



Dimensions

Bimonthly News Journal of the Association of Science-Technology Centers

September/October 2007



The Engaged Scientist:

Fostering Successful
Museum-Researcher
Collaborations

Where Science Meets the Public:
Remembering the Founders of the Field

Content and Commitment: Insights
from the VoITS Front-End Study

In the Comfort Zone: Working with
Scientists on Exhibitions

The Universe in a Cell:
Developing a SEPA Project

Better Communicators:
Postdocs at the Exploratorium

Making the Right Match:
Four Approaches to Collaboration



Bimonthly News Journal of the Association of Science-Technology Centers

IN THIS ISSUE

September/October 2007

Bonnie VanDorn

Executive Director

Wendy Pollock

*Director of Research, Publications,
and Exhibitions*

Carolyn Sutterfield

Editor

Christine Ruffo

Researcher/Writer

Brendan Cartwright

Publications Assistant

Editorial Advisors

Elsa Bailey

*National Science Teachers Association
San Francisco, California, U.S.A.*

Rita Deedrick

*COSI Columbus
Columbus, Ohio, U.S.A.*

Graham Farmelo

Science Museum, London, U.K.

Preeti Gupta

*New York Hall of Science
Queens, New York, U.S.A.*

Mikko Myllykoski

*Heureka, The Finnish Science Centre
Vantaa, Finland*

Vishnu Ramcharan

*Ontario Science Centre
Toronto, Ontario, Canada*

Contributors

Kristin Abkemeier

Roberta Cooks

Sheila Grinell

Cristina Heine

Eric Marshall

Theresa Mattei

Missy Miller

Renee Miller

Kathy Patterson

Wendy Pollock

Beryl Rosenthal

Lauren Russell

Dennis Schatz

*This issue was made possible in part by a
National Leadership Grant from the U.S.
Institute of Museum and Library Services.*

The IMLS-funded VolTS (*Volunteers TryScience*) project described in these pages is a recent U.S. effort aimed at helping ASTC members forge better relationships with practicing scientists and engineers. But collaborations among content experts and museum educators are nothing new. Such partnerships date back to the founding of the field and continue to strengthen our institutions. Whether as museum volunteers or as partners in grant-funded projects, scientists and engineers welcome the chance to inform the public about their work and contribute to the goal of a “science-literate” society. In this issue we offer some examples of successful projects and examine the factors that make for success (or challenges) when two cultures—research science and informal science education—meet.

Features

Where Science Meets the Public: <i>Remembering the Founders of the Field</i>	3
Content and Commitment: <i>Insights from the VolTS Front-End Study</i>	4
A Passion for Public Engagement	6
In the Comfort Zone: <i>Working with Scientists on Exhibition Design</i>	7
The Universe in a Cell: <i>Partnering in a SEPA Project</i>	8
Better Communicators: <i>Postdocs at the Exploratorium</i>	10
Portal to the Public: <i>Bringing Scientists and the Public Together</i>	12
Making the Right Match: <i>Four Approaches to Collaboration</i>	13
Attracting Faculty: <i>Getting Researchers Involved with a University Museum</i>	16

Departments

ASTC Notes	19
Calendar	20
Spotlights	22
Grants & Awards	23
People	24

Cover: Inviting scientists and engineers into the museum opens a window for audiences into the world of academic research and corporate practice. Pictured, clockwise from top right, are chemical engineer and molecular biologist Julie Yu, a postdoctoral fellow at the Exploratorium’s Teacher Institute (*photo by Amy Snyder/© The Exploratorium*); physicist Frank Oppenheimer, founding director of the Exploratorium (*photo courtesy The Exploratorium*); University of Washington marine biologist and NOAA contractor Jennifer Boldt, a volunteer at the Pacific Science Center’s “Get to Know NOAA” event (*photo by Rebecca Reuter/NOAA*); and physical oceanographer and Arctic expert Rick Krishfield, a research specialist with the Woods Hole Oceanographic Institution (*photo by Chris Linder/WHOI*).

ASTC *Dimensions* (ISSN 1528-820X) is published six times a year by the Association of Science-Technology Centers Incorporated, 1025 Vermont Avenue NW, Suite 500, Washington, DC 20005-6310, U.S.A. Copyright ©2007 the Association of Science-Technology Centers Incorporated. All rights reserved. *ASTC Dimensions* is printed on 45 percent recycled paper with environmentally friendly inks.

ASTC Dimensions is intended to keep member institutions apprised of trends, practices, perspectives, and news of significance to the science center field. All ASTC members receive five free copies of each issue as a benefit of membership. Individual subscriptions are also available: For employees of ASTC-member institutions, the annual rate is US\$35; \$45 outside the United States. For all others, the price is \$50; \$60 outside the United States. Send name, address, name of institution, and payment in U.S. dollars to ASTC, 1025 Vermont Avenue NW, Suite 500, Washington, DC 20005-6310, U.S.A., Attn: ASTC Dimensions. For more information or to order bulk subscriptions, call 202/783-7200 x140, or e-mail pubs@astc.org.  ALTERNATE FORMATS AVAILABLE ON REQUEST.

To submit news items and ideas for articles, contact Carolyn Sutterfield, editor, 202/783-7200 x130; e-mail csutterfield@astc.org. For editorial guidelines, visit www.astc.org.

Where Science Meets the Public:

Remembering the Founders of the Field

By Wendy Pollock

Crowd-pleasing attractions are a part of the history and culture of science centers, going back to the Crystal Palace's dazzling displays of industrial innovation in 1841 and P.T. Barnum's American Museum in mid-19th-century New York. But the science center movement that gained momentum in the 1970s and ASTC, the first organization to represent the field, were in many ways a creation of the scientific community.

A legacy of war

First came the physicists, with their new-style teaching. Frank Oppenheimer of the Exploratorium has had the most enduring reputation. A Manhattan Project physicist during World War II, like his more famous brother, J. Robert Oppenheimer, Frank was blacklisted during the McCarthy hearings of the 1950s. Exiled from higher academics, he taught physics in high school, developing the experimental apparatus he would later use in building exhibits for his museum.

But there were others, like Harvey White of the University of California–Berkeley. White had taught a physics course on television in the early 1950s, when that medium was just emerging. He was tapped as founding director of the university's Lawrence Hall of Science, which opened in 1968 as a memorial to another Manhattan Project scientist, Berkeley's own Ernest Lawrence.

Even before the bomb was dropped on Hiroshima, Lawrence's colleague Vannevar Bush, director of the (U.S.) Office of Scientific Research and Development, prepared a report at the request of President Roosevelt that emphasized the importance of science to national security. *Science: The Endless Frontier* (1944) laid the groundwork for

establishment in 1950 of the National Science Foundation (NSF). In the report, Bush advised that “in the last analysis, the future of science in this country will be determined by our basic educational policy.”

Demonstration and experiment

Initially, the focus of U.S. federal support for science education was on the undergraduate and graduate levels. Eventually younger students began to win the attention of the scientific community. In 1956, a group of physicists centered at the Massachusetts Institute of Technology, among them Philip Morrison, formed the Physical Science Study Committee (PSSC). PSSC developed materials for the high-school level—a teacher's guide, laboratory apparatus, films, books—that emphasized experiment over memorization.

The Soviet launch of Sputnik in 1957 sparked an even more determined focus on American science education. In 1960, PSSC scientists—joined by philosopher of science and Manhattan Project historian David Hawkins, chemist George Hein, and others—formed the Elementary Science Study (ESS) to develop materials for even younger children. These scientists and curriculum reformers would, as advisors and friends, influence the science centers emerging from the 1960s on.

In 1963, the American Association of Physics Teachers launched a publication, *The Physics Teacher*, to support high school educators. One of the authors was Richard Crane of the University of Michigan, who wrote the journal's “How Things Work” column. Crane would later become closely involved in development of the Ann Arbor Hands-On Museum, installing

the museum's first exhibit, a hot air balloon, and inspiring a traveling exhibition named after his column.

Science centers organize

The first U.S. science center to use the name got its start when MIT's Courtland Randall, science advisor for the U.S. pavilion at the 1962 World's Fair in Seattle, helped to negotiate the structure's repurposing as the Pacific Science Center after the fair closed.

Randall went on to Oak Ridge, Tennessee, to work with the Atomic Energy Commission (AEC). The little science museum there, heir to the main Oak Ridge site of the Manhattan Project, developed traveling exhibitions. Around 1970, at the invitation of the AEC administrator, several science museums convened there to talk not only about borrowing exhibitions, but also about forming an association. Formal incorporation followed in 1973; ASTC was the result.

The scientific community continued to lend its support to the fledgling organization. The National Academy of Sciences (NAS), in Washington, D.C., provided initial office space for ASTC's staff of two. As Lee Kimche, ASTC's first director, would recall 20 years later, then NAS president Phil Handler “wanted scientists to know what was going on in science centers.” In return, ASTC helped NAS start its own exhibition program, with shows on work like the stroboscopic photography of MIT's Harold Edgerton.

ASTC picked up speed with a start-up grant from NSF's Public Understanding of Science Program, housed at that time in the agency's Education Directorate. Exhibitions were a major focus of this early NSF support, as was ASTC's work with professional soci-

eties like the American Optical Society and American Psychological Association. The American Association for the Advancement of Science (AAAS) has also been a long-standing collaborator. During the 1980s, ASTC and AAAS developed a cooperative program to alert AAAS scientists to volunteer opportunities at science centers.

As more science centers and museums opened, the model of the scientist/director or scientist/chief educator continued. To name just a few, geophysicist Tuzo Wilson (an early proponent of plate tectonics) was among the first directors general of Toronto's Ontario Science Centre; neuropsychologist Richard Gregory founded the Exploratory in Bristol, U.K.; and physicist Ernie Malamud of FermiLab became founding director of Aurora, Illinois' SciTech Hands-On Museum.

'Where are the scientists?'

Growth and expansion were the hallmarks of the field during the late 1980s and 1990s. But by 1993, when ASTC carried out a series of 20th anniversary interviews with founders and early supporters, one of ASTC's first NSF program officers, George Tressel, identified what he called a "weakness."

For one thing, Tressel said, science centers had become "more a business." But more fundamentally, he thought, science centers' shift of focus from the curator to the educator had become a risk, because "science is a very fluid thing—things change from one day to the next."

"Without a science community as a direct part of the operation," Tressel warned, "you'll find that you're teaching stuff that's out of date and tired.... [You'll] do it in an unthinking way." Science centers need people with vision and capacity, he said, to "get the scientists involved." If nothing else, Tressel advised, it was important to keep asking two questions: "Where are the scientists?" and "How do we keep the science exciting?" ■

Wendy Pollock is ASTC's director of publications, research, and exhibitions.

Content and Commitment: *Insights from the VolTS Front-End Study*

By Renee Miller

In November and December 2005, Randi Korn & Associates Inc. (RK&A) conducted a front-end study for the *Volunteers TryScience* (VolTS) project (see opposite page). The evaluators conducted and analyzed 26 in-depth telephone interviews with members of three groups:

The evaluators conducted and analyzed 26 in-depth telephone interviews with members of three groups:

- scientists and engineers who volunteer in educational programs outside of science centers
- scientists and engineers who currently volunteer in science centers
- science center staff who work with volunteers.

The volunteers came from both academic and corporate backgrounds; some were retired from full-time employment. Discussion groups were also held with science and engineering professionals who attended a 2006 IEEE conference; these findings, though not presented officially in the RK&A report, did inform the analysis and recommendations.

This article is based primarily on the interviews done with the volunteers and staff who work in science centers. Museums were picked by location, size, and range of volunteer opportunities they offer. The kinds of collaborations represented ranged from advisory panels to one-time lectures to exhibition development. From the observations and recommendations in these interviews emerges a summary portrait of the characteristics that make for a healthy partnership.

Attitudes and motivation

Why would busy scientists and engineers take time out to share their expertise with science center audiences? Most volunteers we interviewed had only positive things to say about informal science education. They praised

the inquiry approach of science centers and their outreach to general audiences:

"The value is in the hands-on nature..."

"Science centers do a good job of just giving people access."

"I know that they have a commitment to the community, so I was happy to get involved when they asked."

Volunteers expressed a desire to "give back" to the community, but they also saw their role in the museum in specific terms. Some had come to the museum to share their expertise in a certain area of science:

"They asked me to be the champion for that volunteer activity."

"My role was basically in an advisory capacity, for the science end of things."

Others saw an opportunity to educate the public about what scientists do:

"I think people think of engineers and scientists as boring; the science center helps the public interact with people doing the jobs."

"It is all about networking: You're meeting people and getting to talk about your passion."

Even for those who, like one NSF-funded researcher, came because their particular project required community outreach, the social element was an important factor:

"Otherwise, I don't have the opportunity to talk to people about my work outside of work."

"It made me realize how good it was for me, from a job perspective, to talk to the people you're trying to serve."

Interviews with volunteer coordinators revealed that they value equally the role that these expert volunteers play in the science center. "They are able to make real-life science connections," said one staff member. Said another, "It is extremely important to ... show that we are in contact with people doing

real work, real research, right now.” In general, museum staff value in their scientist/engineer volunteers what one coordinator called their “instinctively higher regard for and understanding of science and the science process.”

Recruitment

Scientists often have difficulty finding volunteer opportunities aligned with their interests and expertise, tending to rely on word-of-mouth or personal connections. Some suggested that recruiting efforts should come from the top, be explicitly supported by the top, and be addressed to the top:

“You have to have people on the same level talking.”

“Let them meet and talk with the director. Let them know that they’re being invited to be part of a collaborative team.”

Others recommended going through existing channels, such as corporations, graduate-degree programs, or professional societies:

“You’ve got to get people to start volunteering by the time they’re grad students. Make it part of their education.”

“Go speak to the engineering society meetings. African-American graduate fraternities and sororities are typically active in large cities.”

Almost all of the scientists/engineers we interviewed are employed either full- or part-time. With little time to spare, they value clarity about their role in the science center:

“How many hours, what are my interactions, what am I going to get, what do you need from me? Scientists love it if you spell it out.... Then they can actually

use it in the grant-writing process, in their annual reports.”

“I need to know exactly what’s expected of me. If [the museum representative] can say, ‘This is the commitment I want; this is your role,’ then the scientist can say, ‘I can do this’ or ‘No, I can’t.’”

Volunteer coordinators identified as major recruiting challenges a lack of funding (“Publicity and marketing ... is staff-intensive work.”) and turnover in personnel at partnering companies and universities (“I may have a contact from one year who may not be the same person the next year”).

Like scientists, museum staff saw partnerships with graduate students and postdocs as a promising direction: *“There is some leverage that could be gained from giving young scientists in training more interest and skills in communicating more broadly.... We would be moving toward the larger goal of having a more science-literate society.”*

Training

Interviews with scientists and engineers revealed a general level of resistance to formal training by museum staff and a lack of interest in direct interaction with museum visitors:

“First of all, [we] don’t believe in training. Scientists have never heard the words ‘professional development.’ Personally as a scientist, I don’t know what that means.”

“Being a scientist, I wanted to just deal with the science.... There was just so much other stuff that went along with it. I wanted to help them deal with the science, interpret the science—nothing more, nothing less.”

Museum staff are aware of these attitudes. “Certain scientists and engineers are great with people,” said one coordinator, “and certain ones are not. What we take advantage of is their interest level ... and desire to share knowledge.” Another acknowledged that “there is a perception that we cannot ask them to commit to many hours of training.”

Some scientists admitted they need help in approaching new audiences. “It’s easy to ... make assumptions that are invalid simply because you’re not used to speaking to such an audience,” one confessed. “That’s a challenge the museum can help you meet.” But instead of classroom-based training, several suggested a partnering relationship, in which the volunteer would contribute knowledge and passion about content, and the staff person would contribute knowledge about museum practice.

This idea makes sense to museum personnel, too. Some favor “face-to-face” training for scientists and staff on how to collaborate successfully; one wished for an online “repository of great exhibits ... or case studies [to show] potential volunteers about successful experiences.” Unlike the volunteers, some staff members expressed a desire for related professional development, particularly in keeping up with science research and best practices.

As with recruiting, finding the time and resources to manage volunteers is a challenge for museum staff, “not so much because of the volunteers but because of the work load and how thin we are spread right now.” As one coordinator said, “Staff do not necessarily have the time to get to know

Volunteers TryScience: A Fresh Look at a Longstanding Relationship

Scientists and engineers have participated actively in science centers for decades. But many of these partnerships have occurred in isolation, with little chance for others to learn from their example. Even within a given organization, there may be roadblocks to learning from experiences with content experts.

Volunteers Try Science (VolTS) is a partnership among the New York Hall of Science, IBM, ASTC, the Institute of Electrical Engineers (IEEE), and the National Science Digital Library (NSDL) that seeks to facilitate more involvement of scientist and

engineer volunteers with informal science education institutions through better communication, training, and resources. Funded in 2005 by the Institute for Museum and Library Services, VolTS represents an opportunity to share stories of exemplary accomplishments and ongoing projects and to initiate a broader conversation, from the perspective of both sides, about effective ways to manage those relationships.

For more details, or to participate in VolTS, contact Eric Marshall, emarshall@nyscience.org.

A Passion for Public Engagement

By Eric Marshall

Scientists and engineers have a natural affinity for science centers and museums. This engagement may go back to earliest childhood, or it may arise at various points in their professional lives.

Growing up in Los Angeles, I developed a great love for the California Museum of Science and Industry (now the California Science Center). Coming face-to-face with their

capacity, I knocked often at Alan Friedman's door. The New York Hall of Science director graciously invited me to help with museum projects like their Technology Gallery.

Eventually I became sufficiently motivated to switch my avocation to a vocation. An appearance on the cover of a 1991 *Physics Today* issue on precollege education, closely followed by a colleague's untimely death, pushed me closer to a career change. I started within IBM, initiating a group focused on ways to use technology to break down classroom walls. One of our goals was to foster more resilient connections with community organizations like science centers.

I enrolled in graduate courses at Teachers College and subscribed to the *ASTC Newsletter* (now *ASTC Dimensions*). There I saw a job description from the California Science Center that seemed to have been written just for me. I got the job and felt accepted from the start. Changing to the science museum world satisfied my yearning to move beyond the confines of my technical expertise. It allowed me to engage in dialogue regarding the larger questions driving this work—the kind of questions I'd explored in my Student Pugwash days.

The IMLS-funded *Volunteers TryScience* (VolTS) project grew out of my conviction that science centers have much to gain from long-term relationships with scientists and engineers. The ethos of lifelong teaching and public engagement that flourishes among these professionals—whether in universities, corporations, government, or professional societies—makes them natural partners for the science center community.

The front-end evaluation for VolTS (see page 4) was to have included interviews with four groups, not the three listed in Renee Miller's report. To my surprise, I could not find anyone for the fourth category: "staff at science centers with no scientist/engineer involvement." I saw that the need was not to get science centers started with scientists and engineers—that was already happening—but rather to highlight the successes that exist and to encourage more museums to take advantage of the talent around them.

I hope that the VolTS project and this issue of *ASTC Dimensions* will help us all to become more effective and efficient in our engagement with scientists and engineers. ■

Eric Marshall is director of VolTS and Try-Science.org and vice president for strategic partnerships and innovation at the New York Hall of Science, Queens.

them [the scientists] the way we do with our regular volunteers."

Nurturing the relationship

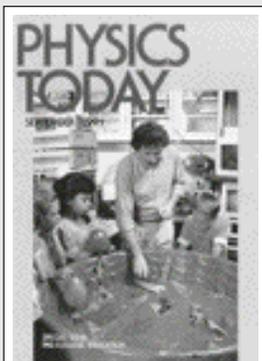
Most of the collaborations involving study participants were time-limited. Short-term projects appeal to volunteer scientists because they are manageable and to coordinators because they provide a positive initial exposure to museum culture.

But even more rewarding, some said, are relationships that are sustained and long-term—the kind that become, as one coordinator put it, "necessary to daily operations." To achieve that goal, mutual understanding and respect are essential. "There are some cultural barriers between museums and scientists, but I think these can be breached," said a volunteer. "You have to know how to interact with each other."

One thing on which most agree is the importance of recognition, regardless of the scope of the activity. One scientist said, "It's the little things that let people know they're valued.... Once an exhibit is up, bring us in and show it to us. Put our names on a plaque. It's just a nice gesture." Another stressed the significance of feedback: "It's important to have some sense of accomplishment, some evidence.... I'm a scientist. [We like] to know that what we're doing with our free time matters."

For staff, appreciation consists not only in providing appropriately challenging work and recognition, but also in demonstrating a commitment to ongoing relationship. "Our volunteer program has a full-time manager, a volunteer association, formal events ... all signifying that [they] are a serious business to us," said one coordinator. "The most important thing for me," said another, "is to ... get buy-in from the volunteer. It is important that the volunteer see what the science center is doing, and what its purpose is, to give them that ownership." ■

Renee Miller is a senior research associate at Randi Korn & Associates Inc., Alexandria, Virginia.



After appearing on the cover of *Physics Today*, the author was inspired to make education his vocation. Photo courtesy Eric Marshall

roaring jet engine and the Moebius Band in *Mathematica* contributed to my motivation to pursue a doctorate in applied physics.

Other professionals may get hooked in high school or in college, when they have time to explore potential public engagement with few external demands.

As an undergraduate at the University of California–San Diego, I volunteered

as a docent at the Scripps Institute of Oceanography Aquarium, where I became mesmerized by the power of inquiry to engage visitors in ways that could change both our lives.

University life also permits exploration of a range of topics and their social implications. As a UCSD graduate student, I joined Student Pugwash, an affiliate of the organization Albert Einstein and Bertrand Russell created to challenge scientists to "think in a new way." Through Pugwash, I came to appreciate those scientists and engineers who lead by example in public engagement—people like Roger Revelle, the father of global warming theory, and Hannes Alven, the Nobel Laureate who said that scientists, whatever else they do, should tell the public the truth.

Becoming a parent can inspire young scientists and engineers to get involved with informal science education. Members of the IEEE, a leading professional association for the advancement of technology, regularly join with their kids to write reviews of science centers for the organization's monthly magazine. A significant number of IEEE members volunteer in museums as well.

As a young father employed at IBM Research, I found myself joining similarly inclined coworkers to initiate a Saturday Family Science program. I began volunteering with local science centers, too. In that

In the Comfort Zone:

Working with Scientists on Exhibition Design

By Sheila Grinell

Most science centers are not staffed by scientists, but rather by people dedicated to bringing a scientific point of view to the public. Museum professionals are skilled in many things, but few of us come to the job with a deep grounding in a scientific discipline. In most cases, we have to learn the science we wish to convey.

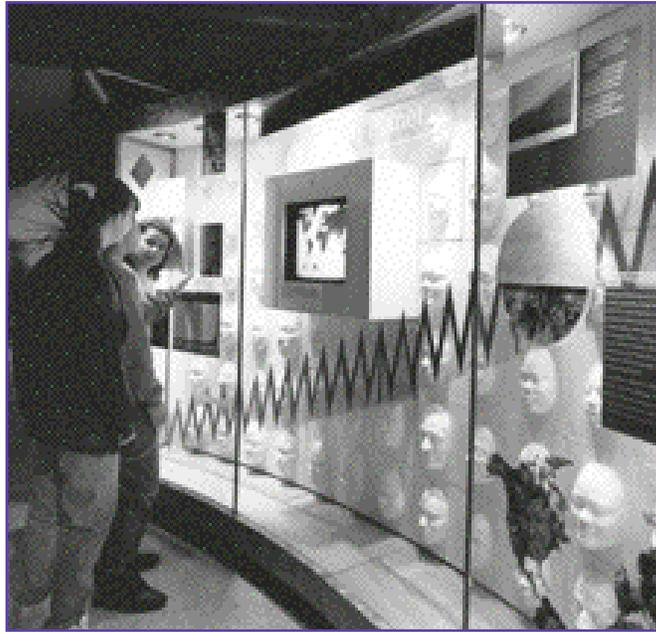
Whether we seek the help of one or more scientists for a project our institution is initiating, or we are approached by a researcher to collaborate on a project he or she has in mind, we face the challenge of building a relationship that yields results and proves rewarding for all concerned. This is particularly true when the project involves a large and expensive permanent or traveling exhibition, an area of science communication that may be new to our expert partners.

Finding the right match

In getting scientists involved in exhibition design, half the battle is won if you find an expert who is already committed to popularization.

Nearly 20 years ago, it was my pleasure to work with oceanographer Kathy Crane on the ASTC exhibition *Greenhouse Earth*. Now with the NOAA Arctic Research Office, Kathy was then a relatively junior scientist, but she had already served on an advisory panel for *Project 2061*, the first effort to define a U.S. national science curriculum.

In the late 1980s, consensus on climate change was still forming.



***Greenhouse Earth*, an ASTC traveling exhibition that opened in 1992, benefited from the guidance of oceanographer Kathy Crane. Photo from ASTC archives**

Kathy wrote a briefing paper that laid out the scientific basis for climate change as she understood it. That paper became the touchstone for the *Greenhouse Earth* project. Each time we made a new technical contact, we referred to her material.

Kathy attended several of the exhibition team's planning meetings. As the design process unfolded, we asked her to pin down the science behind new ideas. She was never heavy-handed, so it was easy to talk things through with her. She also agreed to appear in a film we made for the exhibition, *Uncertainties*, about the nature of scientific research.

The project was a success for both parties. ASTC got top-notch help with *Greenhouse Earth*, and Kathy got a thorough introduction to a medium—museum exhibits—that was new to her.

Working with a team

Because contemporary topics in science are often multidisciplinary, with ethical and social implications that science centers may wish to explore, it's hard to find just one scientist who can cover all the bases. Sometimes we need to ask a team of scientists to work with us on a project. Then we have to facilitate the teamwork.

When Laura Martin and I were developing the exhibition *What Is Addiction?* for the White House Office of National Drug Control Policy, we worked with a truly diverse team. One researcher dealt with the subject on the molecular level—compounds in the brain. Another worked with

brain systems—the body's reaction. Another worked on behavior—the kind of short- vs. long-term thinking that addicts do. Still another worked on treatment protocols.

Although they knew of (and often cited) each other, they didn't know each other—nothing in their professional duties had brought them all face-to-face. To kick off the first advisory meeting, we asked the researchers to make introductory comments. During the morning, each of them politely skirted around the others. By the afternoon, they had settled down and were ready to work together. The morning wasn't wasted; it had served to establish an atmosphere of comfort among the scientists (and staff) that would lead to productive discussion.

Even when working within a multidisciplinary team, many scientists do

not want to address the more speculative aspects of a subject, the very ones that might intrigue the public. They hesitate to participate in a conversation that is not supported by hard data. But I've found that researchers will engage in "what if?" talk if they have a leader whom they respect. The best leader is a well-established senior scientist who welcomes all sorts of questions. He or she can act as a senior statesman to provide grounding for the scientific team.

Reaching a common understanding

The other half of the battle—developing mutual respect and a good working relationship—depends on each party coming to understand the context in which the other works.

Science center professionals "know" what makes an interesting exhibit or program—or at least they know where to start. Most scientists don't have a clue. When the two sides converse, the scientists want to talk about exciting (to them) recent discoveries, while staff want to talk about the teachable moment or the exhibit hook. They may talk past each other, wasting everyone's time, unless staff make an effort to share their perspective.

Our collaborators deserve to know how we make decisions about the format and content of public communications. How can we best show them? I suggest we use data—their language—however soft.

From front-end analysis, whether conducted formally or casually, staff learn what visitors understand and misunderstand about a given topic and which aspects of the topic interest them most. If exhibit developers share this information with their science advisors—being careful to explain that these are the starting points, not the drivers, for selecting content—advisors can creatively suggest appropriate lines of thought.

Most scientists don't know that misunderstandings are obdurate and must be tackled. The more they learn about visitors' mental maps, the better they

The Universe in a Cell:

Partnering in a SEPA Project By Roberta Cooks

Scientists are playing an integral role in a new exhibition on cell biology and the promise of stem cells that will open at the Maryland Science Center (MSC), Baltimore, in early 2009. *Cells: The Universe Within Us* will focus on cells as the building blocks of life and on the science and societal issues surrounding stem cell research. Lead funding for the project was provided by a Science Education Partnership Award (SEPA) from the National Center for Research Resources at the National Institutes of Health.

Among our SEPA partners are three Baltimore-based research and educational institutions: Johns Hopkins University (JHU), the University of Maryland, Baltimore (UMB), and Morgan State University (MSU). Faculty and graduate students from all three have been fully involved in crafting exhibition content from the start. Together with advisors from the science center field, these scientists have played, and will continue to play, a vital role in the evolution of the exhibition.

The power of many

In the first project year, MSC's exhibit team completed a front-end evaluation study designed to measure the knowledge and interest of our target audience in stem cell-based science and exhibitry. We then met with our scientific advisory board to present the results of the study and a preliminary exhibit outline. Besides academic scientists representing the fields of adult and embryonic stem cell research, developmental and cell biology, and cell imaging, this panel also includes bioethicists and several museum-based scientists trained in biology.

At its first meeting, the advisors spent four hours discussing questions basic to the exhibition project:

- *What aspects of cell and developmental biology are important for understanding current stem cell research?*
- *What are the important differences between embryonic and adult stem cells?*
- *What research stories will best*

illustrate the most important aspects of embryonic and adult stem cell research?

- *How can we approach societal issues related to stem cells and be welcoming to people with different points of view?*

The discussion was passionate and lively, with everyone at the table fully engaged and interested in setting a date to meet again.

At the advisory board's next meeting, MSC's team gave a multimedia presentation on the exhibit design concepts we had developed from the initial outline, the evaluation results, and the advisory board's feedback. The scientists then discussed at great length what they felt had worked for them and what hadn't. A showing of a visually stunning animation of intercellular processes at the molecular level, for example, had produced a spontaneous round of applause, but some panel members cautioned that such technically accomplished animations can be misleading—visitors may believe that they are looking at real images of organic molecules.

The MSC team also spoke about including live and digitally recorded scientists as interpreters, to help visitors see scientists as real people and be inspired to go into science themselves. Many members of our advisory board were enthusiastic about the idea and have volunteered to be part of this effort when the exhibition opens.

The power of individuals

In addition to science advisory panel meetings, we have been meeting with additional scientists on an individual basis. One postdoctoral cell biologist from JHU, Malini Mansharamani, has even become an integral member of our MSC exhibit team, attending the weekly exhibit team meetings whenever possible.

Dr. Mansharamani helps to keep us accurate in presenting the science as we develop interactive exhibit prototypes. She welcomed us into her laboratory and took us through the steps of

several real experiments to help us visualize a virtual lab experience we want to include in the final exhibit. Currently she is working in a new lab where her time is not as free, but she continues to be a team member and has told us how much she values the experience. "It takes me from my day-to-day, narrowly focused work of following a single experimental path," she says, "to thinking about the bigger ideas that are the basis of my work and the reason I went into biological science."

Another key element of exhibition development that involves individuals is the project's internship program. Based on a model developed by the science center during an earlier SEPA project, this semester-long program brings young scientists from JHU and UMB to spend five to eight hours a week working with visitors in MSC's wet laboratory.

Interns also pursue individual projects related to the exhibition. For example, one intern teamed up with a JHU medical illustration student to develop an interactive virtual cell. Another developed a new experiment on enzymes for the wet lab.

The program continues throughout the year, with graduate students from medical research labs, public health, and genetic counseling programs coming to MSC during the fall, spring, and summer terms. The important ingredients that make this work include

- frequent communication between MSC staff and the university science advisors from our partner institutions, JHU and UMB
- the agreement that we are each benefiting from this partnership
- a willingness to work out our differences when something is not working well.

Over the past six years, we have had to make adjustments to our graduate student internship program, but MSC and our partners have always had a belief that the internship program benefits the students, the museum, and the universities.

For the graduate students who work at MSC, the program offers a chance to consider new career options—combining laboratory research with teaching, medical writing, and other scientific careers that include interaction with the general public.

For the museum, the program pro-

vides a knowledgeable and enthusiastic group of young scientists to explain science to the public and act as role models to young visitors who may be thinking of science-based careers. And through the students' individual projects, MSC gets new ideas flowing into the exhibit development process.

For the university, the program provides graduate students with opportunities to develop and improve their teaching skills and their ability to speak about science to the public.

Seeing scientists as people

Through the encouragement of our SEPA program officer at NCRR, we have established collaborations with several other museum- and university-based scientists who are working on SEPA projects that include stem cell content.

Kristina Yu from the Exploratorium in San Francisco has been generous in sharing her video-microscopy work with stem cells and other cell processes. Laurie Fink, at the Science Museum of Minnesota, and Martin Weiss, of the New York Hall of Science, are two other scientists who have offered their help and experience in developing biology-based exhibits on this subject. We have also connected with scientists doing groundbreaking, NCRR-supported cell-imaging work at the National Center for Microscopy and Imaging Research at the University of California—San Diego.

As the MSC team moves toward the final development and design phase of *Cells: The Universe Within Us*, we continue to think about ways to weave the passion, excitement, and humor of our scientist partners into the final exhibition.

Over time, we have come to know these researchers as an interesting and varied group who talk and joke, ask lots of questions, and think that doing science is an exciting way to spend your life. We want our public to see them that way, too. We want to acknowledge the many contributions they have made to the exhibition's scientific content, and we look forward to letting the scientists themselves tell the many stories of stem cells. ■

Roberta Cooks is director of exhibits at the Maryland Science Center, Baltimore: www.mdsci.org.

can appreciate how staff deconstruct a topic and allocate resources to different aspects of interpretation.

The best partnerships with scientists generate some "wild" ideas. Everyone on the team, advisors and staff alike, can benefit from participating in formative evaluation to see why these ideas do or do not make the final cut.

In developing the exhibition *Wired for Thought*, the Arizona Science Center and Jeff Kennedy Associates worked with a large advisory group spanning a lot of intellectual turf. We chose to prototype about a dozen of what promised to be the best exhibits and presented the results to the advisors. The resulting conversation, based on evidence, was the most productive and invigorating of all our meetings. Everyone got to share in the satisfaction of knowing that the team was doing its best on behalf of the visiting public.

I expect that collaboration between scientists and science center staff will become easier in the next little while. In the past, scientists have been discouraged from participating in popularization activities because they interfere with the important work of research and publication. But this attitude is changing.

For example, thanks in part to decades of lobbying by AAAS, U.S. researchers can now apply for additional funding for community outreach on the subject of their research. That raises the question of how to spend the money: Few scientists have training in or experience with popularization.

This is where science center staff can offer expertise. Our field is becoming more sophisticated about describing and evaluating our methods of communication. We are better able to assist researchers in addressing the public, especially as current science and technology research becomes more complex. There's plenty to talk about together. ■

Sheila Grinell is an independent museum consultant in Phoenix, Arizona. An author and a former executive director of ASTC, she served as director of the Arizona Science Center from 1993 to 2004.

Better Communicators: *Postdocs at the Exploratorium*

By Kristin Abkemeier and Carolyn Sutterfield

After receiving their doctoral degrees, young scientists typically broaden their knowledge and skills by completing at least one temporary appointment in a lab other than the one where they did their academic work. This “postdoc” period is seen as a first step toward building a successful career. In the United States, government agencies like the National Science Foundation (NSF) and the National Institutes of Health (NIH) have traditionally funded postdoctoral appointments at universities and other research facilities.

In 2002, San Francisco’s Exploratorium became one of the first U.S. science centers to receive National Science Foundation (NSF) support for postdoctoral fellowships in science education. The opportunity arose through the museum’s Center for Informal Learning in Schools (CILS), one of three NSF-funded Centers for Teaching and Learning launched that same year.

The first CILS postdoctoral fellow, biologist Stephen Ribisi Jr., worked in the Exploratorium’s Teacher Institute (TI) from 2003 through 2005. Today, Ribisi holds a joint appointment in the education and biology departments at the University of Massachusetts at Boston.

Since then, five

more postdocs have worked at the Teacher Institute, some with NSF/CILS funding and others with outside support. TI co-directors Paul Doherty and Linda Shore manage the program. Says Doherty, “These postdocs bring the excitement of cutting-edge science into museum exhibits and into workshops for science teachers. I am always impressed by their ability to create new science explorations accessible to all.”

The two Exploratorium fellows profiled here represent a new generation of research scientists and engineers with a strong connection to education.

Julie Yu, Chemistry and Biology

Julie Yu’s two-year turn as an Exploratorium postdoc grew out of a long-

standing connection to the museum. While working as a middle school math and science teacher in East Palo Alto, California—a Teach for America position she took after getting her B.S. in chemical engineering from Brown University—the Houston, Texas native participated in TI’s New Teacher Program. She spent a year running science labs for field trips at San Jose’s Tech Museum of Innovation before entering graduate school at the University of California–Berkeley, where she earned a Ph.D. in chemical engineering with a minor in molecular and cell biology. Yu did her doctoral research on gene therapy and stem cell engineering.

Throughout her studies, Yu kept up with the Exploratorium’s Pinhole computer discussion group for science teachers. “At the end of it all, I knew I wanted to integrate the science I loved with education,” she says. So she went out and found her own postdoctoral funding—an NSF Discovery Corps Fellowship awarded to support chemistry-related projects that address a national need.

In her application, Yu proposed to translate the latest biotechnology research into classroom teaching activities. “Teachers who started prior to the last 10 years missed out on biotechnology in their education, and



Teacher Institute postdoctoral fellows Jamylle Carter, left, and Julie Yu enjoy some play time on the Exploratorium floor. Photo by Amy Snyder/© The Exploratorium

the kids are interested in this topic," she says. "Discoveries made today in biology can change what you teach."

Yu won her grant and started at the museum in September 2006. Her first science activity was created in response to a New Teacher Program participant who said she'd like to be able to teach DNA fingerprinting. Yu adapted the process commonly known as "DNA gel electrophoresis" into a demonstration that uses a recycled pipette tip box, batteries, and chemicals available at the supermarket. Professional classroom kits can run as high as \$500; Yu's costs \$5.

Next, she developed an inexpensive way to bring column chromatography, a chemical method used to analyze liquid and gaseous mixtures, into the classroom. Her activity employs activated charcoal from aquarium filters to separate the different artificial colors in Gatorade. The goal in this and other TI activities, Yu says, is to guide teachers as they learn how to do the demonstration themselves and then communicate the process to students. "I am teaching correct science," she says, "but in a way that appeals to all levels of understanding."

In addition to creating hands-on activities for teachers, Yu is sometimes invited to participate in projects within the museum. She is currently working on an exhibit for *Geometry Playground*, an upcoming NSF-funded exhibition designed to teach math concepts and skills to 5- to 12-year-olds and their families through life-sized geometric structures. Another program Yu finds attractive, although she is not directly participating in it, is the museum's life sciences partnership with the University of California–San Francisco. Preserving a connection to the university can be important for postdocs who want to return to an academic research career, she says.

For the remainder of her time at the museum, Yu plans to explore how other topics from her knowledge of chemistry and microbiology can serve the Exploratorium's educational goals. "I want to see what teachers are interested in and what people here are

interested in," she says. "I still read the teachers' discussions on Pinhole for ideas. It's a successful community of teachers and scientists, and I'm in between."

Whatever she does next, Yu knows it will include a connection to informal science education. "It's a charge of all scientists to communicate their work publicly," she says. "It's a skill to do that, and the museum offers an avenue to acquire that skill."

Jamylle Carter, Mathematics

Originally from Montgomery, Alabama, Jamylle Carter earned her undergraduate degree in mathematics from Harvard and her Ph.D. from the University of California–Los Angeles. Her doctoral work involved applying math algorithms to the restoration of information lost or damaged in image processing.

Carter moved to the Bay Area in 2005 to do a postdoc at the Mathematical Sciences Research Institute (MSRI) in Berkeley. She went on to lecture in mathematics at San Francisco State University (a position she still holds) and work with the San Francisco Math Circle, an after-school math enrichment program for middle and high school students. It was a Berkeley graduate student who told her last summer about the opening at the Exploratorium.

By that time, Carter was already working on plans to launch a similar after-school program across the bay in Oakland. The host site is the Museum of African American Technology (MAAT) Science Village, an institution sponsored by the Northern California Council of Black Professional Engineers. Early in 2007, Carter obtained partial funding for the project through the Mathematical Association of America's Tensor_SUMMA (Strengthening Underrepresented Minority Mathematics Achievement) program.

"I thought that the experience at the Teacher Institute would be a good complement to the program I was already interested in," says Carter. "The

majority of the TI staff seemed excited about it, too. So it was a good match." Since she started her 12-month postdoc appointment last February, several TI staff members have assisted Carter with research and grant writing for the after-school project or signed on to help with activities. The Oakland Math Circle expects to welcome its first 20 participants this September.

Carter says she spent her initial months at the Exploratorium getting acclimated, learning about the history of the museum, and developing a strong appreciation for the "smart, artistic, creative, and just a little bit quirky" people she works with. It's important that a postdoc appointment include this kind of time for adjustment, she says. Another big plus in making the transition from higher education to informal learning, she says, has been "having similarly trained people on staff who understand where I'm coming from. It's good for postdocs to have someone they can talk to about where they've been and how they might move forward."

This summer Carter co-taught TI math workshops for middle and high school teachers on topics like scaling, proportion, and the mathematics of imaging. Along with Yu, she is helping to create exhibits for the *Geometry Playground*. And as a skilled pianist, composer, and singer, she hopes to bring her musical interests into her work before completing her year's appointment.

The skills she's learning at TI will definitely boost her teaching career, Carter says, but would be equally valuable for a museum- or industry-based job. "I am getting stronger in my ability to explain technical concepts to a nontechnical audience," she says. "It's made me stronger as a person who can communicate ideas." ■

Science writer and physicist Kristin Abkemeier interned in the Exploratorium's public information department in 2007. This article was adapted and expanded from a piece she wrote last February. Carolyn Sutterfield is ASTC's editor.

Portal to the Public: Bringing Scientists and the Public Together

By Lauren Russell and Dennis Schatz



At the Pacific Science Center's 2006 Polar Science Weekend, Twila Moon, a graduate student in earth and space sciences at the University of Washington, uses therapeutic Silly Putty to model how glaciers flow. *Photo by Dennis Schatz*

As a group of elementary school children gathers round, the young scientist leans over a simulation she has constructed from therapeutic Silly Putty. Deftly, the graduate student uses the familiar plastic compound to describe how glaciers flow. Nearby, a senior scientist is explaining to an entire family how his research equipment works.

These vignettes from Pacific Science Center's 2006 Polar Science Weekend show the results of a collaboration between experts in science and experts in informal science communication. Together, we created meaningful experiences to engage the public in current science and technology research.

Learning in the first year

The 2006 Polar Science Weekend (really four days: Thursday through Sunday, March 2–5) brought 28 scientists from the University of Washington's Polar Science Center—undergraduates, graduate students, staff researchers, professors, and members of the U.S. Coast Guard—together with science center staff to produce hands-on activity tables, lectures, and demonstrations in which scientists interacted directly with the public.

The synergy between our two worlds led to a natural collaboration that met the mission-based goals of both parties. In a previous poll of U.S. science centers, respondents had clearly indicated that they desire more of this type of program. So does the public, as witnessed by the evaluations we collected at the weekend event. Of the 202 visitors surveyed, 85 percent indicated they would definitely attend a similar event in the future. Many noted that they appreciated the hands-on activities and face-to-face discussions with researchers.

A survey of participating scientists indicated that many of them would be interested in participating again. But when we asked them if they had felt prepared to communicate their research, 74 percent of respondents indicated that they would have liked more pre-event information, specifically on how to

communicate with a wide range of ages. They wanted methods to make their presentations more hands-on and strategies to grab visitors' attention.

Applying lessons learned

Based on those first-year evaluations, Pacific Science Center staff scheduled a professional development session for scientist participants prior to the 2007 Polar Science Weekend.

The two-hour workshop began with an overview of informal learning environments and included sections on how to hook passing visitors, turn conversations and presentations into interactive experiences, pursue questioning strategies, and communicate with diverse age groups. A PowerPoint presentation provided visuals of what to expect, and detailed handouts complemented the content of each section.

Training activities included practicing hooks with sample props, structured role play that highlighted questioning strategies, and time for participants to discuss specifics on how they could make their display and presentation interactive. In an evaluation survey, all participants described the session as useful and worthwhile. One commented, "The [workshop] activities helped to bring principles down to a practical level."

Extending the experience

In June 2007, we repeated this science communication workshop for a group of NOAA scientists scheduled to participate in a "Get to Know NOAA" weekend at the museum. One scientist nicely summed up the value of the experience: "The one thing that helped me the most was learning to ask questions. This helped me engage people of all ages in conversations regarding aspects of science they were interested in learning."

After the event, the NOAA coordinator of the project commented in her evaluation that "there are a variety of reasons for this training, but the number one goal [for us] is . . . to inspire the audience to want to learn more about NOAA's role."

Expressing regret over a NOAA participant who, having missed the training, delivered a graduate-level lecture to museum visitors and failed to leave time for Q&A, the coordinator wrote, "The misconception of simplifying our research into understandable language as 'dumbing down' our science reflects an arrogance that is an obstacle to achieving the goal of effectively communicating to and informing the public.... We hope to work with Pacific Science Center in the future to develop ... training opportunities."

Professional development for visiting scientists is now an essential element of current-research events at Pacific Science Center. We look forward to collaborating with other institutions and expanding this work under our new *Portal to the Public* initiative, recently funded by NSF. Under this program, we will explore new sustainable models for bringing current-research-based programming into our museums and continue to find ways to bring scientists and the public face to face. ■

Lauren Russell and Dennis Schatz are, respectively, Portal to the Public project manager and vice president for education at the Pacific Science Center, Seattle, Washington: www.pacsci.org.

Making the Right Match:

Four Approaches to Collaboration



The science center/scientist collaborations described here—featuring researchers and expert practitioners from medicine/physiology, materials science, polar studies, engineering, and more—represent just a sampling of the range of possibilities for mutually satisfying partnerships.

University of Kentucky researcher Jody Clasey, left, with colleague Gail Peitzmeier at the 2005 opening of Clasey's KY-H.E.R.O.S. exhibit. Photo courtesy Louisville Science Center

Partnering with Kentucky H.E.R.O.S.

By Theresa Mattei

For six years, the SEPA project at the Louisville Science Center (LSC) has helped audiences make a personal connection with biomedical researchers in our state whose work has direct implications for their lives. Since 2001, the Kentucky Health Education Rural Outreach Scientists program—KY-H.E.R.O.S. for short—has selected nine distinguished science teams to be featured in exhibits and in on-site and distance-learning programs integrated with LSC's *The World Within Us* life sciences exhibition. The researchers have also participated in public and school programs in our fully equipped BioLab wet lab.

For 2005–2007, one of our three KY-H.E.R.O.S. teams features Jody Clasey, associate professor in the department of kinesiology and health promotion and director of the Pediatric Exercise Physiology (PEP) lab at the University of Kentucky, Lexington. Together with former University of Louisville researcher Kent Adams, Clasey has collaborated on a number of research initiatives related to children's physical development in general and

childhood obesity in particular.

In a session sponsored by the VolTS project at the ASTC Annual Conference in Louisville last year, Clasey and former LSC life sciences coordinator Beth Blakeley talked about their collaboration and offered parallel perspectives on the experience. This report is based on their conversation.

Working with a statewide BioLab Advisory Committee, LSC identified childhood obesity as one of five critical topics we should explore in the KY-H.E.R.O.S. program. Advisors helped us to solicit applications from a range of research labs statewide. The PEP Lab's work with childhood obesity seemed an ideal focus. Clasey and Adams applied and were interviewed and selected in a competitive process.

Clasey was drawn by the opportunity to get public exposure for her work and address an escalating health problem by reaching out to museum visitors. But initially there were reservations on both sides.

"I have a heavy teaching load," said Clasey. "I am involved in multiple research projects and am leery of additional time commitments." Blakeley was careful to explain exactly what LSC was asking the research team to take on. The project would involve creating an interactive exhibit for the

science center's *Breakthrough Gallery*, helping staff develop related distance-learning labs for second through 12th grade students, and meeting with visitors and teachers at LSC to talk about her work. "I thought Dr. Clasey might not have the time," she said.

In the end, both partners found that their concerns were unjustified. "The science center is extremely professional; they go out of their way to package the experience," said Clasey. "Time is not a factor because of their efforts to help us with every aspect—organizing it, laying it out beautifully. Staff is always receptive; there's respect for what we're doing. We feel we're in a real partnership."

LSC is pleased with the results of the collaboration, too. The Food as Fuel exhibit developed with Clasey and Adams allows young visitors to compare the amount of time needed to burn off the calories in different foods. It has been a hit on the museum floor. Said Blakeley, "Visitors are especially impressed with the stories about Dr. Clasey's lab because her research directly engages children in the process."

For the scientist, the interaction with the public brought unexpected rewards. "It helped me get ideas about new research, new approaches to problems. I enjoy meeting with children in

the BioLab,” Clasey said. The response from medical professionals is gratifying, too: “The last time I went, several pediatricians were in the gallery, looking for strategies.”

In wrapping up their presentation, the two offered advice for science centers seeking to develop a relationship with researchers. “Choose scientists with projects relevant to something your public is interested in,” said Blakeley, “and have a training session to help them communicate with public audiences.”

Clasey added the caution to “find a good fit with mission and objectives.” But she would still have the same advice she offered then to a fellow researcher considering a science center collaboration. “Do it!” said Clasey. “Don’t hesitate.”

Theresa Mattei is managing director of visitor experiences at the Louisville Science Center, Louisville, Kentucky; www.LouisvilleScience.org. To learn more about Jody Clasey’s research, visit www.uky.edu/Education/khphead.html.

A ‘Strange’ and Fortunate Encounter

By Carolyn Sutterfield

In the spring of 2005, the Discovery Center of Idaho, in Boise, hosted the traveling exhibition *Strange Matter*. The exhibition, which explores the properties of 21st-century manmade materials, was developed by Canada’s Ontario Science Centre on commission from by the Materials Research Society, a nonprofit international association of scientists and engineers in academia, industry, government, and private research. One MRS member who participated in the planning and prototyping of *Strange Matter* was Amy Moll, a professor of materials science and engineering at Boise State University (BSU).

Her visit to Ontario was Moll’s first experience with a science center. “I think I learned more from the muse-

um professionals than they learned from me,” the professor says. “Creating something that’s active and hands-on and doesn’t break and helps people learn—that’s a whole different job from what I do.” Moll even took some of the ideas that didn’t work out for exhibits, she says, and turned them into labs for her BSU students.

Her enthusiasm for the project led Moll to bring *Strange Matter* to the attention of the science center in Boise. “They’re just across the river from our campus,” she says, “but I hadn’t been over there before. This was a chance to start to build a partnership with them.” At the same time, she contacted the local Micron Foundation for funds to rent the exhibition. Once that was in place, Moll sat down with science center staff to find out how she and her students could help.

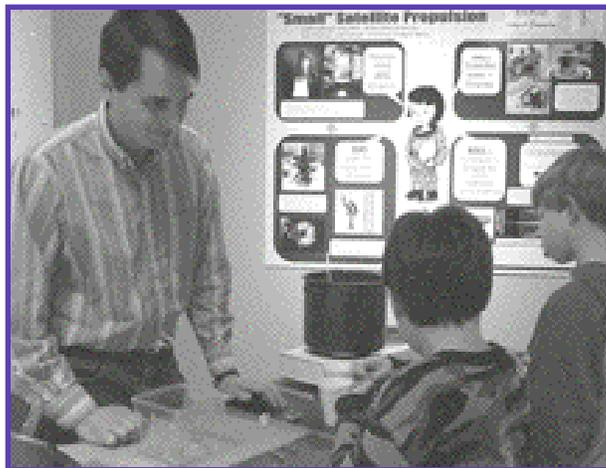
Discovery Center exhibit director Bill Molina was already comfortable with university volunteers. “We’re a small center. I try to get other people involved to leverage what we have,” he says. “The university has been great in that regard. We have a number of exhibits on our floor that were BSU senior engineering team projects.”

Molina welcomed Moll’s offer to help with programming, but the professor was careful not to play the expert. “Sometimes as scientists and engineers, and especially as faculty members, we tend to come in and tell people what they should do,” she says. “I wanted to provide the resources that could help them with what they wanted to do.”

What the Discovery Center wanted was enthusiastic and knowledgeable volunteers who could do demos, staff exhibits, and generally be available to interact with visitors. At the time, Moll was teaching the sophomore-level Intro to Materials Science and Engineering course. “I offered as a service-

learning option that, instead of writing a paper, students could go over and volunteer,” she says. The option turned out to be popular.

“We tried to work with the center in terms of what kinds of demos did they want, what days made sense, when did they have school groups coming in, so that having an extra demonstrator would help at a busy time.” Her stu-



Boise State University materials science student John Youngsman conducts a hands-on activity at the Discovery Center of Idaho. Photo courtesy Amy Moll

dents also created posters to inform visitors about research at BSU.

Moll put in time as a volunteer herself during the exhibition’s run. One rainy weekend, she and her husband, both whitewater kayakers, joined with a local science teacher, a kayaker who had competed in the Olympics, to offer a program on materials science in water sports. “We brought in a couple different boats and drysuits and had some displays,” she recalls. “But the kids had the most fun with an activity where they make a boat and see how many pennies it can hold.... It’s all about getting in there and making something.”

Another time, Moll paid for her entire Materials Science class to visit the exhibition. “They probably got more out of that hour at the Discovery Center and the *Strange Matter* exhibit than they got out of me for the rest of the semester,” she says. “It got them excited about the topic and the field. Two or three students, at the end of

what would have been our lecture time, actually asked me, 'Can we stay?'"

The exhibition left Boise after six months, but Moll has kept up her involvement with the science center, still referring students to the volunteer program and consulting on exhibits and occasionally dropping in herself for a short visit. "It's a 15-minute walk for me to go over there from my office. You can fit it into your normal day," she says. "That helps a lot."

Says Molina, "We appreciate that Dr. Moll is always up for creative ways to supplement the work of each institution. She's an important part of our ongoing relationship with the university."

Carolyn Sutterfield is ASTC's editor. To learn more about the Materials Research Society, visit www.mrs.org.

Breaking the Ice with Scientists

By Kathy Patterson

For informal science educators looking to develop exhibits and programs based on current research, perhaps the biggest challenge is translating complex science into language that museum visitors can understand. Although the researchers them-

selves would generally like to help, they often find themselves limited by time, staff, and funding constraints.

A model project in science communication at the Woods Hole Oceanographic Institution (WHOI) may prove applicable to a variety of future situations. Sponsored by the National Science Foundation as part of the International Polar Year (IPY), WHOI's *Polar Discovery: Live from the Poles* project uses satellite technology and the latest Web tools to link working scientists from four major polar expeditions with museum-goers and the general public. The WHOI research highlighted ranges from tracking climate change and searching for hydrothermal vents and vent life in the Arctic to monitoring the melting of the Greenland ice sheet to investigating Antarctic ecosystems.

"Our goal is to apply collaborative, multimedia approaches to telling the story of polar research," says WHOI research associate Chris Linder, principal investigator for *Polar Discovery*. "Scientists can plug into our web site and take advantage of the partnerships we've developed with science centers across the country."

The eight U.S. science centers and museums that have joined with WHOI in the project are the Birch Aquarium at Scripps (San Diego); Carnegie Museum of Natural History (Pittsburgh);

Houston Museum of Natural Science; Liberty Science Center (Jersey City, New Jersey); Museum of Science, Boston; Pacific Science Center (Seattle); Smithsonian National Museum of Natural History (Washington,

D.C.); and the Field Museum (Chicago). The program not only lets researchers communicate the excitement of their discoveries directly to students, teachers, museum visitors, and web viewers from their research sites, but also offers a framework for working with exhibit developers and outreach professionals at the museums.

"Sometimes your research can be isolating," said Rick Krishfield, a WHOI Arctic research specialist who spoke with museum audiences from the North Pole in April 2007. "Participating in a project like *Polar Discovery* and interacting with kids is fun and refreshing. It has a way of bringing you back down to Earth."

Public interaction with *Polar Discovery* takes three forms:

- A web site (<http://polardiscovery.who.edu>) that offers podcasts, photo essays, videos, animations, audio clips, and a forum for e-mailing questions to researchers in the field.
- Interactive and media-rich exhibits related to the polar expeditions developed by the partner museums.
- Public events that center around live satellite calls from researchers on the ice to visitors on the museum floor.

A communications team of web designers, graphic artists, outreach specialists, and writers at WHOI has been working with the researchers to convey the goals, methods, and findings of these WHOI polar expeditions. Using the *Polar Discovery* web site, they provide daily updates on the research as it progresses. The communications team also facilitates satellite phone calls from the polar field sites to museum auditoriums across the United States.

Each presentation at a museum starts with an introduction by a knowledgeable local moderator—often a scientist. Then students and other museum visitors get to interact directly with the researchers in the field, as they work to deploy climate sensors, hunt for new communities of life, or monitor the pace of global change. The live question-and-answer sessions take place via satellite phone, connecting researchers on *(Continued on page 18)*



At an airbase in northern Canada, researchers transfer equipment bound for the North Pole Environmental Observatory. There it will be used to make year-round measurements of the waters beneath the Arctic icecap. Photo by Chris Linder/WHOI

Attracting Faculty:

Getting Researchers Involved with a University Museum

By Beryl Rosenthal

The MIT Museum's mission, recently updated for the new millennium, is to "engage the wider community with MIT's science, technology, and other areas of scholarship in ways that will best serve the nation and the world in the 21st century." Program staff recognize that the best way to accomplish this is to provide visitors with direct access to Massachusetts Institute of Technology researchers and their work.

At MIT, as at other respected institutions of technology, faculty are engaged in extraordinarily high-level research. Yet the typical stereotypes about scientists and engineers—working 24/7, always either in the lab or off sitting on international research panels, wrapped up in writing grants, communicating only via e-mail—do not apply here. In my 6+ years at the museum, I have found MIT faculty to be extraordinarily collaborative, operating from an institutional (and probably constitutional) culture of sharing and openness.

One reason may be that, as an engineering institution, MIT is less focused on pure research and data gathering and more focused on solving real-life problems. It's common for younger faculty members to be involved in some form of outreach, even making themselves available to their children's classrooms. A goodly number of researchers are not only willing to address the public, but often fearless about doing so. Most professors freely post course materials and videocaptured lectures online at the MIT Open Courseware site (<http://ocw.mit.edu>).

At the MIT Museum, we have been able to engage faculty support because



Researchers converse with adult visitors at an MIT Museum Soap Box evening. Photo courtesy MIT Museum

we recognize and honor this culture. In developing exhibitions, we may ask one or more researchers to lend their scientific expertise in a particular field. Some may be invited to join in group brainstorming, helping to identify research areas and topics that should be covered in the exhibition. Others may provide curators with content information. But where we most consistently make use of our MIT faculty resources is in programming.

Despite the open culture at MIT, I learned early on that I would have to "sell" the relevance of informal education programs to researchers. Some are intrigued by opportunities at the museum, but public presentation is not a priority for them. They are generally unaware of how much cachet "meeting

the scientist" carries with museum visitors. A concerted effort may be needed to convince them that participating at the museum will not take up too much time, and that their work is important and of interest to the public. For those with NSF grants, another selling point hinges on the frequent requirement for public dissemination. But once committed, they follow through with energy and enthusiasm.

The FAST approach

One example of a successful program that draws on MIT researchers is FAST (Family Adventures in Science and Technology). FAST is a weekend opportunity for faculty and (more commonly) graduate students to communicate to a family audience about their work.

For two hours on the last Sunday of the month, we offer family visitors the opportunity to explore current science topics and technologies through engagement and active conversation with MIT faculty, students, and researchers. We have covered topics as widespread as nanotechnology, genetics, neuroscience, robotics, and aero- and astronautical engineering.

Attendance varies with topic, but average visitation on FAST Sundays is high. It is our primary and most regular vehicle for demystifying science and technology (in particular, MIT science and technology) and for addressing the public's understanding of research.

Graduate students make an excellent resource for programs like this. They are often far more available to participate than faculty. They are also more comfortable with informal settings.

Several years ago, the museum ap-

plied for an MIT Student Life grant to support programming specifically designed for graduate students. Grad-Night@theMuseum was conceived as a set of social networking evenings; over time, the students began to take ownership of the program. As their comfort level with the museum increased, attendance rose from 50 to more than 700 per evening, and graduate students began to participate in ever-increasing numbers in museum programs such as FAST.

On the Soap Box

The MIT Museum's flagship program for adult visitors is Soap Box, a series of monthly "salon-style" conversations with researchers on topical issues in science and technology. Soap Box events are held midweek in the early evening. Each features a 20-minute presentation by the researcher (no PowerPoints here), followed by discussion of key topics. The aim is to spark informed public debate about important scientific and technological issues.

Though the target audience is not necessarily familiar with all the latest research, our exit and audience surveys indicate that they are a scientifically literate and interested group of adults.

Attendance ranges from 60 to 180 participants on-site, as well as a large number of virtual visitors who watch the webcast. Each session is archived on MIT World (<http://mitworld.mit.edu>), a free and open distributed-intelligence site that provides on-demand video of significant public events at MIT. (MIT World has recently been added to the offerings at iTunes.)

Demystifying science

"By its nature, current research is difficult to present in public venues," wrote Hyman Field and Patricia Powell in a 2001 *Public Understanding of Science* article (Vol. 10). "It is continually being modified according to the latest findings." Rather than presenting an established set of facts, science educators must track a moving target and try to predict its trajectory, Field and Powell noted. "The field of informal, public information is uniquely positioned to provide an orderly dissemination of the nature and scope of ongoing and emerging research to the general public, but it will require altering the way the field goes about conducting its business."

At the MIT Museum, we have learned that visitors look to us as a

place where they can find out about new technologies in a satisfying and exciting way. They come expecting to meet scientists, engage in hands-on activities, and leave with a better understanding of cutting-edge research. Recruiting faculty researchers and putting them in direct contact with visitors is a win-win way to achieve those goals.

Formal and informal educators, working together, can help to demystify the new science and technology, as well as the people who produce it, for the lay public. Such collaborative programming highlights the fact that scientists don't always have all the answers, and that emerging data can dispute previous theories. It reinforces the idea that science is a self-correcting and cumulative process—and one that is also, to be fair, a product of human endeavor and not always free of bias. And it gives MIT researchers a chance to do what most people like to do: talk about their day at work. ■

Beryl Rosenthal served as director of education and public programs at the MIT Museum, Cambridge, Massachusetts, from 2001 to 2007. She recently became director of education at the Paul Tsongas Industrial History Center, Lowell, Massachusetts.

Spotlighting Research at Universum

By Cristina Heine

With 18 institutes including 10 centers for science research, the National University of Mexico (UNAM), in Mexico City, is a vital center for scientific investigation. Yet the work being done at UNAM is often little known to the general public. It is important that the community in general, and our young people in particular, should know of the scientific and technological advances generated in our laboratories.

That is why staff at UNAM's own science museum, Universum, decided in 2005 to initiate a new public program. Over the next 18 months, we would dedicate one entire month to each of UNAM's scientific institutes and centers, inviting the researchers to come to the museum and communicate their work to the students and families who visit us. Each month, staff would mount in the lobby an exhibit showing some of the main experiments of a particular institute, its different areas of research, and information on the academic preparation required for that field.

Since Friday is the day when most students visit Universum, we scheduled our lectures for high school and college students on Friday mornings. These talks not only explained a current science topic, but also oriented the students to science careers. On Sunday, when most families visit the museum, we scheduled lectures for the general public. These were aimed at parents and children aged 10–14.

To promote the events, we designed posters and sent them to technical schools and colleges. The teachers publicized lectures related to the school's curriculum, and students could attend on Sunday with their families or go with a school group to the museum on Friday.

Some scientists expressed concern about their ability to talk to the public in easy and understandable language. We worked with them until they felt more comfortable about their new audience. Each lecture lasted 30–45 minutes, with 15 minutes for questions and answers. The most popular talk was "The Future Telescopes of Mexico"—the researcher had to repeat the lecture an hour later for the overflow crowd.

In all, Universum hosted 89 lectures: 43 on Fridays, given by scientists from UNAM's institutes and centers, and 46 on Sundays, with speakers drawn more broadly from members of the Mexican Academy of Sciences. Total attendance was 2,795 students and teachers on Fridays and 2,579 adults, youth, and children on Sundays.

For the museum, the main objective was to get the audience involved with the topic of the lecture. We encouraged those of the scientists who were willing to invite the public to get in touch with them later, to learn more about what they are doing in their labs.

Another public event involving UNAM scientists at Universum was "Earth Day" in May 2006. Each institute and center from UNAM's Earth Sciences division devised workshops for children and adults. Activities ranged from making fossil replicas and starting a collection of rocks and minerals to learning about tsunamis and solving a tectonic plate puzzle. I am happy to say the scientists had as much fun as the families! ■

Cristina Heine is curator at Universum, Museo de las Ciencias, National University of México (UNAM), in México City.

(Continued from page 15) the ice or an icebreaking ship to students immersed in a multimedia polar experience at a museum that includes big-screen projections of visuals from the expedition.

The live presentations not only provide an opportunity to hear how polar science is done in real time; they also let museum audiences learn more about the character and background of scientists themselves—what excites them, how they cope with their environment, and how they face down the challenges of understanding our planet.

“The most valuable aspect of the partnership is this ability to inspire the public through real connections with scientists and their research,” says Brian Droege, coordinator of gallery programs at the Field Museum. Adds Museum of Science education associate Greg Murray, “We are thrilled to have this opportunity.... Having access to the folks who are doing the science and designing and building the experiments is key. It allows us to bring our visitors a truly unique experience.”

Kathy Patterson is the Ocean Science Exhibit Center manager at the Woods Hole Oceanographic Institution, Woods Hole, Massachusetts: www.whoi.edu. WHOI is one of the ASTC members participating in the IGLO initiative.

Minority Scientists Showcase: Honoring The Community's Own

By Missy Miller

The *Minority Scientists Showcase* at the Saint Louis Science Center honors local African-American men and women whose contributions to the advancement of science, technology, engineering, and mathematics tend to remain below the community's radar. Since 1994, the annual three-day event has drawn as many as 5,000 visitors to the St. Louis, Missouri museum over the January Martin Luther King holiday weekend.

At the Showcase, professional scientists and engineers from more than two dozen area businesses and organizations exhibit their work and engage audiences through hands-on demonstrations and activities. Participating and sponsoring organizations include Boeing, Monsanto, the National Society of Black Scientists (NSBE), Du-Good Chem Lab, ABNA Engineering, and Washington University. Each of these organizations has a strong commitment to empowering underserved audiences in the area.

Frank Mack, an educator from NBSE who has participated in the Showcase since 2003, cites its importance as a chance to introduce the St. Louis public to local STEM talent. “The *Minority Scientists Showcase* is an excellent forum to help [NSBE] accomplish several things, from highlighting African-American involvement in engineering, science, and technology, to networking with other organizations with similar outreach goals,” says the retired Air Force reservist, aviator, engineer, and entrepreneur. “We hope it encourages young people of any cultural group to consider one of these fields of study. We like them to appreciate that there are people of various backgrounds that have made it and to believe they can, too.”

Although African Americans comprise more than 50 percent of the urban St. Louis population, hardly a minority, “there is a wide misconception among the community that African Americans cannot have a career in science,” says Showcase organizer Siinya Riley-Dulaney, the events manager for the science center's Community Science department. “This is an opportunity for youth and adult visitors to discover the academic and professional pathways needed to achieve successful careers in science and engineering and to see the science center as a resource. The information we offer is not readily available to them in their schools and home life.”

The *Minority Scientists Showcase* couldn't happen without the strong, sustainable relationships built between community-based organizations and

the Saint Louis Science Center. One major supporter is Nicole Adewale, co-founder and president of ABNA Engineering, a St. Louis firm that specializes in engineering design, laboratory testing, construction management, GIS/planning, and land surveying.

A former Showcase participant herself and a member of NBSE and other community-service organizations, Adewale believes strongly in the power of exposing minority children early on to careers in STEM fields. “Engineering is one of the only professions in which you can train a child as early as kindergarten,” she says, adding that young people are inspired by seeing “someone who looks like them doing something they have been taught to perceive as out of reach or unrealistic.”

Once organizations and businesses have participated in the Showcase, says Riley-Dulaney, they rarely turn down the opportunity to return the following year. “Some have been involved since the beginning,” she says, citing Boeing, Monsanto, and Washington University as particularly loyal participants. “This is an opportunity for them to become mentors and to inspire St. Louis youth to enter a science-related field.”

Other regulars at the Showcase include members of the Saint Louis Science Center's own Youth Exploring Science (YES) program. This year-round, work-based program for underserved teenagers provides opportunities for participants to engage in hands-on STEM experiences, and offers them a chance to share their knowledge and work with others in the community.

Each year, more than 100 YES teens offer hands-on science activities at the Showcase. “As YES teens model that science is cool, they empower young minority audiences and help them realize that anything is possible,” says Riley-Dulaney. ■

Missy Miller is grants manager for the Community Science department at the Saint Louis Science Center, St. Louis, Missouri. For more information on the Minority Scientists Showcase or the YES program, contact Siinya Riley-Dulaney, sriley@slsc.org.

NSF Funds New ISE Center

Thanks to a five-year award announced in June by the National Science Foundation (NSF), ASTC will join with organizations and individuals from across the informal science education field to develop a new Center for the Advancement of Informal Science Education (CAISE).

During the past 25 years, NSF's ISE Program (formerly Public Understanding of Science) has supported more than a thousand projects that together have enriched and advanced science learning outside of school. CAISE will serve as a focal point for interaction and knowledge-building among those who work within the wide range of ISE organizations and settings—among them, science centers and museums, living collections, film and broadcast media, youth and community programs, nature centers and parks, after-school programs, and digital media and gaming.

Partner organizations with ASTC are the Program in Free-Choice Learning of the Science and Mathematics Department at Oregon State University (OSU), John Falk, co-PI; the University of Pittsburgh Center for Learning in Out-of-School Environments (UPCLOSE), Kevin Crowley, co-PI; and the Visitor Studies Association (VSA), Alan Friedman, co-PI. Wendy Pollock is the ASTC PI. A search is now under way for a CAISE director and project manager, who will be based in ASTC's Washington, D.C. office.

Through a mix of strategies, CAISE will work to connect the ISE community, facilitate the flow of knowledge between academic researchers and practitioners, and distill knowledge from NSF's portfolio of funded projects and from educational research.

For the field: CAISE will build capacity and support continued professionalization. It will foster a community of practice that bridges the many varied forms in which informal STEM learning experiences are developed and delivered for informal

audiences of all ages, as well as further knowledge transfer between educational research and practice. Activities will include a clearinghouse for ISE-funded awards to enable others to learn from and build upon this prior work; identification of practices and findings based on project evaluations; and leadership development, with an emphasis on increasing diversity in the field. As a secondary emphasis, CAISE will share relevant knowledge and practice with formal educators and university researchers.

For principal investigators: CAISE will create a network through meetings, communications, and other methods that encourage sharing of deliverables, practices, and findings across projects. The center will encourage prospective PIs, especially from under-represented groups and regions, through orientation to the program by web conferences, workshops, and additional means.

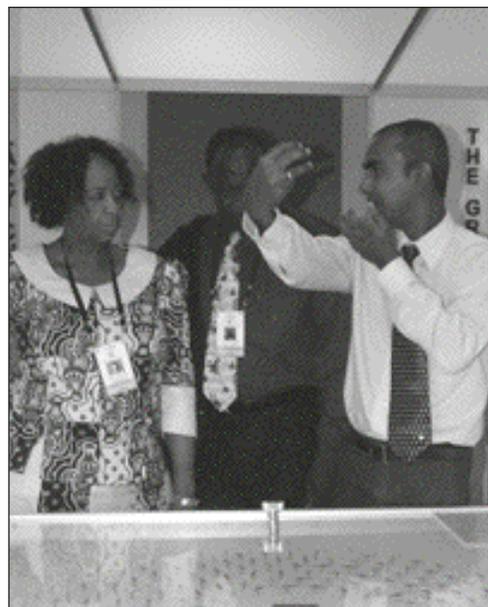
For NSF's ISE Program: CAISE will assist program officers in reviewing the portfolio, assessing evidence of project impacts. It also will assist in identifying reviewers, gathering project highlights, and communicating information externally about the ISE Program.

A Steering Committee representing key sectors of the ISE field will provide strategic guidance. Barry Van Deman, of the Museum of Life and Science, Durham, N.C., and Julie Johnson, of the Science Museum of Minnesota, are co-chairs. The committee's Leadership & Diversity Task Force is led by Preeti Gupta, of the New York Hall of Science. The CAISE evaluator is Mark St. John, Inverness Research Associates.

For further information, contact Wendy Pollock, wpollock@astc.org.

McGrath Fellow Chosen for 2007

Joining us at ASTC 2007 in Los Angeles will be the recipient of this year's Lee Kimche McGrath Worldwide Fellowship, Vishwamitra Oree. Oree comes to us from the Republic of Mauritius, an island nation in the



2007 McGrath Fellow Vishwamitra Oree, right, talks with visitors at the Rajiv Gandhi Science Centre in Mauritius. Photo courtesy Vishwamitra Oree

southwest Indian Ocean, where he is curator at the Rajiv Gandhi Science Centre. His responsibilities include the development of interactive exhibitions and educational programs, as well as research in the history of science and technology.

One of Oree's main concerns is countering the lack of public interest in science in his part of the world. "Fewer students are opting for science subjects at college in developing countries," he wrote in his grant application, adding that, at the ASTC Annual Conference, he hopes to "study the best practices in the museum profession in order to find solutions that may address the problems faced by S & T centers in the African region."

The Lee Kimche McGrath Worldwide Fellowship Endowment Fund was established in 2004 through a generous gift from ASTC's first executive director. Its goal is to create opportunities for communication and exchange among ASTC members worldwide. The McGrath Fellows program annually funds a representative from a science center or museum outside the United States to attend the ASTC Annual Conference. The fellowship provides free conference registration and a grant of \$1,500 toward travel expenses.

For more information or to download an application form for 2008, visit www.astc.org/about/awards.

2007 Diversity Fellows Selected

The Diversity and Leadership Development Fellows Program, a component of ASTC's Equity and Diversity Initiative, makes the professional development experiences of the ASTC Annual Conference more accessible to

science center professionals of color. Through preconference workshops and career development activities, the program seeks to increase the diversity of voices and perspectives at the conference; encourage the retention of professionals of color in the field, and provide support to member institutions committed to enhancing and sustaining cultural diversity on staff.

Applications for 2007 were reviewed by members of ASTC's Equity and Diversity Committee, and 12 Diversity Fellows—six new and six alumni—

were chosen to attend the conference in Los Angeles. The new Fellows are

- *Greg Andrews*, Sci-Port Discovery Center, Shreveport, Louisiana
- *Marie Kubo*, Bishop Museum, Honolulu, Hawaii
- *Terry Mendoza*, Pacific Science Center, Seattle, Washington
- *Astrid Roman*, New Jersey Academy for Aquatic Sciences, Camden
- *Ravi Baldeo*, New York Hall of Science, Queens
- *Nikole Williams-Manning*, EdVenture Children's Museum, Columbia, South Carolina

Each of the new Fellows will be paired this year with an alumni Fellow. Attending alumni include

- *Corin Pinto*, Markham Museum, Markham, Ontario, Canada
- *LaJean Burnett*, MidAmerica Museum, Hot Springs, Arkansas
- *Georgette Williams*, New York Hall of Science, Queens
- *Damon Gibbs*, New Jersey Academy of Aquatic Sciences, Camden
- *Leslie Ka'iu Kimura*, 'Imiloa Astronomy Center, Hilo, Hawaii
- *Lynell Moore*, Detroit Science Center, Detroit, Michigan.

Please join ASTC in welcoming all of the Diversity Fellows in Los Angeles. To make a donation to the program, look for the designated box on the ASTC 21st Century Fund handout in your conference tote bag. For more information on the Fellows program, visit www.astc.org/about/awards.

ASTC in China

Three representatives from ASTC were among a group of distinguished American delegates who attended a joint China-United States forum on science communication in Shanghai last May.

Organized by ASTC and the China Science Technology and Exchange Center (CSTEC) as part of the 2007 China Science and Technology Week, the gathering was hosted by the Shanghai Science & Technology Museum, which recently became an ASTC Governing Member. The goal of the forum

Calendar

SEPTEMBER

5-7 **Astronomical Society of the Pacific Conference.** "EPO and a Changing World." Co-hosted by the Adler Planetarium, Chicago. *Details:* www.astrosociety.org

23-25 **Giant Screen Cinema Association Conference.** Vancouver, British Columbia, Canada. *Details:* www.giantscreencinema.com

OCTOBER

7-10 **ASTEN Annual Conference.** "Audience in Focus." Melbourne, Australia. *Details:* www.astennetwork.net

13-16 **ASTC Annual Conference.** Hosted by the California Science Center, Los Angeles. *Details:* www.astc.org/conference

22-24 **Astronomy from the Ground Up Workshop.** Durham, North Carolina. *Details:* www.astrosociety.org/afgu

NOVEMBER

7-10 **Museum Computer Network Conference.** "Building Content, Building Community." Chicago, Illinois. *Details:* www.mcn.edu

28-30 **10th Annual SAASTEC Conference.** Hosted by the Port Elizabeth Science Centre, Port Elizabeth, South Africa. *Details:* www.saastec.co.za

FEBRUARY 2008

17-23 **National Engineers Week (U.S.).** "Engineers Make a World of Difference." *Details:* www.eweek.org

APRIL 2008

8-12 **Museums & the Web 2008.** Montréal, Québec, Canada. *Details:* www.archimuse.com/conferences

24-26 **Interactivity 2008.** "Let's Play!" Annual meeting of the Association of Children's Museums. Denver, Colorado. *Details:* www.childrensmuseums.org

27-May 1 **American Association of Museums Annual Meeting.** "Leadership: An Open Mic for New Ideas." Denver, Colorado. *Details:* www.aam-us.org

JUNE 2008

15-20 **5th Science Centre World Congress.** Hosted by the Ontario Science Centre, Toronto, Ontario, Canada. *Details:* www.5scwc.org

For updated events listings, click on 'Calendar' at www.astc.org.

was to establish a cooperative channel for Sino-American organizations and scientists in the field of science dissemination, and to improve understanding of the scope of science literacy efforts in both countries. Attendees spent five days discussing such issues as the evolution of public science literacy, ways that scientists can disseminate their science and technology research, and the role and function of science centers.

ASTC requested and received National Science Foundation funding for the U.S. delegation, which included three ASTC representatives: Sheila Grinnell, former director of the Arizona Science Center, Phoenix; Kim Cavendish, president and CEO of the Museum of Discovery & Science, Fort Lauderdale, Florida; and Walter Staveloz, ASTC's director of international relations. Led by Joan Ferrini-Mundy, NSF Division Director for Research on Learning in Formal and Informal Settings, the group also included Jon Miller, of Michigan State University; Tina Philips, of Cornell University; and Brad Kloza, of ScienCentral Inc. ASTC and CSTEM have agreed to look into a multi-annual program that would further profes-

sional exchanges between our two countries in the field of informal science education.

Mayors Invited to Join Climate 'Conversation'

In July, a letter went out to more than 500 U.S. mayors from the directors of ASTC, the Yale School of Forestry & Environmental Studies, and ICLEI-US (Local Governments for Sustainability), inviting communities large and small to join in the October 4 "National Conversation on Climate Action." ASTC is offering as possible resources for the event the IGLO Toolkit and the DECIDE game on global warming developed by IGLO partners.

The U.S. "Conversation" will be part of a global effort on that date to raise public awareness of actions that communities can take locally to address the challenge of climate change. A central web site, www.coolmayors.org/nationalconversation, has been created to provide suggested agendas, fact sheets, sample actions, promotional materials, press packets, and access to a network of mayors who are implementing innovative local solutions to global warming. More information is also available at www.astc.org/iglo.

Five Governing Members Added

At its May meeting, the ASTC Board of Directors approved the promotion of five current members to Governing status, increasing the number of Governing Members to 67.

The five are

- Canada Science and Technology Museum Corporation, Ottawa
- Discovery Science Center, Santa Ana, California
- MadaTech, Israel National Museum of Science, Haifa
- Shanghai Science & Technology Museum, China
- Universum, Museo de las Ciencias, UNAM, Mexico City, Mexico. ■

Welcome to ASTC

The following new members were approved by ASTC's Membership Committee in May 2007. Contact information is available in the About ASTC section of the ASTC web site, www.astc.org.

SCIENCE CENTER AND MUSEUM MEMBERS

- **The Children's Museum of Science and Technology**, Troy, New York. Go Power!, an interactive exhibition that allows kids to explore electricity, natural gas, and alternative energy sources, debuted along with a new café at the October 2006 re-opening of this New York capital-region museum.

- **Great Valley Nature Center**, Devault, Pennsylvania. Located at the eastern end of the state, near Valley Forge, this 10½-acre site opened in 1974 includes a wildflower garden, Bird of Prey Center, and wetland, field, and woodland habitats.

- **Stamford Museum & Nature Center**, Stamford, Connecticut. Among the educational facilities at this 118-acre southwestern Connecticut facility, formerly the estate of Henri Bendel, are a small working farm, nature center, state-of-the-art observatory, studio art building, exhibit galleries, classrooms, planetarium, and hiking trails.

- **Sunriver Nature Center & Observatory**, Sunriver, Oregon. Open since 1984, this central Oregon institution features a quarter-mile nature trail, bug barn, botanical garden, interpretive exhibits, and an observatory that houses more than 20 telescopes. It's also a research center, with a special focus on local amphibians.

- **TÜBITAK** (Scientific and Technical Research Council of Turkey), Ankara. Currently in development, TÜBITAK's planned 2-million-square-meter facility will comprise a hands-on science center, nature museum, planetarium, aquarium, gardens, and recreational areas.

SUSTAINING MEMBERS

- **Economics Research Associates**, Washington, D.C.
- **The Lukens Company**, Arlington, Virginia
- **Utopia Entertainment, Inc.**, Newhall, California. ■



Zhang Chaoying, deputy director-general of the China Science and Technology Exchange Center, and Joan Ferrini-Mundy, NSF Division Director for Research on Learning in Formal and Informal Settings, greet participants at the joint China-U.S. forum in Shanghai.

Photo by Brad Kloza

By Christine Ruffo



In Liberty Science Center's *Skyscraper! Achievement and Impact* exhibit area, visitors can build structures and test them on an earthquake-simulating "shake table." © 2007 Liberty Science Center

CENTER REINVENTED—Almost two years after closing for renovations, **Liberty Science Center**, Jersey City, New Jersey, reopened to the public on July 19. Once largely aimed at children aged 6–12, the center has revised its mission and now features exhibitions designed to appeal to people of all ages and stages of learning.

To bring visitors closer to real science, the expansion includes the new 20,000-square-foot Jennifer A. Chalsty Center for Science Learning and Teaching. Guests enter through the 4,200-square-foot Forum, site of scientific competitions, demonstrations, and discussions. Anchoring the space are two digital multimedia projectors: *Global Microscope*, a 5-foot-diameter sphere that shows aspects of Earth and planetary sciences, and *Anatomical Microscope*, a wall-mounted screen that explores different human body systems in life-sized images.

In the Chalsty Center's 150-seat *Live From...* Interactive Theater, older students can participate in video-conferenced programs, such as "Live From Neurosurgery" and "Live from Cardiac Classroom." Completing the Chalsty Center facilities are six labs equipped with the latest tools for scientific investigation. Here, visiting

scientists from local research institutions will work with museum staff to design lab presentations, activities, and discussions based on their work, while graduate students will conduct experiments and explain their research to groups of visitors. A Young Learner Lab, with smaller furnishings, offers physical and biological science programs for children aged 10 months through second grade.

Expanded from 168,000 to 295,000 square feet, Liberty Science Center includes six new exhibit areas:

- *Skyscraper! Achievement and Impact* invites visitors to walk across a suspended I-beam, design and test their own buildings, and discover the science behind the collapse of the World Trade Center, once rising just across the Hudson River from the museum.
- *Eat and Be Eaten* features live animals that have evolved to use camouflage, toxins, and other adaptations to catch their prey while avoiding being captured themselves.
- *Communication* shows how humans have exchanged ideas through the ages from simple handprints to complex Incan knotted messages to digital pathways.
- *Infection Connection* demonstrates how both individual actions and government policies affect public health at a local and global level.
- *Our Hudson Home* explores how to protect flora and fauna of the Hudson River's ecosystem while helping urban centers remain economically vital.
- *I Explore*, for children aged 2–6, lets young guests journey beneath a sidewalk or play music on ringing rocks.

Green features incorporated into the expansion include a 1,440-square-foot living roof and two new solar arrays. The \$109 million project was funded by a combination of public and private sources.

Details: Mary Meluso, coordinator, media relations, mmeluso@lsc.org

YOU ARE THERE—Before the eruption of Mount Vesuvius, Pompeii was a wealthy Roman trading center of the first century A.D. *A Day in Pompeii*, a traveling exhibition debuted by its

chief developer, **Gulf Coast Exploreum**, in Mobile, Alabama, last January, invites visitors to travel back in time to the eve of the disaster.

Created in partnership with the Soprintendenza Archeologica di Pompei, the 10,000-square-foot traveling exhibition features hundreds of artifacts excavated from volcanic debris. Visitors pass through a reconstruction of



Visitors to *A Day in Pompeii* examine plaster casts of Mount Vesuvius victims. Photo courtesy Gulf Coast Exploreum

one of the city's main gates to enter a street lined with storefronts and filled with ambient sound. Artifacts displayed in the shops—carbonized food items, fish hooks, and baking ovens—demonstrate Pompeii's role as a regional trading hub.

Next, visitors encounter homes and villas filled with furniture, tableware, and jewelry preserved by volcanic ash. A wall-sized garden fresco depicts plants, birds, and garden decorations common to the once popular vacation resort. Household altars and marble statues convey the role of religion in private and public life.

In the final section of the exhibition, visitors experience the darkening skies and violent sounds of Vesuvius's eruption and encounter original plaster casts made by archaeologists of eight volcano victims, including a man holding a cloth to his mouth, a couple embracing, and a slave with his ankle manacle still in place.

Gulf Coast Exploreum designed *A Day in Pompeii* with input from the **Science Museum of Minnesota**, St. Paul; **San Diego Natural History Museum**, California; and **Discovery Place**, Charlotte, North Carolina. The \$600,000 exhibition,

presently on display in St. Paul, will conclude its tour of the four partner centers in January 2009.

Details: Brett Berg, director, marketing and public relations, bberg@exploreum.net, www.pompeimobile.com

FUN FACTORY—Where do everyday products like crayons and sneakers come from? Visitors to the **Children's Museum of Pittsburgh** can find out in a new traveling exhibition, *How People Make Things*. Based on video segments from the "Mister Rogers' Neighborhood" public television series, the 2,500-square-foot exhibition invites guests to "play with real stuff," operating factory equipment and creating their own finished products.

Entering through The Main Office, visitors step into the role of factory workers, trying on lab coats, jumpsuits, and goggles. Passing through a display of local Pennsylvania products and images, they move onto *The Factory Floor* to explore manufacturing processes.

- In *Molding*, guests can match completed objects to their industrial molds or manipulate a real injection-molding machine to create a plastic spoon.

- In *Cutting*, they can use simple clay shapers and chisels to carve a large block of wax or try their hand at operating the cutting head of a 3-Axis Mill.

- *Deforming* lets visitors force materials into new shapes, using a stamper, rolling mill, or vacuum former.

- Finally, *Assembly* features a real golf cart that children can build and customize by fastening manufactured parts to a modular chassis.



A visitor to *How People Make Things* assembles a replica of Mister Rogers' wooden trolley. Photo courtesy the Children's Museum of Pittsburgh

Each of the four process areas includes videos from "Mister Rogers' Neighborhood" that show how individual products are made.

How People Make Things will remain at the museum through September 9. The exhibition was made possible by a \$1.5 million grant from the National Science Foundation and a \$510,000 grant from the Grable Foundation. Other partners include Family Communications Inc. and UPCLOSE (University of Pittsburgh Center for Learning in Out-of-School Environments).

Details: Bill Schlageter, marketing director, BSchlageter@PittsburghKids.org

CHILD'S PLAY—Technopolis, the **Flemish Science Centre**, Mechelen, Belgium, has officially opened its new Children's Science Centre. The 10,000-square-foot exhibit area is designed for children under 8 years old and features 90 interactive exhibits in four themed zones.

Throughout the center, children are encouraged to explore their everyday world through play:

- In *The City*, children can weigh food and scan prices at the supermarket, change a tire in the garage, and print money bearing their own picture.

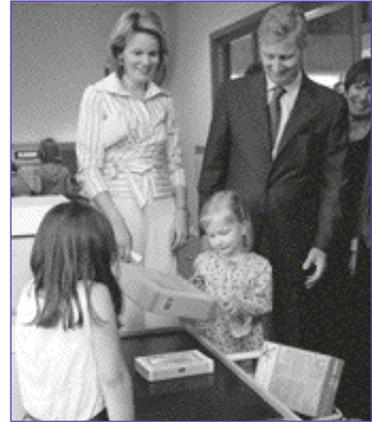
- *Under Construction* puts guests to work laying roof tiles (and learning about safety on a construction site) and building an igloo.

- *At The Park*, children can learn about animals that live underground, match fruits to the correct tree, and look through the eyes of a giant fly.

- In *My Body*, visitors can measure their own height, examine a giant mouth, and resuscitate a "patient" in a real ambulance.

Located on the second floor of Technopolis' new 20,000-square-foot building (the first floor is a multipurpose space), the Children's Science Centre also features a baby corner and a storytelling corner. Major funding for the €2.5 million (\$3.4 million) expansion was provided by Bridgestone, Q8, Carrefour, and General Motors.

Details: Katie Verkinderen, marketing manager, katie@technopolis.be ■



Belgium's Crown Prince Filip, Crown Princess Mathilde, and their 5-year-old daughter, Princess Elisabeth, officially open the new Children's Science Centre at Technopolis, the Flemish Science Centre. Photo courtesy Technopolis

Grants & Awards

The GE Foundation awarded \$100,000 to Kentucky's **Louisville Science Center** to fund summer professional development sessions for middle school teachers in 2007, with follow-up throughout the school year.

- The **Museum of Nature and Science**, Dallas, Texas, received three major donations from Dallas-based foundations for its expansion campaign: \$1 million from the Harry W. Bass Jr. Foundation, \$10 million from the Rees-Jones Foundation, and \$1 million from the Rosewood Foundation.

- The Bernard Osher Foundation, San Francisco, has given the **California Academy of Sciences** \$20 million toward installation of a "living roof," including 2½ acres of native plants, on its new building in Golden Gate Park, as well as creation of a rainforest exhibit.

- The American Psychiatric Foundation has awarded the **Detroit Science Center** \$50,000 in support of new exhibits on the causes and treatment of depression. The exhibits will be part of the new *Beaumont Hospitals and Oakland University Medical Marvels Gallery*, scheduled to open in 2009.

- The **Children's Museum of Pittsburgh** is the 2007 Gold Medal winner of the Rudy Bruner Award for Urban Excellence, the only national award that honors "great places" in U.S. cities. The museum was singled out for its recent renovation project combining historic preservation, innovative architecture, and broad collaboration by local agencies and organizations. The award includes a cash prize of \$50,000.

Jeffrey H. Patchen, president and CEO of the Children's Museum of Indianapolis, was one of three presidential nominees confirmed by the U.S. Senate on May 25 as a member of the National Museum and Library Services Board. Board members advise the Institute of Museum and Library Services (IMLS), an independent federal agency that is the primary source of federal support for U.S. museums and libraries.



Louisville Science Center director of education **Amy Lowen** retired August 10 after a 29-year career at the Kentucky museum. A founding member of ASTC's Teacher Educator Network, Lowen also served on the ASTC Conference Program Planning Committee from 2000 to 2004.



David Ucko, formerly head of the Informal Science Education program at the National Science Foundation, Arlington, Virginia, has been promoted to Deputy Director of NSF's Division for Research on Learning in Formal and Informal Settings. This new

division combines staff and programs previously under the Division of Research, Evaluation, and Communication and the Division of Elementary, Secondary, and Informal Education.



Alan Nursall retired as science director of Science North, Sudbury, Ontario, Canada, effective August 10. He had been with the science center for 23 years. Nursall will continue to do contract work in exhibit design and planning and in science communication.



Beryl Rosenthal resigned as director of education and public programs at the MIT Museum, Cambridge, Massachusetts to become director of education at the Paul Tsongas Industrial History Center in Lowell, Massachusetts, effective September 1. The hands-on history center is a joint project of the University of Massachusetts-Lowell and the National Park Service.



In memoriam: Many in the science center world remember fondly the boost given to informal science educa-

tion by "Mr. Wizard," **Don Herbert**, who died June 12 at the age of 89.

Trained as a science teacher, Herbert initially pursued an acting career. But in 1951, he launched his half-hour live science show, "Watch Mr. Wizard," on NBC TV in Chicago. Herbert would continue to host the show, which used basic experiments to illustrate scientific principles, every Saturday morning for 14 years. By 1955, there were some 5,000 Mr. Wizard Science Clubs across the United States. Later, he would host a cable series, "Mr. Wizard's World," for Nickelodeon in the 1980s and '90s.

At a 1989 gathering held in Los Angeles to honor his contribution to the field, National Science Foundation program director George Tressel (himself an early supporter of ASTC) credited Herbert with being "personally responsible for more people going into the sciences than any other single person in this country." Current ASTC executive director Bonnie VanDorn cites another pioneering Herbert achievement: "By including both boys and girls as guest assistants on his program," says VanDorn, "he let girls know that it was OK to be interested in science." ■



Association of Science-Technology Centers

1025 Vermont Avenue NW, Suite 500
Washington, DC 20005-6310

Address Service Requested

Non Profit Org.
U.S. Postage
PAID
Washington, D.C.
Permit No. 537