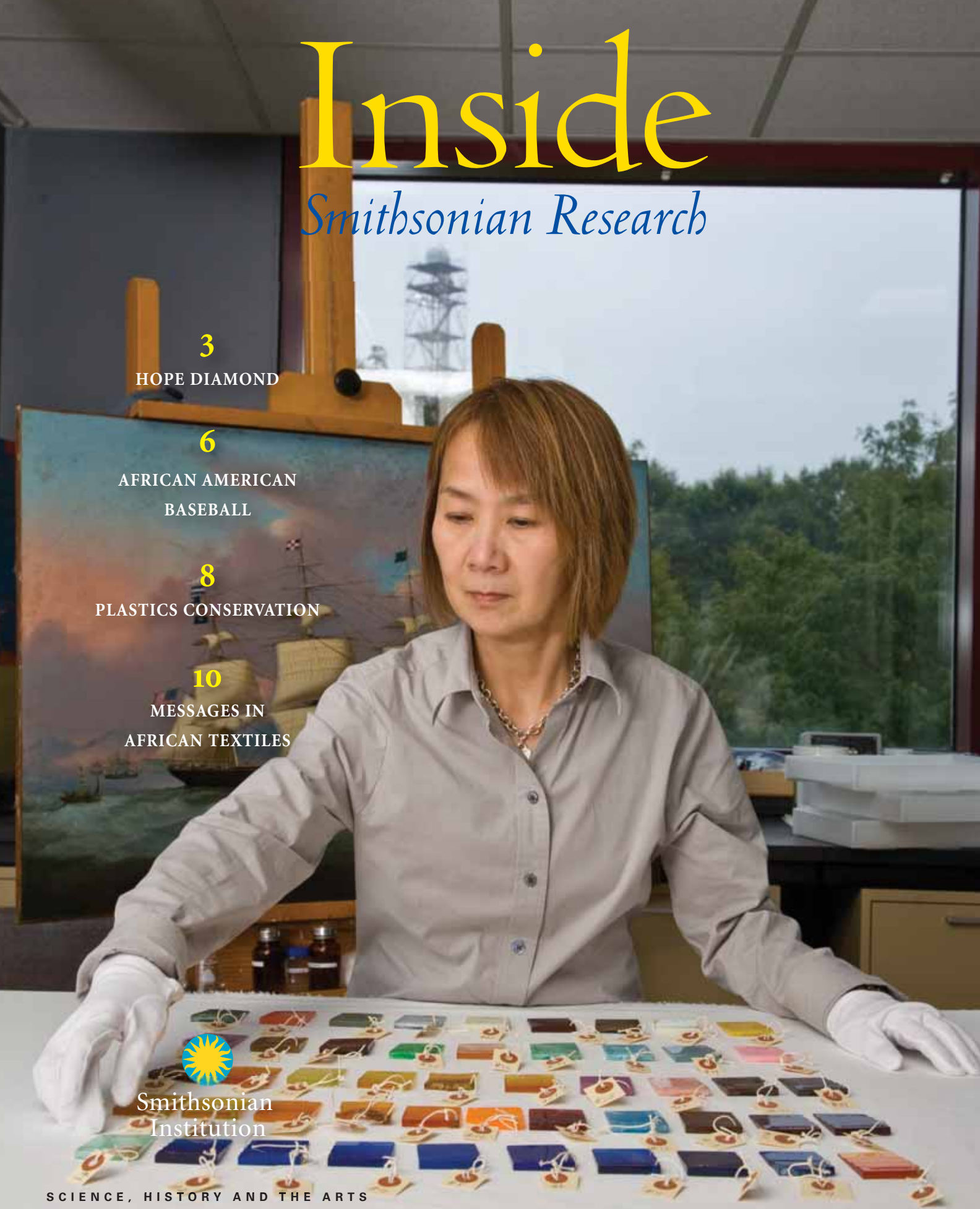
Inside Smithsonian Research



Smithsonian Institution

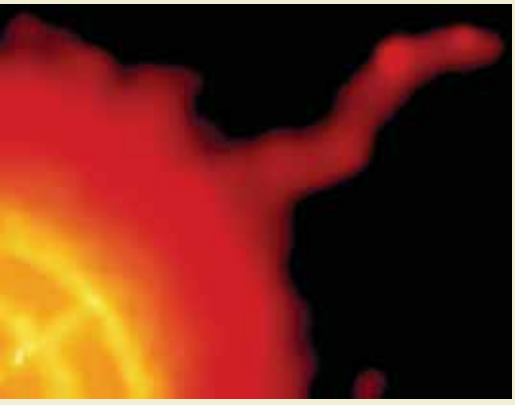
SCIENCE, HISTORY AND THE ARTS

NUMBER 21 • SUMMER 2008

A chair in the rococo revival style from "*La Garde-meuble*"

French interiors. For nearly a century, from 1839 to 1935, the colorful periodical "*Le Garde-meuble, ancien et moderne*" (Furniture repository, ancient and modern) displayed French styles in furniture, fabrics and interior decoration to the world. This bimonthly Paris-based catalog, begun by designer Désiré Guilmard, consisted entirely of illustrations depicting designs for French furniture, window treatments and room settings. Now, Smithsonian Institution Libraries has posted online more than 400 colorful images from a very rare, nearly complete series of "*Le Garde-meuble*"—dating from 1841 through 1851—held by the Smithsonian's Cooper-Hewitt, National Design Museum library. Intended as a practical guide for decorators, architects, cabinetmakers, upholsterers and designers, these lithographs contained such clear and copious detail that craftsmen could easily develop working drawings from them. Even today, they are a rich resource for furniture restorers, set designers, historians, upholsterers and interior decorators. **—www.sil.si.edu/digitalcollections/art-design/garde-meuble/**

X-ray vision. Most things in the universe are invisible to the human eye. The protons, neutrons and electrons that make up the stars and planets are just a small visible fraction of the enormous mass and energy in space. Since 1999, NASA's Chandra X-ray Observatory—a telescope in orbit around the Earth—has been peering into the darkness of space to reveal stunning details of otherwise invisible objects, such as spiral galaxies, supernovas, black holes, quasars and neutron stars. Astronomers are using these images to help decipher some of the enduring mysteries of astrophysics. "Chandra Chronicles: Gateway to the Universe of X-ray Astronomy" is an award-winning Web site from the Harvard-Smithsonian Center for Astrophysics devoted to the Chandra X-ray Observatory. Visitors can download videos and podcasts; read a Chandra blog and an X-ray astronomy field guide, track the telescope as it orbits the earth and view dozens of colorful images of intergalactic phenomena. "Chandra Chronicles" is an open door into the wonders of X-ray astronomy that will fascinate anyone—from children to adults—with even a passing interest in the cosmos.**—chandra.harvard.edu**



A particle jet 3 trillion miles long shoots from Vela pulsar in this Chandra image.

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John Barrat, *Editor*

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

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

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On the cover: Jia-sun Tsang, a conservator at the Smithsonian Museum Conservation Institute, studies a set of 49 plastic samples from a 1920s Lumarith salesman's kit in the collection of the Smithsonian's National Museum of American History. Some of these samples, made from a type of plastic called cellulose acetate, are visibly deteriorating. Tsang and her colleagues are working to slow or mitigate the deterioration of the many plastic objects in museum collections and stem the damage to other objects caused by gases emitted by deteriorating plastic. See story page 8. (Photo by Donald Hurlbert)

Smithsonian Institution

Unique phosphorescence of blue diamonds may be used to 'fingerprint' precious gems

By Michael Lipske
Special to Inside Smithsonian Research

Some research is best done behind heavy, steel-clad doors. For example, when Smithsonian geologist Jeffrey Post embarked on an experiment involving the Hope Diamond, at 45.52 carats, the world's largest deep-blue diamond and one of the most famous and valuable museum objects on earth, he and his colleagues locked themselves and the diamond inside a large vault in the depths of the Smithsonian's National Museum of Natural History.

Post and fellow diamond investigators from the U.S. Naval Research Laboratory, Ocean Optics Co. and Pennsylvania State University were investigating a phenomenon that the millions of museum visitors who gaze at the diamond on its rotating pedestal behind bulletproof glass never see—the mysterious red phosphorescent glow the stone emits when exposed to ultraviolet light. In the end, Post not only learned more about the Hope Diamond, he discovered a sophisticated technique for confirming the identity of any blue diamond.

The 45.52-carat, deep-blue Hope Diamond is shown here inside its surrounding pendant of 16 pear- and cushion-cut white diamonds. Using a spectrometer, Smithsonian geologist Jeffrey Post recently recorded the unique signatures of red and green light the Hope Diamond emits after being bombarded with ultraviolet light. (Photo by Chip Clark)

The Hope Diamond's red glow has long been considered a unique property of that stone. Most blue-colored diamonds produce a bluish-white phosphorescence if exposed to ultraviolet light, and the few other diamonds known to emit red phosphorescence were commonly assumed to have been from the even larger original stone from which the Hope was cut. "It was something that always intrigued people," says Post, who is curator of the National Gem and Mineral Collection. "For people who like the whole idea of a curse and that kind of story, the fact that this thing phosphoresces a bloody red color is just too good to be true."

One owner to another

Much that is known about the Hope Diamond seems too good to be true. Formed deep within the earth more than a billion years ago and brought to the surface by a volcanic eruption in India, the diamond was discovered in the mid-1600s. Sold in 1668 to King Louis XIV of France, it was stolen during the French Revolution, only to reappear decades later in London. Passing from one owner to another, the diamond along the way acquired a reputation for bearing a curse that brought misfortune to its possessors.

In 1911, the legendary jeweler Pierre Cartier sold the deep-blue stone to Evalyn Walsh McLean, a Washington, D.C., socialite who sometimes fastened the diamond to her dog's collar. The gem changed hands again in 1949, when it was bought by New York diamond merchant

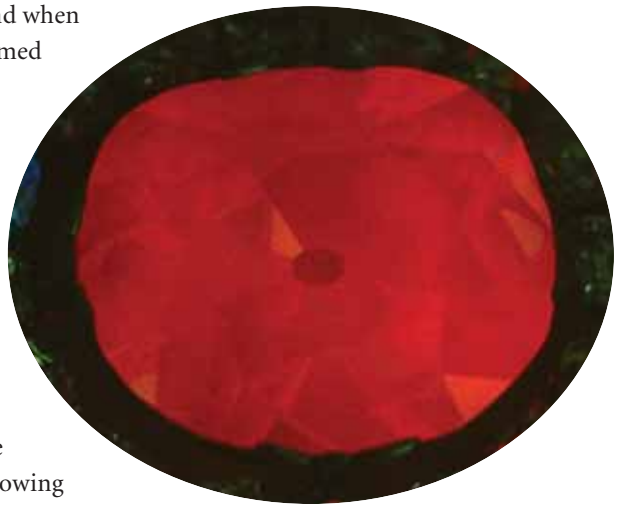
(continued)

Harry Winston. Fifty years ago, on Nov. 10, 1958, Winston donated the diamond to the Smithsonian. Winston seems to have had more faith in the U.S. Postal Service than in the curse, electing to mail the stone to Washington in a plain brown package.

Mindful that many museum visitors want to see the Hope Diamond when in Washington, Jeffrey Post timed his research to occur in the hours after the museum closed for the evening and before it reopened the next day. With guards standing by, the diamond was removed from its pedestal in the Harry Winston Gallery.

"We had a local jeweler come in and take it out of its setting for us," Post says. (The jeweler returned early the following morning to reset the stone.) Next, Post and his colleagues locked themselves in the Department of Mineral Sciences' room-sized vault with the diamond and a portable high-sensitivity spectrometer.

Above: The Hope Diamond, right, without its white-diamond pendant, and the 30.62-carat Blue Heart Diamond. (Photo by Chip Clark) Below: The Hope Diamond emits a red phosphorescence after being bombarded with ultraviolet light. (Photo by John Nels Hatleberg)



Phosphorescent spectrum

"The clock was running," Post says, and the scientists got to work. The diamond was positioned on a piece of clay inside a box that could be sealed to keep out ambient light. A fiber-optic cable connected to an ultraviolet light source was extended into the box and "pushed up against the top face of the Hope Diamond," Post says. Then the diamond was exposed to ultraviolet light for several seconds.

When the light source was turned off, the diamond began to emit its characteristic red glow, a phenomenon that lasts several minutes. A second fiber-optic cable in the box channeled phosphorescent light from the diamond to the spectrometer.

"That was the first time we had been able to see a display of what the phosphorescence spectrum looked like for the Hope Diamond," Post says. Spectrometers measure wavelengths of light, and the display on a laptop computer hooked to the spectrometer revealed that the Hope Diamond's red light was more than just red.

"We saw two strong peaks in the spectrum," Post explains. One was in the red portion of the spectrum, "but the second peak, interestingly, was in the green portion of the spectrum." Because they were able to measure the spectrum approximately every second throughout the period of phosphorescence, Post and his colleagues saw that the green peak decayed quickly. "After the first few seconds, it's gone," Post says. The red peak, however, lasted much longer. That slow decay in the red portion of the spectrum accounts for the diamond's overall red glow.

Diamond district

In the vault that night, the scientists also collected spectrum readings from other diamonds, including the second-largest known deep-blue diamond, the 30.62-carat Blue Heart, also in the Smithsonian's gem collection. The phosphorescence from several synthetic diamonds was also measured. Later, Post and his colleagues brought their portable spectrometer to New York City's Diamond District, an area of Manhattan that is a center of the world's diamond industry, where a dealer known to Post granted the researchers access to dozens of valuable blue diamonds in his safe for further spectral measurements.

The scientists have learned that all blue diamonds show red and green peaks in

All blue diamonds show red and green peaks in their phosphorescence spectrum, but the intensity of those peaks and the rate at which they decay varies from diamond to diamond.

their phosphorescence spectrum. But the relative intensity of those peaks and the rate at which they decay varies from diamond to diamond, leading to differences in the phosphorescent glow seen by the naked eye. The synthetic diamonds they measured showed a completely different range of spectrum readings, with no red peaks.

Boron-nitrogen interaction

Diamonds are composed of carbon, and impurities in the carbon give rise to a stone's color. Blue diamonds have relatively high levels of boron impurities but low levels of nitrogen. Post believes that the red phosphorescence emitted to some degree by all blue diamonds is likely due to interaction between those two elements. To test that possibility, he is continuing his study of blue diamonds, using a different kind of instrument that lets him measure the amount of boron and nitrogen in individual stones "and then correlate that with the particular spectra that we're getting off those diamonds," he explains.

Post's work has already yielded knowledge of interest not just to scientists but to diamond sellers and their customers. Because the relative intensity of the blue and red components of each blue diamond's phosphorescence is unique, the same sort of analysis that the researchers did in the museum vault might be used to fingerprint individual blue diamonds and to distinguish natural stones from man-made ones.

Photographed through the thick protective glass of the Hope Diamond's exhibition case, Jeffrey Post returns the diamond to its pedestal in the Harry Winston Gallery of The Janet Annenberg Hooker Hall of Geology, Gems, and Minerals in the Smithsonian's National Museum of Natural History. (Photo by Chip Clark)

Since even a half-carat natural blue diamond can sell for tens of thousands of dollars, dealers and customers have an interest in knowing all they can about the pedigree of a stone. "Are you really buying a natural blue diamond or not—that kind of information becomes very valuable on the marketplace," Post says. "Likewise, if a certain blue diamond disappears and suddenly three cut blue diamonds appear on the market, you might want to know, 'Did those three cut diamonds come from that stolen diamond?'"

No stranger to spectacular gems, Post still gets a thrill from working with the Hope Diamond. "Every time I look at it, I kind of go, 'My gosh!,'" he says, noting that it is impossible to overlook the stone's "human history, the curse and the kings, the queens, the thefts." However, the scientist believes that his recent research underscores the famous diamond's importance as "a unique natural history object."

"It's a good reminder of why we keep objects like this in museums," Post says. "We keep them here so that we have access to them, so that we can continue to study them and learn from them. I fully believe that 10 years from now, or a 100 years from now, there will be different spectrometers. There will be different questions. There will be people with new curiosities. There will be some other reason why we want to learn something even more fundamental about this very unusual and very important diamond."

And the only sort of places where that is going to be possible, he says, "are going to be places like the Smithsonian. Because, where else?" ❖

African American baseball was once greatest game in town for Washington, D.C., fans

By Topper Sherwood
Special to Inside Smithsonian Research

At the start of the Civil War, Frederick Douglass enlisted his youngest son, Charles, to fight for the Union in an all-black regiment. After the war, the retired abolitionist saw his son wearing a different uniform, that of the Washington Mutuals baseball club in Washington, D.C. The senior Douglass even presided over games as team commissioner, making for a great "draw," according to newspaper accounts.

Such was the promising beginning, during the 1860s and 1870s, of African American baseball in the nation's capital, where city residents such as Frederick and Charles Douglass formed dozens of baseball clubs, scheduled games, hired officials and packed the stands with cheering crowds. Now, the images, artifacts and stories of "blackball" have been brought forth in an exhibition by the Smithsonian's Anacostia Community Museum titled "Separate and Unequaled: Black Baseball in the District of Columbia."

From its beginning in the 1860s to well into the 1880s, black and white baseball players competed on the same teams and black and white teams played against each other, Anacostia Museum Curator Anthony Gualtieri says. "The color line of that time was so permeable. Only after Jim Crow [laws] were passed did black and white baseball players stop playing together."

Some early black teams even dubbed themselves "Puerto Ricans" or the more popular "Cubans" to attract white fans, Gualtieri says.

One of the first professional African American teams was the Cuban Giants, of New York, whose success led to the creation of the National Colored Base Ball League in 1887. This was the same year that Chicago White Stockings manager Ted Anson demanded that the Newark Giants remove two black players (Fleet Walker and George Stovey) from its roster, launching a long-standing segregationist policy in both the American and National leagues.

African American communities continued to embrace the game, however, and the era of "negro leagues" was well under way. The Anacostia Museum's special focus on Washington's community sent Gualtieri to comb the city's archives to find clues about the earliest preprofessional teams in Washington. He turned up names such as the Oriental Tigers, the Anacostia Alerts, the Mutuals and the Potomacs.

"I've been able to identify only a handful," he says. "It's very difficult going back that far; and different teams would take the same names."

For places to play, African American neighborhood and organized teams had to rely on the generosity of white clubs that owned ballparks and open fields. One popular spot to see baseball in Washington was the space between the White House and the Washington Monument, now known as the Ellipse but known then as the White Lot. In 1874, this lot was closed to all clubs except the white Creighton Club, in part, as the Weekly National Intelligencer newspaper reported, to keep off "the gangs of lazy negroes and other vagrants infesting the grounds."

From 1891 to 1965, the privately owned Griffith Stadium—at 7th Street and Florida Avenue N.W. in one of Washington's most vibrant black neighborhoods—hosted the games of both black and white amateur and professional ball clubs. Spectators regularly dressed up for games, and hundreds of young black and white boys from the surrounding neighborhoods worked at stadium events handling concessions.

Indisputably, the glory days of African American baseball in Washington, D.C., were dominated by the Homestead Grays. Established in Pittsburgh, the Grays lived a migratory existence—traveling in a battered bus around an Eastern circuit—before settling in Washington in 1940. The Homestead Grays were among the top professional U.S. teams, black or white. They were supported by a growing, baseball-hungry, black middle-class in Washington, according to Anacostia Museum Historian Gail Lowe.

"The caliber of play by the Homestead Grays would draw black and white people to one spot in the city for an entire afternoon or evening," Lowe says. "All those folks were rooting for a hometown team that was exclusively black. There was segregation; there was injustice. But if the sun was shining, it was a good day for a game."

"Separate and Unequaled" includes a Grays jersey, signed balls and bats, gloves, news clippings, correspondence and even Grays press passes.

A pivotal role in early black baseball, Gualtieri points out in the exhibition, was played by black journalists, notably Sam Lacy, of the Washington Tribune and the Baltimore Afro-American,

Top: The Homestead Grays, 1944 Negro National League champions. Shown here from left to right are: Jelly Jackson, Ray Battle, Edward Robinson, Sam Bankhead, Josh Gibson, Buck Leonard, Dave Hoskins, Jerry Benjamin and Cool Papa Bell. (All images courtesy Art Carter Papers, Moorland-Spingarn Research Center, Howard University)

Center: Josh Gibson, catcher for the Homestead Grays (shown here at bat), was such a mighty hitter that he was often called the "Black Babe Ruth."

Bottom: Matthew Carlisle of the Homestead Grays tries to reach third base against Jim West of the Philadelphia Stars.

and Art Carter, of the Washington Afro-American newspaper. Gualtieri combed through files of Carter's letters, news clippings, and photos in the Art Carter Papers at Howard University.

"Carter would write to all of the black teams every day, saying 'What are your scores? Let me know.'" Gualtieri says. "He was friendly with all of the players, and later became a spokesperson for the Negro National League."

Black news writers, notably Lacy, repeatedly tried to get Clark Griffith, owner of the all-white Washington's Senators team, to recruit from the Grays starting lineup, according to Gualtieri and Lowe. Griffith might have done well to listen. Between 1937 and 1945, the Senators carried a dismal record, while the Grays took eight league championships. Yet Griffith was insistent about keeping blacks off the Senators' roster, even after Jackie Robinson broke the major-league color barrier in 1947 in his debut with the Brooklyn Dodgers.

Griffith's motivation may have been less grounded in racism than in pragmatism. "The Grays brought Griffith a great financial opportunity," Lowe explains. "It was to his advantage to keep baseball segregated, because the black players were a real draw [particularly for the middle-class black community living around Griffith Stadium]."

Fans of black baseball got their money's worth, especially when the Grays went up against the fan-pleasing Kansas City Monarchs. A memorable Griffith Stadium game of 1942 drew a mostly black audience of more than 28,000 who came to see such Grays stars as first baseman Buck Leonard, strongman hitter Josh Gibson, and record-breaking base-stealer James "Cool Papa" Bell going up against the Monarchs and their star pitcher, Leroy "Satchel" Paige.

Soon after the National and American leagues became integrated in 1947, fans stopped coming to the Negro League games, Gualtieri says, and the league folded. Washington, D.C.'s baseball fans turned their attention to the major leagues.

"It may be the nation's capital," says Lowe, a baseball fan herself. "But people still go to the games. Washington is a great baseball town and always has been." ❖

"Separate and Unequaled: Black Baseball in the District of Columbia" is on view at the Historical Society of Washington, D.C., located at 801 K Street N.W., through Oct. 5.

Research finds many plastic objects in museum collections should be isolated

By Mike Lipske
Special to Inside Smithsonian Research

Typical plastic degradation" was Jia-sun Tsang's shorthand for the problem before her. The object of her concern, from the collections of the Smithsonian's National Museum of American History, Behring Center, was a salesman's sample kit for a brand of plastic sold under the name Lumarith in the 1920s.

Easily melted and molded into virtually any shape, the product was popular with makers of everything from fountain pens and toys to electrical appliances. But with the passage of years, the kind of plastic used for Lumarith, cellulose acetate, broke down, giving off a telltale vinegar smell. Several of the brightly colored samples in the kit were warped, cracked, and unpresentable. Tsang, a conservator with the Smithsonian's Museum Conservation Institute, and a team of Smithsonian scientists used a variety of noninvasive analytical techniques, including several forms of spectroscopy to pinpoint the molecular structure of the plastic and figure out precisely the cause of the samples' degradation. Tsang determined that much of the problem was due to leaching of triphenyl phosphate, a fire-retardant compound often added to cellulose acetate to facilitate its softening and flow during the molding process.

Tsang's study concluded that triphenyl phosphate in cellulose acetate was a particular risk factor for plastic degradation, and that artifacts containing the chemical should not be stored in close contact or in an enclosed space with other cellulose acetate plastics and metals. Case closed, but the larger problem was far from settled.

Malignant

While society at large frets about plastics that pile up and seem to last forever—grocery bags clogging landfills and soda

Left: Jia-sun Tsang, left, and Judy Watson, physical scientist at the Smithsonian's Museum Conservation Institute, use a scanning electron microscope to study the surface of Lumarith cellulose acetate samples from the 1930s. (Photo by Donald Hurlbert)

Center inset: This scanning electron micrograph image of a Lumarith salesman's sample shows fully formed corrosive crystals consisting of oxygen (orange), carbon (green) and phosphorus (purple), as well as a crack in the upper left.

Opposite: Residue from a silicon breast implant stains a storage box at the National Museum of American History. (Photo courtesy Office of Preservation Services, National Museum of American History).

bottles washing up on beaches—Tsang worries about the thousands upon thousands of artifacts in museum collections made of plastic, objects that in many cases are crumbling and cracking and sometimes damaging other artifacts as they break down.

"Plastic is a 20th-century material—it is everywhere," she says. But most plastics—cheap to produce and adaptable to almost infinite uses—were not created for the ages. "When they get to a museum, it's our problem," Tsang says. "We have to take care of them."

A year-long survey at the American History Museum revealed that many plastics in its collections are from among the five types that museum conservators have identified as "malignant." Not only are these problem plastics—cellulose nitrate, cellulose acetate, polyurethane, polyvinyl chloride and rubber—more prone to deterioration than other plastics but also their breakdown often produces gases that damage metal, paper or other plastics stored in their vicinity. In most cases, this harmful offgassing cannot be prevented, only slowed, which means degrading plastic artifacts must be isolated from other objects in museum collections.

Probably no Smithsonian museum has more plastic artifacts than the American History Museum. Scratch the surface of its collections and you will find plastic jewelry, plastic eyeglasses, plastic artificial hearts, even the first plastic shoes (sold under the trade name Corfam).

"We have a set of Bakelite salt-and-pepper shakers that were owned by Leo Baekeland, the inventor of Bakelite," says Ann Seeger, deputy chair and curator in the American History Museum's Division of Medicine and Science. Bakelite is a plastic once widely used for manufacturing radios, telephones and other products.

Nondestructive analysis

The earliest plastic, cellulose nitrate, was invented in the mid-19th century. "Celluloid or cellulose nitrate was an extremely flammable substance, but we have cigarette holders, candlestick holders and matchbook holders made of celluloid," Seeger says. If those uses for the plastic strike the curator as "very surprising," imagine the reaction of long-ago pool players to celluloid billiard balls, which had a habit of exploding on impact.

"That's why I love working with the American History Museum folks," Tsang says. "I get all of this nice material to study." Tsang's specialty is conservation of modern paintings and other contemporary art, so a history museum might not seem like her usual haunt. However, before entering the field of fine-art conservation, she was a clinical chemist at the Medical College of Ohio. "Because of my background, I always like to get into the science," she says.

Her interest in nondestructive analysis and testing of museum objects has taken her down some unusual research paths at the Smithsonian, such as consultation a few years ago with staff at the Smithsonian's National Air and Space Museum about restoring the acrylic nose cone of one of the first U.S. guided missiles. "So the crossover between an acrylic painting," Tsang says (gesturing toward an easel in her work area that holds a large painting she is restoring), "to plastic is natural for me."

Rehousing

Lately, Tsang has been working closely with Seeger, as the two of them try to systematically identify the probable causes of deterioration in the museum's plastic artifacts.

According to Seeger, not only have they separated the degraded Lumarith samples from the rest of the salesman's kit (part of a collection Seeger curates) but the museum also is embarking on a "rehousing project" for its problem celluloids, first by relining storage trays with absorbent paper that will soak up off-gassing by-products. "We're going to start monitoring the collection more closely," Seeger says. "I'd like to get new storage units that are open so there will be more air circulation for the celluloid. It is important not to keep them contained in a drawer."

Meanwhile, Tsang continues adding to her knowledge through workshops and consultations with plastic preservation researchers at museums in Europe, where plastics conservation has been studied longer than in the United States.

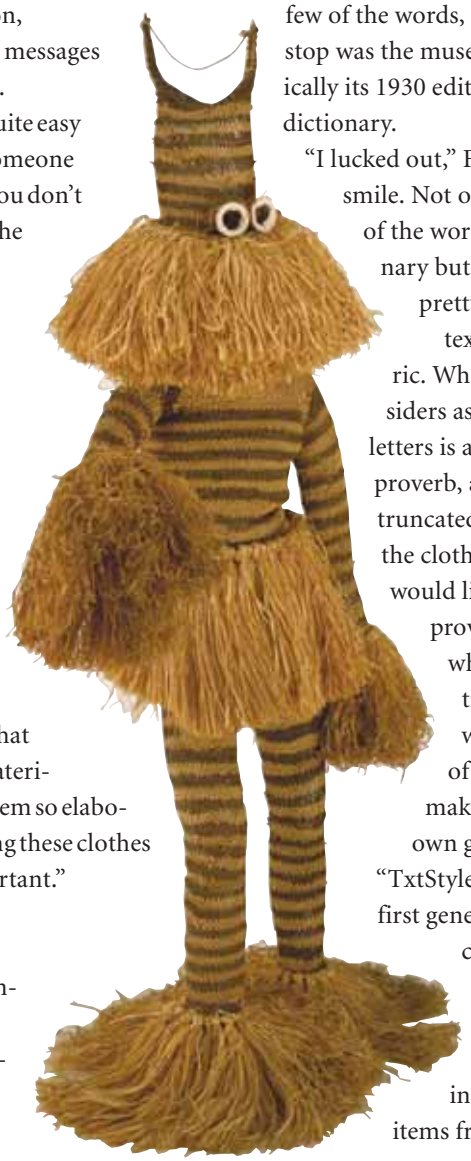
"I want to draw people's attention to the problem of plastics degradation in museums," Tsang says. "There is an issue here—let's work together." ❖

Exhibition unveils hidden meanings in African textiles

By Harvey Leifert
Special to Inside Smithsonian Research

It is not quite "CSI: Smithsonian," but a fair amount of detective work went into the mounting of "TxtStyles/Fashioning Identity," a new exhibition at the Smithsonian's National Museum of African Art. Comprising 70 rarely seen objects from the museum's collection, "TxtStyles" reveals the messages hidden in wearable art.

Some messages are quite easy to decode. "If you see someone driving a Rolls Royce, you don't necessarily have to see the price tag to figure out, 'That's an expensive car!'" says Museum of African Art Curator Bryna Freyer, who co-curated the exhibition with Christine Mullen Kreamer, also a curator at the African Art Museum. "It's the same thing with some of these textiles: you can see at a glance that a lot of time and fine materials went into making them so elaborate. The person wearing these clothes is clearly rich and important."



Yoruba proverb

Not all messages are immediately apparent, though, even for an expert such as Freyer. She points to an indigo cloth that had been described to her as having letters incorporated into its pattern. After studying it, Freyer had a revelation: they were not just letters, she realized, they were words in the Yoruba language of Nigeria, run together without spaces or accent marks. She knew just a few of the words, though, so her next stop was the museum's library, specifically its 1930 edition Yoruba-English dictionary.

"I lucked out," Freyer says with a smile. Not only did she find all of the words in the old dictionary but she deciphered pretty much the entire text dyed into the fabric. What appears to outsiders as a string of random letters is actually a Yoruba proverb, although somewhat truncated and rearranged on the cloth. Any Yoruba person would likely know this proverb, Freyer says, which in its full form translates as: "God will divert the wiles of your enemies and make them prey to their own guile."

"TxtStyles" is the museum's first general exhibition focusing on textiles since 1987. Freyer and Kreamer faced a challenge in selecting just 70 items from the African Art Museum's vast holdings. They decided against showing only the oldest or rarest cloths in favor of those that best demonstrate the ability of textiles (and, in a few cases, other wearable materials) to convey a range of messages. A rare 19th-century cloth from the Gold Coast, now Ghana, therefore remains in storage, while one woven in honor of the 1947 wedding of Britain's Princess Elizabeth and never before displayed is included in the exhibition. It demonstrates the weaver's respect for the young princess, who became queen five years later.

Mahdi tunics

Several military tunics featured in "TxtStyles" convey a different kind of message. They were made for soldiers of Sudan's Mahdi army, who launched a holy war to purify Islam in Egypt in the late 19th century. Using cloth captured from Egypt's protector, the British, the Mahdi designed uniforms incorporating patches, to signify holy poverty and send a message to the enemy.

How did the curators research the story of these patched-up tunics? They got little help from African art books, Freyer says, but the tunics were amply described in British military histories and even the London Illustrated News of the day. Curating an exhibition, Freyer says, is partly studying the objects carefully and partly poring over a wide range of books and documents.

Identifying the Mahdi tunics was actually easy, Freyer observes. Other items took some sleuthing—and knowledge

based on long experience. For example, a robe in the exhibition was described in the museum's database as coming from Bida, in central Nigeria, and of Hausa origin. Freyer was suspicious. She knew that most objects from Bida were made by Nupe people. To resolve the issue, she turned the robe inside out and examined its seams. The Nupe tend to use strips of maroon with green/blue striped fabric to cover interior hems, while the Hausa use the same color as the robe itself. The colored strips settled the matter. Freyer recatalogued the robe as Nupe.

Teeth, horn, quills

Inventive combinations of materials impart a coded message or convey an individual's style, Freyer and Kreamer point out in "TxtStyles/Fashioning Identity." Teeth, horn, quills or skin of wild animals or the feathers, beaks or claws of birds of prey announce men's roles as traditional hunters, healers and leaders.

One striking headdress in the exhibition boasts a lion's mane and was likely worn at the coronation of Ethiopian Emperor Haile Selassie in 1930. To wear a lion mane, one had to personally kill the lion, Freyer notes, so the headdress conveys a strong message about the proud wearer's bravery and skill.

Glass beads, ivory, shell and brass tell of positions of leadership or communicate status and economic success, the curators note. Imported fabrics, buttons, sequins and metallic threads proclaim either affluence, one's capacity for innovation or simply a desire to impress with the new or unusual.

In displaying each item in "TxtStyles" to its best advantage, Kreamer and Freyer realized that wall hanging would not work for some of the more elaborate pieces. "African textiles are far from static," Kreamer says. "Rather, they are performed, kinetic and 3-D, worn on the body and thus moving through space in their contexts of use and display."

In the exhibition Kreamer and Freyer present beaded cloths and other items on mannequins. Video monitors show various textiles in actual use in Africa.

The word "txtstyles" in the exhibition title is meant to emphasize that "text messaging began way before computers," Kreamer says. "Much as mobile phone text messaging and computer-based-text documents convey information in short and long written formats, African textiles, clothing and accessories serve as visual devices to communicate complex ideas about the body adorned." ❖

"TxtStyles/Fashioning Identity" is on view at the National Museum of African Art through Dec. 8.

Above: Made from cotton and indigo dye, this mid- to late-20th century woman's wrapper is from the Yoruba peoples of Nigeria and is printed with a Yoruba proverb.

Opposite top: This cotton-and-wool tunic dates from 1882-1898 and is from the Mahdiyya State, Sudan.

Opposite bottom: This mid-20th-century fiber mask with costume is from the Pende peoples, Gungu, Democratic Republic of the Congo. (Images courtesy National Museum of African Art)

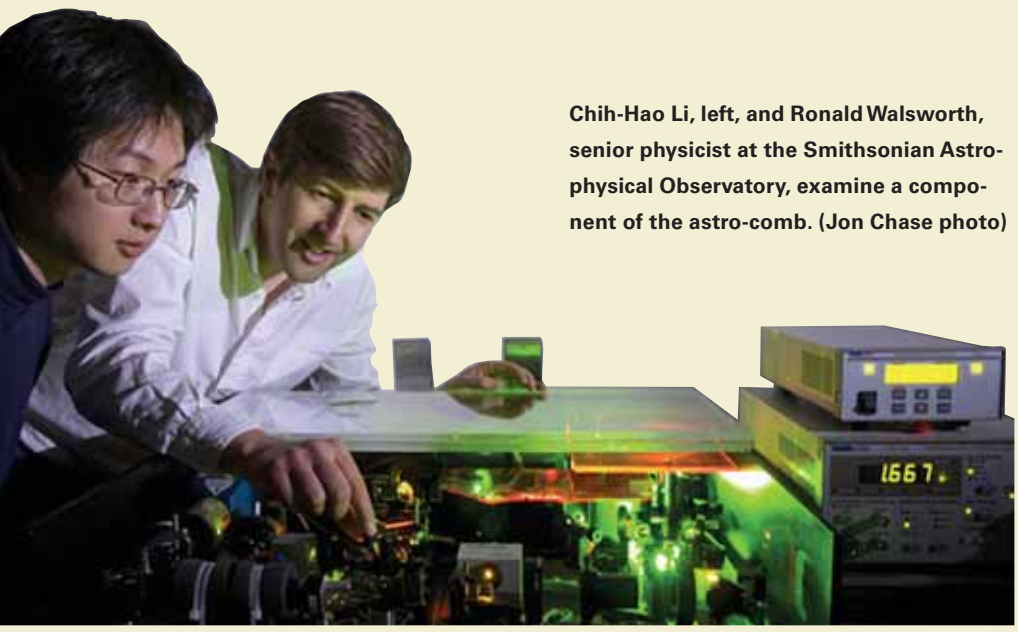
Astro-comb. Using ultrashort pulses of laser light linked to an atomic clock, a new instrument developed to detect distant planets at the Smithsonian Astrophysical Observatory in Cambridge, Mass., is 100-times more sensitive than previous instruments. Known as the astro-comb, this new laser device was created by Smithsonian Astrophysicist Chih-Hao Li and colleagues at the Harvard-Smithsonian Center for Astrophysics and the Massachusetts Institute of Technology. The astro-comb greatly increases the ability of astronomers to detect faint fluctuations or wobbles in the light of a star that is caused by the gravitational tug of an orbiting planet. Previous technology only allowed for the detection of Jupiter-sized planets or larger.

Hawaiian botany. On the islands of Hawaii, the plant genus *Metrosideros* flourishes in a variety of forms—from small, ground-hugging shrubs to 100-foot-tall trees. Scientists once believed these plants were relative newcomers to Hawaii. Now, new molecular research by scientists at the Smithsonian's National Museum of Natural History and the National Zoo indicates these plants may have colonized the islands of Hawaii sequentially, as each island formed, millions of years ago. *Metrosideros* is well integrated into the ecosystems of Hawaii—many species of birds and insects are specialized to coexist with and feed on them—and knowing when these plants colonized the Hawaiian islands will help scientists better understand the role the plants played in shaping the ecology there.

An apapane bird feeds from a *Metrosideros* flower. (Photo by Jack Jeffrey)

Boeing donation. In April, the Boeing Co. announced a $5 million contribution to support the design and construction of the Smithsonian's National Museum of African American History and Culture. Scheduled to open in 2015 in Washington, D.C., on Constitution Avenue between 14th and 15th streets N.W., the museum will be the only national museum devoted exclusively to the documentation of African American life, art, history and culture.

Logging and sea turtles. Careless logging practices in the West Central African country Gabon are impeding the nesting journeys of sea turtles—particularly endangered leatherbacks—along Gabon's beaches, says a study by William Laurance, staff scientist at the Smithsonian Tropical Research Institute in Panama. Lost and abandoned logs float downriver and into the sea, where they collect on the shore, creating tangles that block the turtle's access to the beaches where they lay their eggs. In an aerial survey, Laurance's team counted more than 11,000 logs along Gabon's beaches and estimated that 8 to 14 percent of all sea turtle nesting attempts are being thwarted by the abandoned logs.



Chih-Hao Li, left, and Ronald Walsworth, senior physicist at the Smithsonian Astrophysical Observatory, examine a component of the astro-comb. (Jon Chase photo)

Reverse vasectomy. A successful reverse vasectomy was recently performed on a rare Przewalski's horse by veterinarians at the Smithsonian's National Zoological Park. The surgery represents the first successful reverse vasectomy ever performed on an equid species. The genes of the animal, which was vasectomized at another institution in 1999, were deemed valuable enough to the captive population of this critically endangered species to warrant the surgery. This breakthrough has important implications as well for how endangered species in captivity are managed. Zoo scientists hope to pair the horse with a suitable female this summer.

National Zoo is candidate site for National Ecological Observatory Network

Following rigorous review, the Smithsonian National Zoological Park's 3,200-acre Conservation and Research Center in Front Royal, Va., was recently selected as a candidate core site for the National Ecological Observatory Network, a planned continental-scale ecological observatory. This national observatory will consist of fixed and mobile sensors located in 20 wild areas across the continental United States, as well as in Alaska, Hawaii and Puerto Rico. NEON is a project of the National Science Foundation.

The Conservation and Research Center is NEON's candidate core site for the mid-Atlantic region. Candidate core sites were selected through analysis of more than 90 proposed locations in 20 ecoclimatic regions in the United States. Sites were chosen that best represent the ecological and climatic characteristics of their specific region.

Instruments on towers erected at the core sites will take continuous readings of a variety of climate and ecological data, such as atmospheric chemistry, soil moisture and biogeochemistry, solar radiation, forest canopy microclimates, precipitation and temperature. The NEON design also includes instruments that will track patterns and changes in small streams. Staff scientists will collect samples of a variety of organisms at each site, such as birds, fish, plants, small mammals and microbes. NEON will collect data for at least 30 years, a period considered adequate by scientists to observe most ecological trends at the continental scale.

The NEON project is on schedule for a final design review with the National Science Foundation in 2009. If an award is made for construction, the plan is to build NEON over approximately five to seven years in order to spread out costs and reduce risk.

The National Zoo's Conservation and Research Center in Front Royal, Va. (Jessie Cohen photo)

"For the Smithsonian, NEON represents a renaissance in ecological research as we create new scientific and education synergies that will allow ecological forecasting," said Francisco Dallmeier, head of the National Zoo's Center for Conservation Education and Sustainability. "It is a dream come true to be able to integrate the ecological research and monitoring we do at the Smithsonian with a national network of top scientists backed by state-of-the-art instrumentation and infrastructure. —*John Barrat*

Researchers compile first scientific checklist of all known bees in the world

After five years of work by leading taxonomists on six continents, a checklist of all the known species of bees in the world has recently been completed. The list identifies nearly 19,500 bee species worldwide—about 2,000 more than experts previously estimated existed. The checklist, coordinated by the staff of the Integrated Taxonomic Information System, a public–private partnership hosted by the Smithsonian's National Museum of Natural History, is available online at the Web address: www.itis.gov. The checklist includes the scientific name of each species; the name of the scientist who described each species and year of its discovered; and the family and subfamily name of each species.

"At a time when biological diversity is suspected to be declining at an alarming rate, it is important to have a solid baseline from which to measure future trends," said Michael Ruggiero, senior scientist for the Integrated Taxonomic Information System, who led the project. "The bee checklist will enhance communication, information exchange and data repatriation about bees, a species critical for pollinating flowering plants, including most noncereal food crops. The completed checklist is a first step in modeling and forecasting future population trends," Ruggiero explains.

A honeybee (Photo by Rob Flynn, Agricultural Research Service)

"Only about 500 bee species produce honey," John S. Ascher, a collaborator on the project from the American Museum of Natural History in New York, points out. "Most species, however, do not produce honey or live in hives, yet they are crucial pollinators of crops and native plants."

—*Kelly Carnes*

The Drillmaster of Valley Forge: The Barron De Steuben and the Making of the American Army, by Paul Lockhart (Collins, 2008, $27.95). The dramatic story of a forgotten founding father who taught the soldiers of the Continental Army how to fight like Europeans and whose principles guide the American armed forces to this day.

Remarkable Birds: 100 of the World's Most Notable Birds, by Stephen Moss (Collins, 2008, $24.95). A visual celebration of favorite and notable birds—from albatrosses to wrens, hoopoes to hummingbirds, and cranes to warblers—compiled by a panel of noted birders, ornithologists, organizations and conservationists.

The Secret of the Great Pyramid: How One Man's Obsession Led to the Solution of Ancient Egypt's Greatest Mystery, by Bob Brier and Jean-Peirre Houdin (Collins, 2008, $24.95). How a forensic architectural investigation by an obsessed French architect led to the most exciting discovery in Egyptology in decades.

The Botanical Palette: Color for the Botanical Painter, by Margaret Stevens (Collins, 2008, $29.95). A practical and superbly illustrated book that demonstrates how to achieve the right colors in paintings of botanical subjects through step-by-step instruction from many of the world's best botanical artists.

America's Forested Wetlands: From Wasteland to Valued Resource, by Jefferey K. Stine (The Forest History Society, 2008, $8.95). A chronicle of the history of American attitudes and actions in regard to the transitional areas between dry land and open water, such as cypress swamps, marshes and bottomlands.

The Airplane: How Ideas Gave Us Wings, by Jay Spenser (Collins, 2008, $24.95). From wings and flight controls to fuselages and landing gear, the author examines the parts of the airplane to show how they came into being and have evolved over time.

Nature's Blueprint: Supersymmetry and the Search for a Unified Theory of Matter and Force, by Dan Hooper (Collins, 2008, $24.95). An amusing and accessible book on a theory of physics that explains the forces and particles comprising our universe.

Amor, Dolor y Lágrimas: Mariachi Los Camperos de Nati Cano (Smithsonian Folkways Recordings, 2008, $15). Thirteen memorable música ranchera songs that reflect a rich rural Mexican tradition.

From Now On: Michael Doucet (Smithsonian Folkways Recordings, 2008, $15). Nineteen tracks featuring the wide-ranging talents and instrumentation of Michael Doucet, the leader of the Grammy-winning group BeauSoleil.

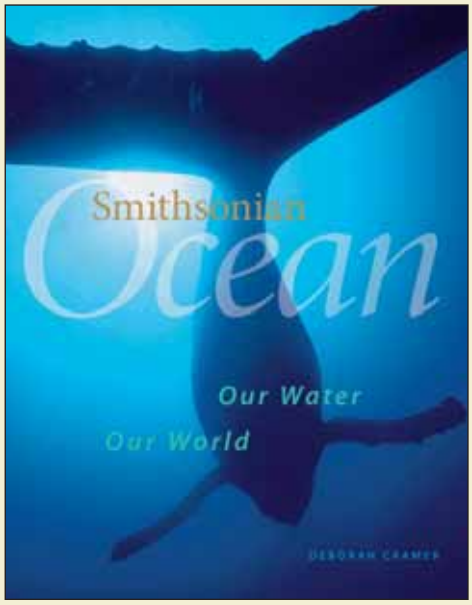
The Sligo Indians (Smithsonian Folkways Recordings, 2008, $15). The long-awaited solo debut of Tony DeMarco, a Brooklyn native of mixed Irish and Italian descent and one of America's finest folk fiddlers.

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 Ocean: Our Water, Our World

By Deborah Cramer (Collins, 2008, $42.95)



In 1947, an engineer, fascinated by turtles, captured on home video a mass nesting of Kemp's ridley sea turtles at Rancho Nuevo, Mexico. In broad daylight, after a long migration, some 40,000 of these reptiles crawled out of the Gulf of Mexico to lay their eggs, an event known as an arribada.

Today, this faded film is evidence of the devastating impact that trawl nets and trade in turtle meat has had on sea turtles. In 1985, only 250 Kemp's ridley sea turtles nested at Rancho Nuevo. In recent years, however, conservation efforts have helped increase the numbers of these turtles.

The Kemp's ridley arribada is one of many vivid stories that spring from the pages of *Smithsonian Ocean: Our Water, Our World,* the companion book to an exciting new 23,000-square-foot permanent exhibition called the Sant Ocean Hall, opening in September at the Smithsonian's National Museum of Natural History. Lavishly produced with 300 eye-popping photographs and 25 maps, *Smithsonian Ocean* was written by Deborah Cramer, a gifted author who is often compared with environmentalist Rachel Carson.

In the book, Cramer explores the sea's dazzling diversity, the myriad ways it touches humankind and increasingly, how the earth's growing population of 6.5 billion people is altering the sea. For example, in "Eden in the Depths," the book's opening chapter, Cramer takes readers down to the volcanic vents and hot springs at the bottom of the ocean, introducing such odd creatures as vent crabs, limpets, eyeless shrimp, brittlestars, stalked barnacles and giant tube worms. Amazingly, many species thrive in this extreme environment where "the shortest distances separate the near-freezing water of the deep sea from scalding hydrothermal fluid," Cramer notes.

In the chapter "A Green Sea," Cramer points out that most marine plants, unlike their terrestrial counterparts, are too small to be seen by the unaided eye. Still, nearly all marine life—from tiny herrings to massive whales—depend upon these invisible drifting plants. Turning sunlight into carbon, the plants constitute the foundation for almost all marine food webs.

Beyond marine life and food webs, *Smithsonian Ocean* also demonstrates how all life on Earth depends upon the sea and how humans hold the future of the oceans in our hands. Just as we are coming to understand its extraordinary diversity, we have become powerful enough to permanently alter the sea itself.

Perhaps nowhere on earth is the incidental effect of human activity more evident than in the Arctic. Here, fragile food webs are powered by a burst of life in the short summers, and animals such as penguins, Arctic cod and Weddel seals have evolved strategies to survive in the bitter cold.

Greenhouse emissions from fossil fuels are warming the Arctic and accelerating the retreat of summer sea ice, Cramer writes. "The time is soon coming, perhaps in the next few decades, when much of the Arctic will be free of ice in the summer.... Unless we substantially and immediately reduce greenhouse gas emissions, a flood we thought would come a thousand years from now may come much sooner, within the lifetimes of our children and grandchildren."

Cramer weaves together the beautiful story of the ocean, its many creatures and environments through a number of riveting chapters, such as "Building the Basin," "Circle of Water," "Climate from the Sea," "The Long Migration," "Edge of Continents," 'Rhythms of a Reef," 'Far Ends of Earth" and 'Where Rivers Meet the Sea."

In the closing pages of *Smithsonian Ocean* Cramer observes, "Oceans past have recorded earth's history in ancient seafloor now built into continents. So too does today's ocean record our own human imprint on the planet. Our mark is being recorded on the floor of the Mediterranean....on the floors of the Chesapeake Bay, the Baltic and the Gulf of Mexico, whose sediments describe waters that each summer can no longer breathe; and along the world's continental shelves, here fossils will tell of the disappearance of the sea's large fish, whales and coral reefs."

Smithsonian Ocean is a vibrant and inspiring portrait of the living sea—its past, present and uncertain future.

—John Barrat

Once a status symbol, the reliable thermostat quickly became icon of convenience

Don't touch the thermostat!" This ritual household command may be heard more frequently in coming months if oil, natural gas and electricity prices remain at record levels. Yet beyond issues of comfort and cost, the thermostat, says David Shayt, curator in the Division of Work and Industry at the Smithsonian's National Museum of American History, Behring Center, "is an icon of engineering convenience, and much more than just that plastic box on the wall."

Recently, the Museum of American History received a collection of 24 vintage thermostats from Bill Axelson, now retired, a thermostat distributor who worked for both Honeywell and Industrial Control Co., in Portland, Ore. During the course of Axelson's career, engineers renovating older houses and other buildings saved the thermostats they removed and gave them to Axelson.

The collection holds thermostats dating from 1915 to 1984 that regulated the temperatures of homes in Portland's West Hills District. Most were made by Honeywell, the prominent American thermostat manufacturer. The earliest examples are made of cast-iron, followed by brass, aluminum and finally, plastic, which today dominates thermostat production.

"The evolution of industrial design is a story well told by the metal and plastic housings of American thermostats and their often curious arrangements of dials, gauges, clock faces and levers," Shayt says.

A thermostat is what engineers call a "feedback control mechanism," Shayt explains, a device that follows a closed command-and-response loop to yield a continuous stream of self-regulating mechanical behavior. Inside thermostats, expansion or contraction of a bimetallic coil remains the key to their operation, often tilting a blob of mercury contained inside a glass bulb to open or close an electrical circuit. "Setting the thermostat is one of those rare moments when home life intersects with operational engineering," Shayt points out.

Early thermostats were status symbols. Before World War II, middle-class families usually had to trudge down basement stairs to regulate their furnaces.

The collection's 1918 "Minneapolis" model, named for Honeywell's home base, has a hand-wound clock allowing its owners to set day and night times for furnace operation. Once the clock reached a pre-set time, it tripped a lever to start the furnace. Thermostat designs embraced a multitude of shapes before designer Henry Dreyfuss created the iconic "Round," Honeywell's beige plastic dome that became standard in homes in the 1950s and has been popular ever since.

Axelson's collection features only thermostats that regulate heat. Air conditioning— that other force of indoor environmental change—did not become common until the 1950s, that hot decade for bold, new indulgences. *—Jennifer Endick*

A 1918 Honeywell "Minneapolis" model thermostat. (Photo by Harold Dorwin)

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