



Garrett Morgan (1877-1963), featured in *Invention at Play*, invented a range of devices including a safety hood, an early version of the modern-day gas mask.

The Jerome and Dorothy Lemelson Center for the Study of Invention and Innovation

The Lemelson Center was established in 1995 with a gift from the Lemelson Foundation, a private philanthropic organization founded by inventor Jerome Lemelson.

Phone: 202/ 357-1593
Fax: 202/ 357-4517
E-mail: lemccen@si.edu
Website: www.si.edu/lemelson

Photo credits: Cover photo by Cary Wolinski, courtesy of Vreseis Ltd. and FoxFibre®; p.2, photo illustrations (top and bottom) from *The American City*, Jan. 1912.; p.3-4, photos by Rich Strauss, Smithsonian; p.8-10, photos by Rich Strauss, Smithsonian; Ganson photo by Henry Groskinsky; p.11, King photo courtesy National Portrait Gallery, Smithsonian, gift of Eastman Kodak Professional Division, the Engl Trust, and Benedict J. Fernandez; briefcase photo by Carol Slatick, Smithsonian; p.12, photo courtesy of the Western Reserve Historical Society.

Lemelson Center Team

Arthur Molella, *Director*

Joyce Bedi, *Historian*
 Chris Broda-Bahm, *Public Affairs Specialist*
 Anita Cater, *Education Specialist, Invention at Play*
 Maggie Dennis, *Project Historian*
 Yolonda Earl, *Management Support Assistant*
 Will Eastman, *Project Historian and Coordinator, Nobel*
 John Fleckner, *Associate Director*
 Tanya Garner, *Program Specialist*
 Gretchen Jennings, *Project Director, Invention at Play*
 Michael Judd, *Senior Educator*
 Claudine Klose, *Program Manager*
 Alison Oswald, *Archivist*
 Alison Smith, *Program Specialist*
 Monica Smith, *Project Historian/ Exhibit Specialist, Invention at Play*

Advisors

Joseph Anderson, Molly Berger, Ruth Cowan, Ashok Gadgil, Yolanda George, Luvenia George, Sandra Morgan, Katherine Ott, Arnold Roos, Matthew White, Janice Williams, Helena Wright

Lemelson Center Visiting Committee

Jeffrey L. Sturchio, Daryl M. Hafter, David J. Rhees, Helen W. Samuels

Design: Anne Masters Design, Inc.
Copyediting: Jane Sapp

The Lemelson Center for the Study
 of Invention and Innovation
 PO Box 37012
 AHB 1016, MRC 604
 Lemelson Center
 Smithsonian Institution
 Washington, DC 20013-7012



News from the Lemelson Center for the Study of Invention and Innovation **Behind every invention there's a story**



Smithsonian
 National Museum of American History



from the Director

Inventing for Humanity

As I write this column, we are living in a period of uncertainty and danger. The tone of the times is negative (war, threats of terrorism, a stalled economy), and much of the news highlights the perils of technology. Yet some of what I have recently read and heard has instilled in me a certain sense of positive anticipation—positive, in that it gives me hope about the uses of technology and invention to address some of our current dilemmas.



Sally Fox's naturally colored cotton eliminates the need for polluting chemical dyes.

A recent article in the *New York Times* (“Dot-Com Saviors, Tilting at the World’s Ills,” March 16, 2003) described a new altruistic mood among high-tech entrepreneurs. Chastened by the bursting of the market bubble and the worsening world situation, they are directing their business and inventive talents toward launching socially aware projects for global good. Instead of focusing solely on financial gain, this new crop of entrepreneurs is seeking social returns.

Inside

Invention at Play / 3

**Yo-Yo
 Ups and Downs / 5**

**Toy Invention
 Festival / 8**

**Metaphysics
 in Motion:
 Arthur Ganson / 9**



Industrial air pollution is a long-standing problem, as these “before and after” illustrations (top and bottom) from 1912 show.

Over the past year, I’ve met a number of such socially aware entrepreneurs, as well as policy experts, scientists, historians of technology, and others interested in inventing for the public good. Last December, for example, the Lemelson Center hosted an international gathering of experts on the subject of “Inventing for Humanity,” to explore applying invention and technology systematically for the benefit of society. The discussion of historical precedents included examples from medicine (efforts to eradicate polio and smallpox), as well as collaborative efforts to solve global problems in areas such as public health (formation of boards of health in the 19th century), agriculture (green revolution), economic development (formation of the World Bank), and the environment (methods for controlling air pollution).

What struck me most was the participants’ idealism—albeit tempered by the realities of practice and history—as they addressed urgent problems in these areas. Similarly, I

was encouraged by the enthusiasm of teachers and students at a follow-up panel session entitled “Inventing for a Better World” at the annual meeting of our sister organization, the National Collegiate Inventors and Innovators Alliance. Focusing on global health, the panel brought together the perspectives of public policy experts, historians, and practitioners who had developed innovative approaches to the urgent need for clean, safe drinking water.

before

Panel moderator Jeffrey Sturchio, from Merck & Co., Inc., made this critical observation: “Conceiving, developing, and implementing new technologies that can make a difference in the lives of those who are desperately poor must be done in a way that’s sensitive to their social, cultural, economic, and political contexts.”

Very soon to appear is the Lemelson Center’s book *Inventing for the Environment*, the first in its series on invention with MIT Press. It is full of stories of surprise and tempered dreams. Yet undergirding it is a belief that socially aware inventors and innovators hold one of the important keys to a better future, a belief that we try to cultivate through our publications and programs.

Through our Innovative Lives program, the Lemelson Center has been privileged to introduce young people to inventors who take this belief to heart. Middle school students have met inventors Ashok Gadgil, whose water purification device makes clean water not just available but affordable in developing countries; Sally Fox, whose naturally colored cotton obviates the need for polluting chemical dyes; and Subhendu Guha, whose solar roofing shingles promise to reduce dependence on dwindling energy sources. All have shared their stories with students. Introducing young minds, eager to learn what they might do for the future of our world, to such visionary yet practical inventors can only nurture the idea of inventing for humanity.

—Arthur Molella
Lemelson Center
Director

after

IAP on the Road

As you may know, *Invention at Play*, our hands-on exhibition, was on display at NMAH from July through December 2002. During that time, we presented a variety of public programs for a broad range of visitors: a symposium on creative spaces for invention; two family days with activities and events all over the Museum; several family workshops; two evenings for adults, with time to talk with one of the exhibition’s featured inventors and play with all the hands-on activities; events for teachers; a play about invention specially created by the Smithsonian’s Discovery Theater; and opportunities for

visitors to view inventions in the collection and talk with curatorial staff. Through these programs and events we served about 110,000 visitors, including 1,678 students from 52 schools who visited the exhibition and another 1,200 who registered to view both the exhibition and the play.

Now that the exhibition is on tour, Lemelson team members continue their involvement with the exhibition, supported by Lemelson funding and a grant from the National Science Foundation. We work closely with the staff at the Association of Science-Technology Centers (ASTC), the organization that is managing the exhibition tour. Our efforts with the tour serve two

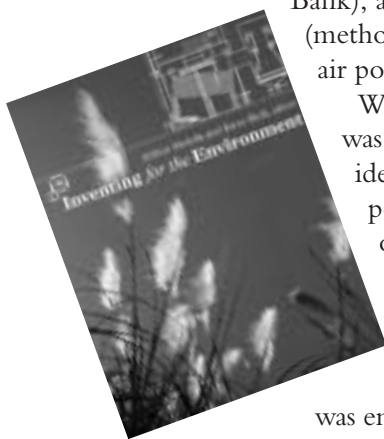
IAP 2003 Tour Schedule:

February 1 – April 30
Museum of Science
Boston, Mass.

June 1 – August 31
Arizona Science Center
Phoenix, Ariz.

October 1 – December 31
COSI Columbus
Columbus, Ohio

MindFest participants learn how to animate their Lego creations by programming “crickets” (tiny computers with sensors).



The Lemelson Center’s book *Inventing for the Environment* will be out this fall.





A staff member helps a visitor enjoy the *Invention at Play* exhibition.

purposes. First, by working with ASTC and with each site, we help ensure that the exhibition will be displayed, marketed, and interpreted in ways that are consistent with its display at the Smithsonian. Second, collaboration with each site provides an opportunity for new audiences to become familiar with the Lemelson Center and its resources. As we work with the staff at the science and history museums on the tour, we can make sure they know that the Lemelson Center, its employees, programs, and websites are available to them as they plan future programs, events, or exhibitions on invention and the history of technology.

Host-Site Workshop

In November 2002 we invited three staff members from each of the first several host sites to come to NMAH for two days of training. Education, marketing, and exhibits personnel from the host museums were able to meet with members of the *Invention at Play* team; tour the exhibition; ask questions about its layout and mainte-

nance; discuss training, staffing, school programs, and public programming for the exhibition; and brainstorm about publicity and marketing strategies. This host-site workshop also laid the foundation for further contacts, as *IAP* team members here began to learn names and faces of staff from the upcoming sites. We have NSF funding for a second workshop, for the sites not included in the first.

Resources for Host Sites

For many sites on the tour, the usual three-month stay for a traveling exhibition does not allow sufficient time for developing new programs and events. To assist site staff, we provide a CD that documents the full menu of programs we presented at NMAH during the exhibition's display. We also provide artwork, sample ads, training materials, teacher materials, and a variety of other resources that can give museums a head start in putting their own stamp on programs that we have found successful. Two members of the *IAP* team, educator Anita Cater and project historian Monica Smith, travel to each site to work with exhibition, education, and marketing staff and to see that the exhibition is launched successfully.

Nurturing the exhibition on its tour involves extra staff time, but we are confident that the effort will assure optimal display at each site and an exhibition that will be in top condition when it returns to the Lemelson Center in 2006.

—Gretchen Jennings
Project Director,
Invention at Play



"Drawing Robots," a "cricket"-based activity, wow the crowds at MindFest.

FIG. 1.

The National Museum of American History's Archives Center, the Division of Cultural History, and the Lemelson Center collaborated to acquire objects and archival materials documenting the history of the yo-yo in America and the central role of the Donald F. Duncan family in popularizing the now ubiquitous stringed toy.

from the Museum Archives

Yo-Yo

Ups & Downs

America owes its fascination with the yo-yo mainly to Chicago businessman Donald F. Duncan Sr., who spotted it while on a business trip to San Francisco in 1928. It was being used by a Filipino émigré named Pedro Flores, who was beginning to mass produce and sell the simple toy he had known as a boy in the Philippines, the "yo-yo."

By early 1929, Flores had secured financing, set up his own firm and had turned out more than 100,000 yo-yos, advertising them as the only genuine ones and shrewdly trade marking the name "yo-yo." Realizing that people had to be shown how to use a yo-yo before they would buy it, Flores hired a team of fellow Filipino yo-yo masters to demonstrate the toy's amazing tricks. To pump sales, he also sponsored yo-yo contests, awarding prizes at all skill levels.

Flores never claimed to have invented the yo-yo and always pointed out its ancient Philippine lineage. However, he deserves credit for the yo-yo's first widespread use in the

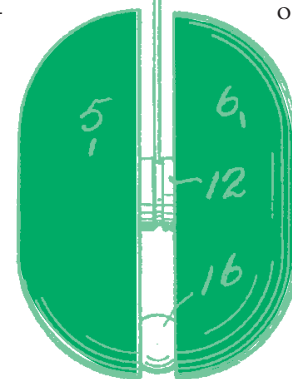
United States, including popularizing the name and initially mass producing and marketing the delightful flying toy.

Because of Flores, a yo-yo craze was sweeping California—just as Donald Duncan arrived on business. An astute marketer, entrepreneur, and manufacturer of, among other things, wooden novelty items and toys, Duncan immediately recognized the yo-yo's vast potential.

He quickly raised \$5,000, purchased initial rights to the yo-yo from Flores and founded Donald F. Duncan, Inc. By October 1932, he had secured Flores's remaining assets, including the all-important trademark. Until the trademark expired in 1965 and competing plastic yo-yos began to outsell his old-fashioned, lathe-turned wooden ones, Duncan was the country's leading yo-yo producer.

First Contact

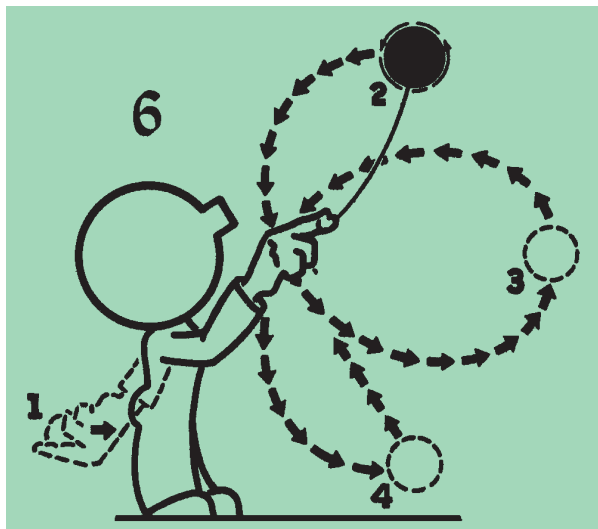
In January 2002, Donald F. Duncan Jr. called David Shayt in NMAH's Division of Cultural History, asking if the Smithsonian was interested in acquiring



materials relating to the Duncan Yo-Yo. A veteran of the family business for most of his life, Duncan Jr. had developed several innovative yo-yos of his own in the 1970s and 1980s. After retiring, he set up a small “Yozeum” dedicated to the yo-yo.

Initiated as a traveling exhibit, the Yozeum became a permanent facility in a leased storefront in Bartlesville, Okla., when Don and his wife, Donna, retired there. Unable to fully maintain the Yozeum, the

A drawing of the Three-Leaf Clover trick from the *Art of Yo-Yo Playing*, 1950, Duncan Family Yo-Yo Collection, Archives Center, NMAH.



Duncans were seeking a permanent home for the materials they had so carefully preserved.

Shayt understood that this was a unique opportunity to acquire original documentation and artifacts from the company that was virtually synonymous with 20th century yo-yo manufacture and innovation. Because there were large quantities of paper documentation and photographs, he asked me, an acquisitions archivist in NMAH’s Archives Center, to help evaluate the collection. (The Archives Center serves as a repository for manuscripts, archival collections, and business records, while Shayt’s divi-

sion cares for three-dimensional objects.)

Realizing the importance of the Duncan collection, we went to Bartlesville to select Yozeum materials for NMAH. The Lemelson Center paid for our travel and the costs of shipping the yo-yo items to Washington.

The Yozeum

The Yozeum consisted of some museum-quality display cases, an eight-foot yo-yo, some blown-up photographs on the walls, and a small gift counter. The cases were filled with a dazzling array of yo-yos of every color and type, either dangling by their strings or artfully laid out in colorful patterns. Other displays showed the prizes awarded to Duncan yo-yo contest winners, from patches and trophies to baseball mitts and bicycles, as well as a wide range of related items, including photographs and song sheets.

A workroom curtained off from the public held the business records of the companies founded by both Duncans, along with a wealth of yo-yo ephemera and research materials. Neatly labeled boxes filled several rows of shelves, and two large tables were covered with additional papers spread out in anticipation of the Smithsonian’s visit. After a tour of the exhibit, my colleague joined Don and Donna Duncan in the exhibit space while I tackled the stored materials.

Shayt carefully negotiated and assembled some 50 objects from Duncan and Playmaxx (the junior Duncan’s company), and from other manufacturers, such as Cheerio, Goody, and Royal. Together, these recounted the history of the Duncan businesses and the yo-

yo’s wider tale. They included the oldest and newest models; rare and unusual types; those of different styles and price ranges, from “beginner” to “tournament” models; yo-yos of wood, plastic and metal; those with special features, such as flashing lights or whistling noises; and those given away in cereal boxes or other commercial promotions. Not neglected, too, were patches, pins, trophies, and ribbons from Duncan-sponsored contests.

While Shayt took care of the objects, I chose the materials that most thoroughly document the yo-yo’s history and the Duncans’ involvement. Primarily, these are from the 1930 Donald F. Duncan company, including incorporation papers; legal, advertising, and sales records; and manufacturing documentation such as a film of the company’s Luck, Wisc., production line in action.

The company’s marketing efforts are documented by contest rule books, illustrated books of yo-yo tricks, photos of yo-yo contestants and their prizes, guidelines and rules of conduct for demonstrators, and the field manuals used to lay the groundwork for Duncan-sponsored events.

Of additional interest were the records from 1972 to 1994 covering Playmaxx, the company founded by Don Duncan Jr. to produce a more technologically advanced plastic yo-yo. These consisted of market research, confidential business plans, marketing strategies, production and operating data, sales records, and advertising. The best included a patent record book, a set of original patent drawings, and design sketches—even the archetypical

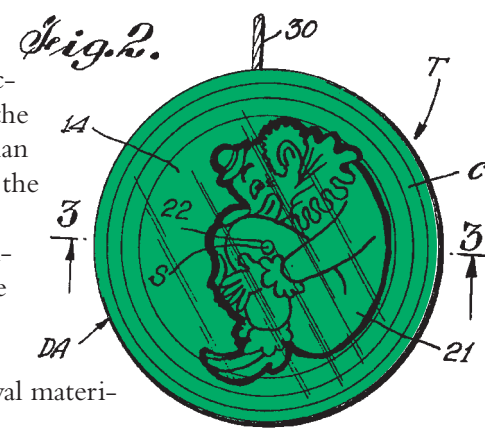
sketch on a dinner napkin!

Other finds, especially news clippings and published articles, chronicle the yo-yo’s broad sweep, from its origins in the Philippines to its introduction to 18th century Europe and on to Pedro Flores. Duncan competitors are also represented in the archives by advertisements, catalogs, and sales materials.

The yo-yo’s renewed popularity in the 1980s and 1990s is caught in videotapes of yo-yo competitions, books of yo-yo tricks, reference guides to yo-yo collecting, and information on Tommy Smothers, whose Yo-Yo Man character was instrumental in the comeback of this ancient Filipino toy.

In all, I selected some 14 cubic feet of archival material, out of a total of about 25 cubic feet. Throughout our day of Yozeum evaluation and selection, Shayt and I kept in close touch on what we were finding and choosing for the Smithsonian, in order to strengthen our respective components of the collection.

With the final object carefully wrapped, the last papers securely boxed up, and the deed of gift signed by Donald Duncan Jr., another collecting trip concluded successfully; the Smithsonian now held the nation’s most comprehensive collection of objects and archival materials on the history of the yo-yo.



The yo-yo graphics on p. 5 and below are specification drawings from the U.S. Patent Office.

—Craig A. Orr



Yo-Yo Crazy at the Toy Invention Festival

Since the late 1920s, the yo-yo has been a classic American toy story. Its adoption, national emergence, and enduring popularity are worthy of special scrutiny by the Lemelson Center, whose mission is to celebrate the art and science of invention.

The yo-yos and yo-yo archives now in the Museum's collections formed the basis for the yo-yo component of last October's Toy Invention Festival. While the Archives Center mounted a small display of Duncan Yo-Yos, photographs, and historic papers at its third-floor premises, actual yo-yos were put through their paces by invited demonstrators and manufacturers in NMAH's first floor Palm Court. The triple dose of yo-yo history, manufacturing innovation, and artful demonstration was memorable.

A visitor to the Toy Invention Festival demonstrates his yo-yo prowess.

The amazing Tommy Moore wowed onlookers with a combination of classic yo-yo tricks and cheerful patter. Georgia's Bob Rule reprised his many years as a Duncan Yo-Yo demonstrator traversing mid-20th century America to spread the gospel of yo-yoing among small towns and big cities alike. Duncan depended upon an army of such showmen to ignite a craving for yo-yos that could only be satisfied by buying the latest Duncan Yo-Yo, mastering the 10 basic tricks, and entering the local Duncan Yo-Yo contest.

The country's major yo-yo manufacturers—Yomega, What's Next Manufacturing Company, YoYoJam, and Duncan (now part of Flambeau Plastics Corporation)—displayed their newest wares while their pros “walked the dog,” “rocked the baby,” and “looped the loop,” to the crowd's delight.

This vibrant display of yo-yo creation, adaptation, manufacture, and marketing was proof positive that the Lemelson Center's study of invention and innovation strikes a resounding chord with the public. The convening of demonstrators, yo-yo banter, and even the custom-designed What's Next yo-yo distributed at the festival remind us that invention and innovation are perpetual, exceedingly human processes essential to any worthy enterprise. Yo!

—David Shayt
Museum Specialist,
Crafts & Trades

Metaphysics in Motion: Arthur Ganson

Playing with objects and ideas—bringing them together and setting them in motion—is the work of kinetic sculptor and inventor Arthur Ganson, who describes himself as a cross between an engineer and a choreographer. Often whimsical, sometimes wistful, his sculptures are handcrafted machines that captivate viewers of all ages (see his website, www.arthurganson.com).

Ganson's interest in making things began in his childhood. Born in 1955, he grew up near Hartford, Conn. He was particularly interested in the way things moved, and he loved to make models.

Ganson entered the University of New Hampshire intending to study medicine, but he was dissatisfied with the rote memorization required in some of his premed courses. He switched his major to art and began making machines out of wire for a design class. Ultimately, he entered a fine arts program that had an intense studio component and required a senior exhibition, and he stayed an extra year to earn his B.F.A. in 1978.

Although Ganson loved making mechanical pieces, he never took an engineering course, preferring to work out technical problems intuitively or by trial and error. In those years he encountered the work of artists who seemed like kindred spirits, such as the Swiss master of kinetic sculpture, Jean Tinguely, whom Ganson acknowledges

as an influence, along with Paul Klee, Alexander Calder, and others.

The ideas for Ganson's sculptures often come from objects he finds, such as dolls or a Chinese fan. Even eggshells and cat whiskers have inspired him. Ganson's works have been described as gestural, humorous, evocative, and introspective. They don't rely on explanations but present objects in motion that can be universally understood—although each viewer brings unique associations and interpretations to the experience.

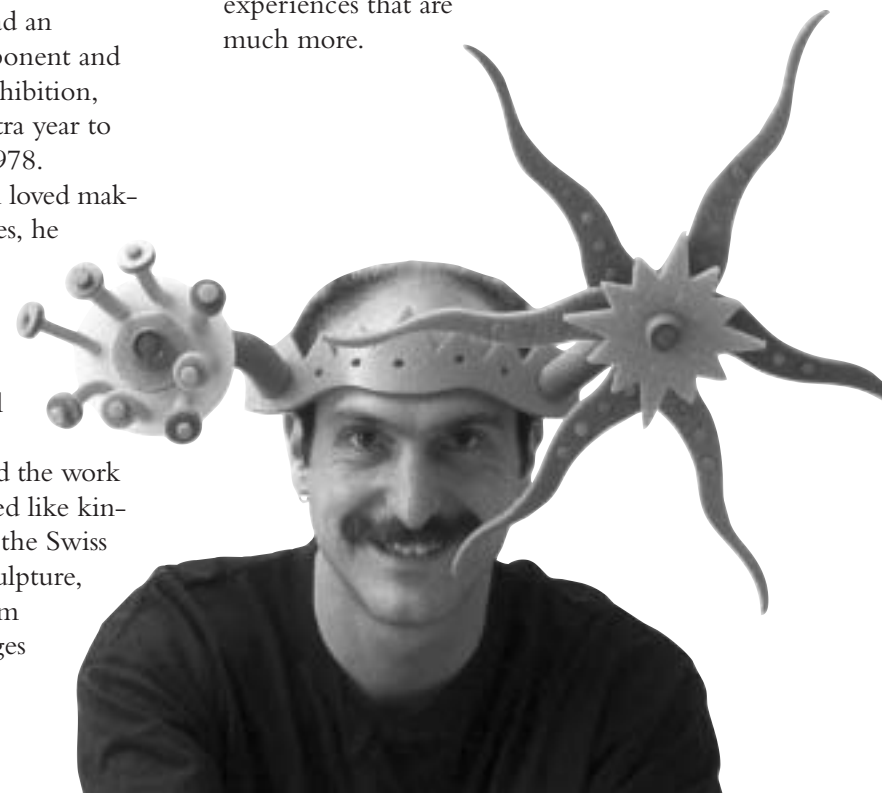
Museums, galleries, and individuals have collected Ganson's work. He made a debut in the New York art world with a solo exhibition in 1998, and he has been an artist-in-residence at science museums and the Massachusetts Institute of Technology.

Music, meditation, movement, machines: are all part of the art of Arthur Ganson, art that links the physical and the metaphysical, transforming ordinary materials into experiences that are much more.



“27 Scraps of Paper,” by mechanical sculpture artist and engineer Arthur Ganson, sets the tone for *Invention at Play*.

Arthur Ganson with his whimsical sculptures created with Toobers and Zots, the interactive construction toy he invented.



BITS & PIECES

Crossroads

On the one-year anniversary of the terrorist attacks, the Museum opened the exhibition *September 11: Bearing Witness to History*, along with an ambitious series of public programs. The Lemelson Center contributed to two programs in the series. The first, “The Psychology of Terrorism,” was a resumption, on October 1, 2002, of the popular lunchtime series *Crossroads: Historical Perspectives on Topics Related to September 11*. The second program, held on March 9, 2003, brought *Crossroads* and the Museum’s program series to a close. Working in collaboration with the exhibition team and the Office of Education and Public Programs, we presented “How Has Life Changed Since September 11?” Program panelists discussed the ways our lives really have changed and then looked to the future for how the American experience will continue to be shaped by the events of that day. After the program, the audience was invited to meet members of the curatorial team in the exhibition, and a reception was held for the many people who have supported this effort through donations of artifacts or their time and expertise as program presenters. The event was a meaningful and appropriate conclusion for everyone who has participated in this collaborative effort.

Nobel laureate Dr. Rita Levi-Montalcini during her presentation, “My Journey for Science and Society.”



Rita Levi-Montalcini

In December the Lemelson Center welcomed Dr. Rita Levi-Montalcini, winner of the 1986 Nobel Prize in physiology/medicine for her discovery of nerve growth factor. The presentation was part of the Spirit of Innovation lecture series, a complement to our exploration of the Nobel Prize, and was cosponsored by the Italian Embassy.

The 94-year old Dr. Levi-Montalcini drew a standing-room-only audience and spoke passionately for over an hour about living through the Mussolini regime, continuing her scientific pursuits despite laws barring Jews from research and professional careers, and the struggle of women in the field of science. She also spoke of her current work with her foundation, which provides scholarships for young women in Africa.

Nobel at the Museum of American Financial History

Adaptations of the Lemelson Center’s exhibition *Nobel Voices: Celebrating 100 Years of the Nobel Prize* continue to make their way around the world. After tours at the Deutsches Museum in Bonn, Germany, and the Strong Museum in Rochester, N.Y., a modified version of the exhibition arrived at the Museum of American Financial History (MAFH) in Lower Manhattan in March, where it will run through July 2003.

The exhibition at the MAFH, entitled *The Nobel Prize: Celebrating 100 Years of Creativity and Innovation*, provides a glimpse into the minds, lives, and work of selected Nobel laureates, particularly those in the economics category, and features personal video interviews, candid photographic portraits, and original artifacts. Milton Friedman, Albert Einstein, Martin Luther King Jr., Pearl S. Buck, and Nelson Mandela are among the laureates featured.

Lemelson Center’s 2002 Fellows

The Lemelson Center Fellows Program supports scholars and professionals who are pursuing creative approaches to the study of American invention and innovation. Fellows for 2002–2003 were Cyrus Mody, Ph.D. candidate in the Science and Technology Studies Department at Cornell University, and Tamar Zinguer, Ph.D. candidate in the School of Architecture at Princeton University. Thorin Tritter, who deferred his 2001 fellowship award, was also at the



Center last summer. He is now a lecturer in the History Department at Princeton.

Mody is interested in the organizational cultures that developed around the invention and use of the scanning probe microscope. Using materials in the Modern Physics collections, his research will contribute to a dissertation chapter on the early history of probe microscopy. Zinguer’s dissertation focuses on toy inventors Froebel, Lilienthal, Gilbert, and Eames and investigates the ways in which construction toys have related to architecture and to the built environment. Tritter’s research for an upcoming book centers on technological changes in the New York newspaper industry from the 1830s to the 1930s and the effect of those changes on American culture.

This photo of Martin Luther King Jr. (1967) by Benedict J. Fernandez is one of the many portraits of Nobel laureates on display in the Nobel exhibition.

Milton Friedman used this briefcase to carry writings and correspondence from 1981 until 2001, when he donated it to the Smithsonian.



Gilbert’s 1913 Erector Set manual from the Domestic Life collection, NMAH.