kathy Brader introduces herself to the National Zoo's newly hatched North Island brown kiwi. (Photo by Jessie Cohen)

"The kiwi's egg grows to 20 percent of the female's body weight," Brader says, giving it one of the largest body-to-egg ratios of any bird. The large egg size allows a kiwi hatchling to grow a large internal yolk sac—64 percent of its birth weight—in essence, a refrigerator of nutritious snacks available 24/7. This gives the baby bird a window of eight to 11 days before it has to eat. Kiwi chicks receive no food or nurturing from their parents.

What Brader likes best about kiwis is their spirit. "They've got the most attitude of any bird in the world," she says. Soon, the baby kiwi will lose its gentle demeanor and turn into a feisty, loud creature.

For all their spiritedness, kiwis cannot stand up to introduced mammal species, such as dogs and rats. In 1987, populations of New Zealand's North Island brown kiwi, one of five kiwi species, was 68,000. Today, it stands at 24,000.

Brader wants more zoos to breed kiwis and create a self-sustaining population of North Island browns in U.S. zoos. "What better way," she says, "to ensure that generations of Americans get a peek at this extraordinary creature." —*John Ross*

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