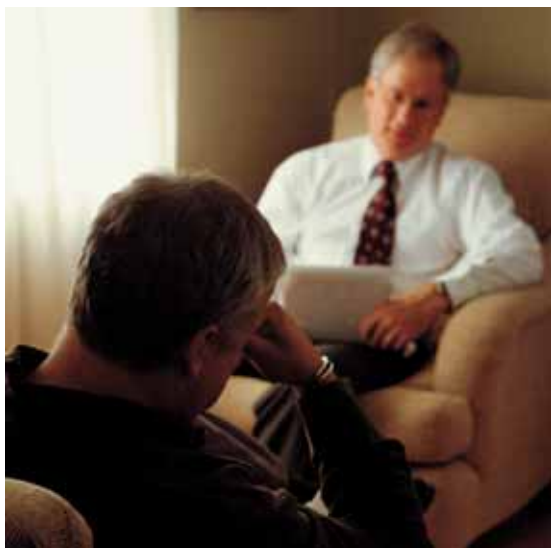


# THE NATIONAL ACADEMIES **IN FOCUS**

[infocusmagazine.org](http://infocusmagazine.org)



A Plan to Improve Roads & Reduce Congestion | Marketing Healthier Foods to Kids  
Caring for Both Mind and Body | Wetland Restoration of Coastal Louisiana

Winter/Spring 2006  
vol. 6 number 1

# THE NATIONAL ACADEMIES

*Advisers to the Nation on Science, Engineering, and Medicine*

The nation turns to the National Academies — National Academy of Sciences, National Academy of Engineering, Institute of Medicine, and National Research Council — for independent, objective advice on issues that affect people's lives worldwide. Additional information about the institution and its work can be found online at <national-academies.org>.

*The National Academies In Focus* features broad coverage of the National Academies' activities. We welcome your comments on the magazine; e-mail us at <infocusmagazine@nas.edu>.

*In Focus* (ISSN 1534-8334) is published three times a year by the National Academies, 500 Fifth St., N.W., Washington, DC 20001. Subscription (three issues): \$10; Canada and foreign, \$12 (U.S. currency only). Subscription address: *In Focus*, P.O. Box 665, Holmes, PA 19043. Bulk-rate U.S. postage is paid at Washington, D.C. Back issues and back volumes can be ordered in microform from National Archive Publishing Company, 300 North Zeeb Road, Ann Arbor, MI 48103.

Postmaster: Send address changes to *In Focus*, P.O. Box 665, Holmes, PA 19043.

## Credits:

- Cover: (clockwise from upper left) ©Royalty-Free/Corbis; ©Royalty-Free/Corbis; bald cypresses in Louisiana, ©David Muench/Corbis; ©David Buffington/Photographer's Choice/Getty Images
- Page 1: (col. 1) ©Photodisc; (col. 2) ©Royalty-Free/Corbis
- Page 2: (from top) Participants at the first annual conference of the African Science Academy Development Initiative, held in Nairobi, Kenya, November 2005, photo by Vanee Vines; a working group discussion during the third annual conference of the National Academies Keck *Futures Initiative*, held last November in Irvine, Calif., photo by Paul R. Kennedy
- Page 3: Photo by Cable Risdon Photography
- Pages 4&5: ©Photodisc
- Page 6: ©Imagezoo Media Inc.
- Page 7: ©ImageState
- Page 8: ©Paul Schulenburg/Images.com
- Page 10: ©Strauss/Curtis/Corbis
- Page 11: Louisiana barrier island on Gulf of Mexico, photo courtesy National Oceanic and Atmospheric Administration
- Page 12: Marshlands in Louisiana, ©Philip Gould/Corbis
- Page 13: ©Stephanie Carter
- Page 14: ©Wire Design/Digital Vision/Getty Images
- Page 15: ©Royalty-Free/Corbis
- Page 16: ©Dynamic Graphics/Jupiterimages
- Page 17: Photo by Vanee Vines
- Page 18: Participants at the first annual conference of the African Science Academy Development Initiative, held in Nairobi, Kenya, November 2005, photos by Vanee Vines
- Pages 19&20: Participants at the third annual *Futures* conference, held November 2005 in Irvine, Calif., photos by Paul R. Kennedy

## FEATURES

### HEALTH & SAFETY

- 4 Time for a Change**  
Marketing healthier foods to kids



4

- 6 After Cancer**  
Better long-term care for those who survive

### BEHAVIORAL & SOCIAL ISSUES

- 8 A Health Care Disconnect**  
Caring for both mind and body
- 10 Helping Older Americans Get Better With Time**  
Research to achieve a new understanding of old age



10

### ENVIRONMENT & RESOURCES

- 11 Mapping Louisiana's Future**  
A long and broad view needed to guide wetland restoration
- 13 Setting Standards for Vehicle Emissions**  
A look at state and federal practices



14

### ENGINEERING & TECHNOLOGY

- 14 Pay As You Go**  
A plan to improve roads and reduce congestion
- 16 Protecting Air Transportation**  
Better defenses against chemical and biological threats

## 17 Spotlight Out of Africa

Experts meet to discuss development of African science academies



17

## 19 Meeting Third Futures Conference Launches a Genomic Attack on Infectious Diseases

Communication and interdisciplinary collaboration characterizes meeting on genomic solutions to infectious diseases



19

## 21 Brief Takes

- Landmark 'Intelligent Design' Decision Cites NAS
- Kavli Gift to Frontiers of Science

## 23 New Projects & Publications

## THE NATIONAL ACADEMIES

### National Academy of Sciences

Ralph J. Cicerone, President  
Barbara A. Schaal, Vice President  
E. William Colglazier, Executive Officer  
Kenneth R. Fulton, Executive Director

### National Academy of Engineering

Craig R. Barrett, Chair  
Wm. A. Wulf, President  
Sheila E. Widnall, Vice President  
Lance Davis, Executive Officer

### Institute of Medicine

Harvey V. Fineberg, President  
Susanne Stoiber, Executive Officer

### National Research Council

Ralph J. Cicerone, Chair  
Wm. A. Wulf, Vice Chair  
E. William Colglazier, Executive Officer

*In Focus* is prepared by the Office of News and Public Information.

Executive Director: William Skane

*In Focus* Editor: Valerie Chase

Assistant Editor: Sara Frueh

Staff Writers: Bill Kearney, Patrice Pages,  
Christine Stencel, Vanee Vines

Design: Francesca Moghari



## Foreign-Born Researchers Are Key to U.S. Prosperity and Security

I would like to use this space to comment on what I see as a deeply troubling change in public attitude. Last fall I testified to the House Judiciary Committee's subcommittee responsible for immigration issues. The subject was foreign-born students, especially in the physical sciences and engineering. I presented to the panel a few undisputed facts:

- Between 1980 and 2000, the percentage of Ph.D. scientists and engineers employed in the United States who were born abroad increased from 24 percent to 37 percent.
- The current percentage of foreign-born Ph.D. students in engineering is close to 60 percent.
- One-fourth of the engineering faculty at U.S. universities was born abroad.
- Between 1990 and 2004, over one-third of the U.S. scientists who received Nobel Prizes were foreign born.

To me these facts suggest that the United States has been skimming the best and brightest from around the world — and that much of the prosperity and security we enjoy today is the result of having access to that incredible talent pool.

But reading between the lines of their questions, it seemed that the majority of the subcommittee members present had a completely different take — namely that every foreign student is a potential spy and, as one congressman explicitly said, the U.S. would be better off if there were no foreign students, since that would create room for all the U.S. students who want to be scientists and engineers.

I was stunned. What would our country be like today if this had been the prevailing attitude in years past? Fifty years ago many of our nation's scientific leaders came from Europe. They included famous names like Einstein, Fermi, and Teller — without whom we might not have been the first to build the atomic bomb; von Braun — without whom we would not have gone to the moon; and von Neumann — without whom we might not be leaders in computing and information technology.

Today, it isn't just Europeans who contribute to our successes. Our leading scientific minds have names like Praveen Chaudhari, who was born in India and now directs the Brookhaven National Laboratory; C.N. Yang, a Nobel Prize winning physicist born in China; and Elias Zerhouni, director of the National Institutes of Health who was born in Algeria.

Secretary of State Condoleezza Rice recently gave a speech in which she pledged to make the United States more “welcoming” to citizens of other nations. I sincerely hope she succeeds. But I remain concerned that unwise policies regarding foreign-born students and scholars may irreparably damage our own science and engineering capacity. You can read my complete Sept. 15, 2005, testimony by visiting <[www.nae.edu](http://www.nae.edu)>.



WM. A. WULF

President, National Academy of Engineering



## TIME FOR A Change



### Marketing Healthier Foods to Kids

**K**ids in the United States collectively wield \$200 billion in spending money annually, so it's understandable that food and beverage manufacturers and restaurant companies spend billions of their own dollars each year marketing directly to America's children and youth. High-calorie foods and beverages are among the top 10 items young consumers buy most frequently. Moreover, kids influence an estimated \$500 billion of their parents' purchases, as anyone who has heard the wheedling of an 8-year-old in a supermarket cereal aisle can confirm.

With the proliferation of food and beverage products and marketing aimed at kids in recent years, public concern has grown about the extent to which friendly cartoon characters, product-focused games, and other persuasive tactics are contributing to the rise in childhood obesity. The issue has been hotly debated, with some decrying the popular *SpongeBob SquarePants* for promoting junk food, and others pointing to physical inactivity, not eating habits, as the major culprit behind the obesity spike.

Now, however, a committee of experts convened by the Institute of Medicine has

announced that concerns about the influence of marketing on children's dietary patterns and weight are backed up by scientific evidence. With the evidence in hand, the committee said, it's time for a major turnaround in the types of foods and beverages marketed to kids and how they're promoted.

After analyzing the results of more than 120 studies, the committee determined that TV advertising influences kids under age 12 to ask for and consume particular products and brands. And because the majority of foods, beverages, and meals pitched to children are high-calorie, low-nutrient offerings, these are the types of products they desire.

There is no study that definitively rules out every other possible factor that could contribute to weight gain, so the committee's report stops short of saying that there is a direct cause-and-effect relationship between viewing television ads and childhood obesity. Even so, the collective evidence clearly indicates that there is a strong association — especially for children ages 2 through 11 — and it's sufficient to justify significant changes. Future research also needs to look beyond TV ads because marketing strategies now employ many other ways of reaching kids, such as Internet ads, pitches incorporated into games, and product placements in various media.

"We can't argue anymore about whether marketing influences children's diets and puts their long-term health at risk; it clearly does," said committee chair Michael McGinnis.

To spur a society-wide shift from low-nutrient, high-calorie items to healthier fare, the committee called on the food, beverage, and restaurant industries to redirect their creativity and resources to develop

offerings that are higher in nutrients and lower in fat, salt, added sugars, and calories and to make them just as appealing to children as their current products. Already, several companies have introduced new healthy lines of products that the committee would like to see expanded.

Voluntary efforts should be encouraged, and the government should pursue policy



initiatives such as awards, tax incentives, and other inducements. But if voluntary efforts fail to achieve a substantial shift, Congress should consider legislation to mandate changes in food and beverage advertising on both broadcast and cable television.

But changes cannot rest on industry's shoulders alone. To help families better understand nutrition and how to make healthy choices, the federal government should partner with the private sector to roll out a national campaign about healthful diets that employs all the promotional techniques that help make products and brands popular. — *Christine Stencel*

■ **Food Marketing to Children and Youth: Threat or Opportunity?** Committee on Food Marketing and the Diets of Children and Youth, Food and Nutrition Board and Board on Children, Youth, and Families, Institute of Medicine (2005, approx. 500 pp.; ISBN 0-309-09713-4; available from the National Academies Press, tel. 1-800-624-6242; \$54.95 plus \$4.50 shipping for single copies; also on the Internet at <[books.nap.edu/catalog/11514.html](http://books.nap.edu/catalog/11514.html)>).

The committee was chaired by **J. Michael McGinnis**, senior scholar, Institute of Medicine. The study was funded by the U.S. Centers for Disease Control and Prevention.



# After Cancer

## BETTER LONG-TERM CARE FOR THOSE WHO SURVIVE

**T**he uncertainties and angst cancer survivors may experience are not unfounded. Cancer and its harsh treatments can leave both physical and emotional scars and lead to subsequent medical and psychosocial problems. Moreover, successes in cancer detection and treatment have not been matched by similar advances in care for survivors' physical and mental health over the long term. A new report by the Institute of Medicine and National Research Council, citing shortfalls in the consistency and quality of care, calls for new tools, clinical guidelines, and standards to improve the care given to America's more than 10 million cancer survivors.

Initiatives that improve the transition from active cancer therapy to post-treatment would be welcomed by survivors like Shirley Shinohara, who lived through a bout with colon cancer. "You never stop dealing with cancer; it's always an ongoing process," she said. "I'm reminded of it when I see my body every day with the scars that I have, my neuropathy from my chemo that I had,

You might expect the day that a patient finishes radiation or chemotherapy to be a joyful one filled with celebratory toasts and high-fives. But for some cancer survivors, completion of their initial therapy can be marked just as much by worries about what's next.



and my colitis from the radiation that I had.... I take each day as it comes now.”

The committee that conducted the study found that there is wide variation in the care cancer survivors receive due to a lack of clear evidence for what constitutes best practices in long-term care for these patients. Moreover, primary care physicians and nurses and other health care providers often are not very familiar with the consequences from cancer that may arise later, and seldom receive training in recognizing and managing the disease’s delayed effects, even though they are treating more and more patients with a history of cancer as the ranks of survivors increase. They also do not typically receive explicit guidance from patients’ oncologists.

“There is currently no organized system to link oncology care to primary care,” said committee chair Sheldon Greenfield. “Unfortunately, many critical aspects of cancer survivors’ needs are lost somewhere between active treatment and long-term follow-up.”

Besides being at risk for cancer recurrence and for developing other malignancies, survivors also may face psychological distress, sexual dysfunction, infertility, impaired organ function, cosmetic changes, and limitations in mobility, communication, and cognition. Some of this is because cancer treatments can have long-term effects on tissues and organ systems.

As a key step to alleviating these problems, the committee recommended that

each survivor receive a “cancer survivorship plan” that summarizes information crucial for long-term care. Plans should include the individual’s cancer diagnosis, treatment, and potential consequences; the timing and content of follow-up visits; tips on maintaining a healthy lifestyle and preventing recurrent or new cancers; legal rights affecting employment and insurance; and the availability of support services. These plans would also help survivors’ primary care providers better recognize and manage any effects of cancer and its treatment that their patients may experience later in life.

Following the release of the report, the American Society of Clinical Oncologists announced that it is undertaking a range of activities to advance the report’s recommendations, including offering a new training course in survivorship care for health care providers. The society is also developing new guidelines to provide health professionals with the knowledge and expertise to manage long-term and late effects of cancer.

— *Christine Stencel*

■ **From Cancer Patient to Cancer Survivor: Lost in Transition.** Committee on Cancer Survivorship: Improving Care and Quality of Life, National Cancer Policy Board, Institute of Medicine and National Research Council (2005, 536 pp.; ISBN 0-309-09595-6; available from the National Academies Press, tel. 1-800-624-6242; \$69.95 plus \$4.50 shipping for single copies; also on the Internet at <[books.nap.edu/catalog/11468.html](http://books.nap.edu/catalog/11468.html)>).

The committee was chaired by **Sheldon Greenfield**, professor of medicine and director of the Center for Health Policy Research, University of California, Irvine. The study was funded by the National Cancer Institute, U.S. Centers for Disease Control and Prevention, and the American Cancer Society.





## A HEALTH CARE **DISCONNECT**

### Caring for Both Mind and Body

Each year more than 33 million Americans, many of them working adults, use health care services for mental and substance problems. When appropriately treated, people can lead satisfying, productive lives. But without proper treatment, the consequences can be devastating — lost jobs, low academic achievement, antisocial behavior, even suicide.

**S**uccessful, cost-effective treatments and interventions for mental problems and substance use do exist, but unfortunately delivery of these measures is spotty at best. Without a comprehensive strategy to improve the quality of care in these areas, high-quality care in the nation's overall health system is a goal that will remain unmet, says a new Institute of Medicine report that offers such a plan.

Building bridges is key. Modern scientific thought does not separate mind and body, but services for mental and substance-use problems have been isolated from the rest of the health system and often from each other, despite the fact that many people suffer from both types of conditions. Health professionals need to connect relevant areas of their own organizations as well as form ties with other providers, the report says. And federal and state governments should revise laws and practices that hinder the ability of health professionals to

quickly obtain and share information on a patient's health and potential treatments — links that are essential to effective assistance. Likewise, the U.S. Department of Health and Human Services should establish a permanent, high-level mechanism to encourage greater coordination across its mental, substance-use, and general health care agencies.

An information technology system called the National Health Information Infrastructure (NHII) is now being developed to make the exchange of health information easier. But so far, these efforts have not fully dealt with health care for mental and substance-use problems, the report says. HHS and the U.S. Department of Veterans Affairs should make sure that this system adequately addresses such conditions.

Policymakers also should pay closer attention to the work force itself. Critical skills and knowledge are unevenly distributed among a broad range of providers, the report notes. Congress should authorize and fund a Council on the Mental and Substance-Use Health Care Work Force, which would aim to strengthen professional standards as well as training. The council should operate as a partnership between the public and private sectors.

The principle of putting your money where your mouth is would make a difference, too, said the committee that wrote the report. Government programs, employers, and purchasers — companies or other groups that pay health care providers for delivering patient services — should spend money in ways that support the delivery of high-quality care. When sizing up prospective vendors, for example, states should

give more weight to those who stress this kind of excellence.

HHS, the report adds, should oversee a coordinated research agenda for improving health care services for mental and substance problems. The agency's efforts should include synthesizing and disseminating scientific evidence.

The report — like the IOM's 2001 report *Crossing the Quality Chasm: A New Health System for the 21st Century* — envisions a revamped health care system that is centered on the needs and preferences of patients, encourages teamwork among health care workers, and makes much greater use of information technology. Patient-centered care is imperative in the delivery of mental health services and treatments for addiction, the report says, because there is greater use of coercion into treatment compared with general health care. And interventions sometimes carry social stigmas. — *Vanee Vines*

■ **Improving the Quality of Health Care for Mental and Substance-Use Conditions.** Committee on Crossing the Quality Chasm: Adaptation to Mental Health and Addictive Disorders, Board on Health Care Services, Institute of Medicine (2005, approx. 600 pp.; ISBN 0-309-10044-5, available from the National Academies Press, tel. 1-800-624-6242; \$60.00 plus \$4.50 shipping for single copies; also on the Internet at <[books.nap.edu/catalog/11470.html](http://books.nap.edu/catalog/11470.html)>).

The committee was chaired by **Mary Jane England**, president, Regis College, Weston, Mass. The study was sponsored by the Annie E. Casey Foundation; CIGNA Foundation; U.S. Department of Veterans Affairs; Robert Wood Johnson Foundation; and the U.S. Department of Health and Human Services' Substance Abuse and Mental Health Services Administration, National Institute on Alcohol Abuse and Alcoholism, and National Institute on Drug Abuse.

# HELPING OLDER AMERICANS GET BETTER WITH TIME

*“Will you still need me,  
will you still feed me,  
when I’m 64?”*

**A**s the Beatles sang their 1967 hit, the song likely turned a young generation’s thoughts toward the future and getting “old.” If the song were written today, the old-age marker might be 74 or 84, but the questions would reflect a similar discomfort about aging: Will older people remain healthy and mentally sharp members of society?

The “graying” of America is well under way. By 2030 roughly 70 million people in the United States will be 65 or older — more than double the number in 2000. A new report from the National Research Council offers the National Institute on Aging a research agenda to achieve an entirely new understanding about the health and well-being of this population.

The proposed agenda is centered on four areas with far-reaching roots in psychology — motivation and behavioral change, socioemotional influences on decision-making, the relationship between social engagement and cognition, and the effects of stereotypes.

Understanding individual and social behavior over a lifetime is key to understanding differences in how older people fare, the report says. Moreover, such knowledge should be used when formulating public policies to support healthy lifestyles among this group, ultimately benefiting group members and society as a whole.



Motivation is a critical part of getting people to develop and maintain healthy living patterns, said the committee that wrote the report. More research is needed on what sparks and sustains behavior changes in older people.

For many seniors, personal rules of thumb — accompanied by gut feelings or intuition — may play larger roles in decision-making than careful deliberation does, the report adds. But more study is needed on the effects of such emotional influences. Likewise, researchers should systematically explore whether social relationships and interactions affect cognition among older people.

Stereotypes also should be investigated because they may limit the contributions that older people make to society, the report says. A research agenda on aging should incorporate studies of how gender, race, ethnicity, class, and culture shape the way that people think and act as they age.

The recommended research on aging requires interdisciplinary approaches, the report emphasizes. NIA should strengthen its research infrastructure to conduct studies in the proposed areas and widely disseminate their findings. — *Vanee Vines*

■ **When I’m 64.** Committee on Aging Frontiers in Social Psychology, Personality, and Adult Developmental Psychology, Division of Behavioral and Social Sciences and Education (2005, 280 pp.; ISBN 0-309-10064-X, available from the National Academies Press, tel. 1-800-624-6242; \$54.00 plus \$4.50 shipping for single copies; also on the Internet at <[books.nap.edu/catalog/11474.html](http://books.nap.edu/catalog/11474.html)>).

The committee was chaired by **Laura L. Carstensen**, professor of psychology, Stanford University, Stanford, Calif. The study was sponsored by the National Institutes of Health.



**A**s efforts get under way to rebuild New Orleans and mend the damage wreaked by hurricanes Katrina and Rita on the Gulf Coast, drawing a map of what coastal Louisiana will look like decades from now should be one of the first steps in any large-scale restoration of its vanishing marshes and barrier islands, says a new report from the National Research Council.

Wetlands along the state's coast have been disappearing at the rate of several square miles a year, mainly because much of the Mississippi River sediment needed to support them has been trapped upstream by levees and other barriers, or has been routed offshore by flood-control measures. Moreover, the reduction in sediment buildup has prevented the Mississippi delta from keeping pace with sea level rise and natural subsidence.

### **A Long and Broad View Needed to Guide Wetland Restoration**

The report was requested in 2004 by the Louisiana governor, who specifically asked the Research Council to review a study by the state and the U.S. Corps of Engineers that proposes five major wetland restoration projects. A Research Council committee found most of these projects to be scientifically sound, but given the size of the watershed in question and the continuing rapid decline of wetlands, concluded that a much more strategic approach addressing the system as a whole is needed.

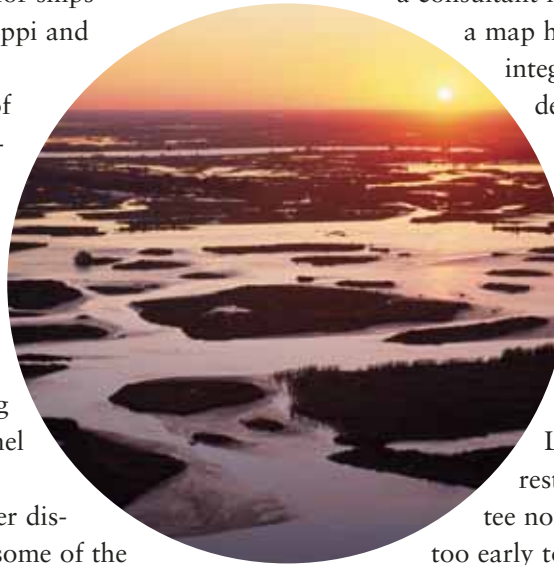
The current project proposals are designed for completion in the near term — which is all the federal Office of Management and Budget provided funding for. The committee said this near-term focus precludes more-promising projects that have not yet been fully designed, and the study itself indicates that its projects



will only reduce wetland losses by about 20 percent a year. Nevertheless, all but one of the near-term projects should move forward because they will support a broader approach to wetland restoration in the future. The exception is a proposal to build a stone retaining wall along an outlet that provides a shortcut for ships between the Mississippi and the Gulf of Mexico. Despite a price tag of more than \$100 million, it will only cut land loss by 0.2 square miles a year. In addition, the Corps is studying whether to even continue maintaining the outlet as a channel for large vessels.

Another idea under discussion is diverting some of the Mississippi's flow to create a so-called Third Delta that will allow the river to reach the Gulf southwest of New Orleans, renourishing wetlands there with badly needed sediment. The committee said consideration should be given to an alternative or companion to the Third Delta that would deliver even greater amounts of sediment but travel through less-developed areas, perhaps making it more feasible.

Projects such as this, where homes and businesses may need to be relocated, will obviously require significant public involvement. Explicit maps depicting what the Louisiana coastline will look like with or without various wetland restoration projects should be circulated among all interested parties.



"It's unlikely that the entire coast can be restored, so decisions need to be made about where restoration is most needed," said committee member Jeffrey Benoit, former director of the National Oceanic and Atmospheric Administration's Office of Ocean and Coastal Management, and now a consultant in Arlington, Va. Once a map has been agreed upon, integrated projects can be designed to achieve it.

As the economic impact of Katrina and Rita becomes clearer, it will be possible to better judge the potential national economic benefits of Louisiana's coastal restoration, the committee noted. And although it's too early to say what role, if any, the missing wetlands played in amplifying the effects of the hurricanes, enough is known about the ability of wetlands to lessen the impact of coastal storms and hurricanes that their restoration should be part of national efforts to reduce hurricane hazards. — *Bill Kearney*

■ ***Drawing Louisiana's New Map: Addressing Land Loss in Coastal Louisiana.*** Committee on the Restoration and Protection of Coastal Louisiana, Ocean Studies Board, Division on Earth and Life Studies (2006, 204 pp.; ISBN 0-309-10054-2; available from the National Academies Press, tel. 1-800-624-6242; \$39.00 plus \$4.50 shipping for single copies; also on the Internet at <[books.nap.edu/catalog/11476.html](http://books.nap.edu/catalog/11476.html)>).

The committee was chaired by **Robert G. Dean**, professor of civil and coastal engineering, University of Florida, Gainesville. The study was funded by the state of Louisiana and the U.S. Army Corps of Engineers.

# Setting Standards for Vehicle Emissions

California has become synonymous with strict environmental standards, some of which can be traced to a 1952 discovery by a scientist at the California Institute of Technology who found that nitrogen oxides and hydrocarbons emitted by vehicle engines and fuels interact in the presence of ultraviolet radiation to form ozone, a key component of smog. That finding, along with studies showing how unhealthy smog could be for humans, sparked the movement to regulate vehicle emissions. By the early 1960s, California had established the nation's first standards to control such emissions.

In 1967, Congress recognized California's leadership in regulating emissions — and the fact that it had 10 million vehicles and some of the worst pollution in the country — by exempting the state from a section of the newly passed Clean Air Act which dictated that federal emissions standards pre-empt state standards. California could set its own standards for vehicles as long as they were as protective in the aggregate as federal standards. A decade later Congress went a step further when it allowed other states to adopt California standards in lieu of federal regulations.

A new report from the National Research Council says that over the years California has enacted more aggressive emissions standards, just as Congress intended, which also had the added benefit of driving innovations in emission-control technology. And it did so by following standard-setting practices and procedures similar to EPA's. The report warns, however, that the ability for California to set tighter standards — and for other states to follow its lead — is still needed. Even now, California has some of



the worst air quality conditions in the country, and along with other states, needs tougher vehicle emissions rules in order to meet EPA's overall air quality standards.

The report says that EPA could help by streamlining the process for granting a waiver, which must be obtained by California each time it sets a new emission standard. Currently, EPA only grants waivers to California, but the report says that the agency also should play a role in other states' adoption of California standards. The committee that wrote the report could not agree on whether EPA's participation should include a waiver process for other states, but it did say that the agency's opinion could help prevent or settle legal disputes that arise when automakers claim difficulty complying with California standards when they are adopted elsewhere. For example, cars made to meet California's emission standards may not achieve a similar standard or operate efficiently in another state because of colder weather or different fuel composition. — *Bill Kearney*

■ **State and Federal Standards for Mobile Source Emissions.** Committee on State Practices in Setting Mobile Source Emissions Standards, Board on Environmental Studies and Toxicology, Division on Earth and Life Studies (2006, approx. 310 pp.; ISBN 0-309-10151-4; available from the National Academies Press, tel. 1-800-624-6242; \$30.00 plus \$4.50 shipping for single copies; also on the Internet at <[books.nap.edu/catalog/11586.html](http://books.nap.edu/catalog/11586.html)>).

The committee was chaired by **David Allen**, Melvin Gertz Regents Professor in Chemical Engineering, and director, Center for Energy and Environmental Resources, University of Texas, Austin. The study was funded by the U.S. Environmental Protection Agency.



Tired of sitting in traffic on the daily commute to work, driving around the same potholes every day, or navigating road work that never seems to end? Maybe there's a solution in sight.

## PAY AS YOU GO

### A Plan to Improve Roads and Reduce Congestion

**A** new report from the Transportation Research Board endorses a proposed plan that could not only improve traffic conditions but the quality of roads as well. Instead of paying fuel taxes at the gas pump, which subsidizes the lion's share of highway operations, travelers could pay for the miles they drive. The committee that wrote the report said that such fees would prompt some drivers to take cheaper alternate routes, travel in off-peak hours, or switch to transit, while others would be willing to pay rush-hour fees to travel on less-congested roads.

"Congestion in our nation's urban areas is only getting worse over time," said Rudolph Penner, committee chair and senior fellow, Urban Institute, Washington,

D.C. “If drivers paid for the roads they use, not only would traffic conditions improve, but the public agencies collecting the money would increase their efforts to improve the roads.”

Although the current funding system has been effective for maintaining existing highways and building new ones, it cannot help improve traffic flow, the report says. Also, the system doesn’t compel agencies to check that individual transportation projects are financially justifiable and conducted efficiently. The new funding plan would zero in on projects with the greatest benefits to the general public and could increase the cost-effectiveness of highway spending in general.

The new plan could partially or completely eliminate fuel taxes — which represent nearly 20 percent of what drivers pay for gas — and would require drivers to pay a toll for the highways they use. The toll would be used to cover the cost of highway maintenance and traffic services such as police, but the greatest benefit would be the alleviation of congestion, particularly in urban areas during peak hours, when each driver slows down traffic upon entering a congested road. It is not clear how much drivers would need to pay for tolls or whether the amount paid would fully replace fuel taxes. But the total amount collected might be less than what they pay today in fuel taxes and other user fees because roads would be used more efficiently, Penner said.

For the plan to be adopted, public acceptance will be critical. Highway



agencies will need to demonstrate that the plan is worth implementing and be receptive to suggestions from the public, the committee said. Once technically proven and publicly acceptable designs are available, the federal government should support large-scale trials.

For the coming decade, transportation agencies should expand use of conventional tolling on existing and new expressways, and establish tolls that vary over time to manage demand and prevent traffic jams, the report says. In the longer term, variable toll lanes could be extended to entire highways. Then, after a few more years, all roads could be charged, with lower fees for non-highway driving. The committee noted that commuting by car during rush hour would become more expensive and bus travel would be faster and more reliable, so more people might decide to use transit services.

— *Patrice Pages*

■ **The Fuel Tax and Alternatives for Transportation Funding — Special Report 285.** Committee on the Long-Term Viability of Fuel Taxes for Transportation Finance, Transportation Research Board (2006, approx. 222 pp.; ISBN 0-309-09419-4; available from the board, tel. 202-334-3213; \$30.00 for single copies; also on the Internet at <[www.trb.org/bookstore](http://www.trb.org/bookstore)>).

**Rudolph Penner**, senior fellow at the Urban Institute, Washington, D.C., chaired the committee. The study was funded by the National Cooperative Highway Research Program, U.S. Department of Transportation’s Federal Highway Administration, and the Transportation Research Board.



# Protecting Air Transportation

## Better Defenses Against Chemical and Biological Threats

**T**he U.S. air transportation system is an attractive target for attacks with chemical or biological agents. Not only do the large luggage-toting crowds at airports make terrorists hard to spot, the dispersal of passengers to destinations around the world makes it much easier to spread infectious diseases or dangerous toxins widely.

A new report from the National Research Council recommends that responsibility for guarding against such an attack be assigned to the Transportation Security Administration. Defending against a chemical or biological attack means understanding the spaces likely to be targeted — in this case, terminals, boarding areas, and aircraft — and in particular knowing how the air-handling systems in those spaces operate. TSA is the agency with the most knowledge about the unique physical characteristics of airports, concluded the committee that wrote the report.

TSA should collaborate with other entities in the U.S. Department of Homeland Security to form a high-level task force to develop a specific defensive strategy, the committee recommended. The task force also should keep up-to-date “threat assessments” that outline scenarios of how terrorists might release agents in airports and planes, or directly into their air-handling systems. The task force should use chemical and biological simulants to explore how particles disperse, and it should take advantage of research that models airflow within aircrafts and terminals.

Some of the research and development of chemical and biological sensors is promising, but their performance is hard to evaluate, the committee said, and none of the technologies is ready to be deployed in an airport or plane. Regardless, relying solely on sensors to detect an attack would be a mistake. A vast number of dangerous chemicals and pathogens must be monitored for, and an attack with fast-acting agents would begin producing symptoms in victims in about the same amount of time it would take for a sensor to sound an alarm. In this case, video monitoring, especially coupled with behavioral-pattern-recognition software, would be the fastest way to realize an attack had occurred.

Besides improved video surveillance, the committee recommended that TSA focus on protective measures such as reducing airflow between different airport areas and limiting access to air intake vents. The agency should also promote the development and deployment of “active purification units” that could reduce or eliminate infectious biological agents and some fast-acting chemicals in systems delivering air to terminals and aircraft. Establishing a separate air supply for critical areas such as control towers should be considered as well. — *Bill Kearney*

■ **Defending the U.S. Air Transportation System Against Chemical and Biological Threats.** Committee on Assessment of Security Technologies for Transportation, National Materials Advisory Board, Division on Engineering and Physical Sciences, and the Transportation Research Board (2006, 46 pp.; ISBN 0-309-10074-7; available from the National Academies Press, tel. 1-800-624-6242; \$12.00 plus \$4.50 shipping for single copies; also on the Internet at [books.nap.edu/catalog/11556.html](http://books.nap.edu/catalog/11556.html)).

The committee is chaired by **James F. O'Bryon**, retired deputy assistant secretary of defense, Belair, Md. The study was funded by the Transportation Security Administration.



# Out of Africa

## *Experts Meet to Discuss Development of African Science Academies*

**S**cholars must be more-active members of society, work harder to engage government officials, and help meet the need for scientific and technical expertise in policy arenas, concluded roughly 160 leading researchers and government representatives who attended the ASADI conference in Nairobi, Kenya, last November. S&T knowledge in many African countries is disconnected from decision-making — reducing the research community's opportunities to contribute to policy improvements that would benefit the public at large and boost the continent's standing in the global marketplace. Stronger science academies can contribute positively toward measures that will save lives or improve living conditions by settling key scientific questions on topics such as malaria prevention or agricultural production.

"I think we must stop talking...we talk too much," said conference presenter Lee Yee-Cheong, coordinator of the U.N. Millennium Project Task Force on Science, Technology, and Innovation. "Merely offering advice is not enough. ...I appeal to you: Get your hands dirty."

Said presenter Miriam Were, chair of the African Medical and Research Foundation and of the National AIDS Control Council, both of Kenya: "The bottom line is how you improve the lives of the people."

Supported by a \$20 million grant from the Bill & Melinda Gates Foundation and

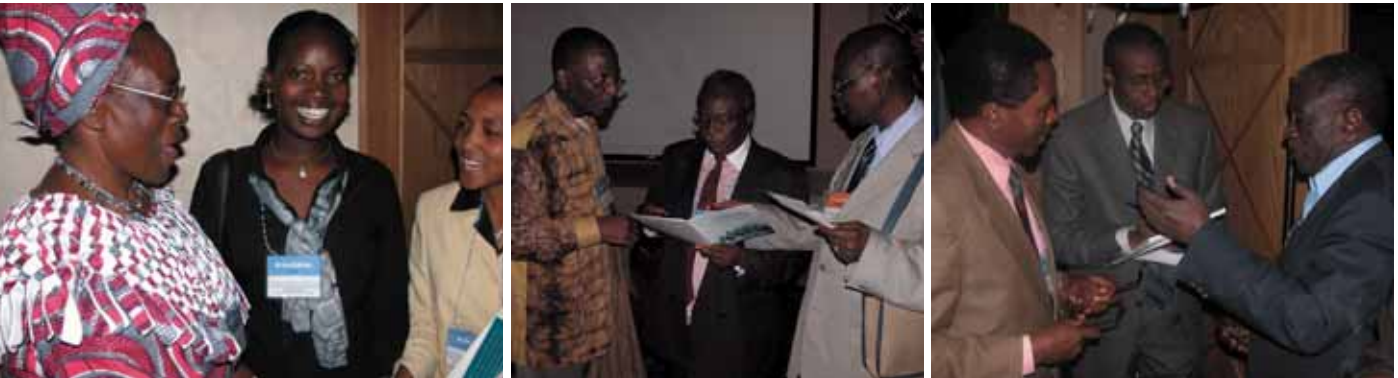


"It takes a village to raise a child" is an African proverb that stresses the importance of strong communities and the power of working together.

Likewise, participants at the first annual conference of the African Science Academy Development Initiative (ASADI) emphasized that the full heft of the continent's scientific enterprise is needed to help decision-makers cultivate sound public policies and programs.

administered by the U.S. National Academies, ASADI will be carried out over the next decade and focus on efforts to improve human health in Africa. The science academies of Nigeria, Uganda, and South Africa are the initial focal points, receiving financial support as well as tech-

too. Memberships are “too old, too male, and too familiar with each other,” said Mohamed Hassan, executive director of the Third World Academy of Sciences. And academies should improve how they communicate scientific information, making it more accessible and useful for politicians



nical assistance and training. Discussions at the conference centered on finding ways to harness Africa’s S&T enterprise to help leaders fulfill their commitments to the United Nations’ Millennium Development Goals in areas such as disease prevention and the eradication of extreme poverty and hunger. Participants also talked about the challenges of creating science-advisory models that would be workable and cost-effective over time.

All academy representatives seem to agree that the challenge will not be an easy one, stating that many government leaders across Africa question the value of homegrown scientific advice, provide only marginal funding and other support, or are unsure of how to best tap their countries’ scientific expertise. At the same time, academies must shed their often elitist attitudes and seek ways to actively serve government and society in a structured, consistent manner, speakers said. Greater diversity is needed within the ranks,

and the public. Africa’s pipeline of scientists, engineers, and health care professionals has long operated below capacity because of inadequate education systems and the flight of talented scholars to the West.

There are success stories, however. Uganda’s academy has worked closely with a government commission on HIV/AIDS, for example.

Using science to tackle basic problems that Africans routinely face must always be the primary goal, other presenters said. Speciosa Wandira-Kazibwe, Uganda’s former vice president and minister of agriculture, said that researchers often “work like artists who are very independent-minded, who want to do [their] own thing. ...This must stop.”

More information about the conference and initiative is available online at [national-academies.org/nairobi](http://national-academies.org/nairobi). Cameroon’s academy will host the 2006 conference in Yaoundé. — *Vanee Vines*

## Third *Futures* Conference Launches a **GENOMIC ATTACK** on Infectious Diseases

BY KIRYN HASLINGER

One question on everyone's mind each winter is the how to avoid getting the flu. Influenza and its fellow infectious diseases — which range from moderately troublesome bugs such as the common cold to lethal assassins like HIV — are collectively the most potent source of illness and mortality across the world. Just as understanding the criminal



mind may be the most effective way to deter human villains, a similarly penetrating approach could be applied against these microbial bad guys.

This broad imperative provided the impetus to bring together 150 researchers, policymakers, foundation representatives, and science journalists last November at a four-day conference to discuss solutions to the growing problem of infectious diseases

using the field of genomics. The third annual conference of the National Academies Keck *Futures Initiative*, “The Genomic Revolution: Implications for Treatment and Control of Infectious Disease,” invited its participants to develop creative ways to attack dangerous microbes through understanding their fundamental genomic compositions.

The trademark of the *Futures Initiative* is interdisciplinary research. “Discovery comes at the interstices of disciplines,” said NAE President Wm. A. Wulf. With that, he introduced a series of tutorial sessions intended to explain the state-of-the-science of various specialties, so that researchers could communicate clearly with one another across disciplines. In one tutorial, Gary Nabel, director of the Vaccine Research Center at the National Institute of Allergy and Infectious Diseases, discussed genomics, structural biology, and rational vaccine design. Using genomics, he asked, “How can we create new paradigms to create highly effective vaccines?” He stressed that the key would be gaining a better understanding of gene function and evolution. In another session, Stanford University professor David Relman declared, “We are 10 parts microbial and one part human,” to emphasize the dynamic interplay between humans and microbes, before taking conference participants on a tour of disease epidemiology.

Interspersed with other technical tutorials on topics such as human genetic variation and bioinformatics were talks about the societal impact of infectious disease. Austin Demby, a senior staff fellow at the Global AIDS Program of the Centers for Disease Control and Prevention, discussed the needs

of developing countries and the unique delivery and implementation issues that face parts of the world most affected by infectious diseases, such as sub-Saharan Africa.

The tutorials served as a stepping-off point for the participants to address concrete prob-



lems in small working groups. Throughout eight hours of discussion, researchers brainstormed about potential plans for designing technologies to improve rapid response to disease, developing an inexpensive diagnostic test for pathogens, preventing the next pandemic flu, creating a device to detect and identify pathogens, and sequencing an individual's genome for under \$1,000. Other groups focused on such vital topics as determining the role of public health in

integrating genomics into disease control and devising new therapies by harnessing natural genetic variation in disease resistance.

These working groups provided a fertile environment for communication among scientists, engineers, and medical researchers who discovered a valuable opportunity for interdisciplinary collaboration. The *Futures Initiative* aims to spark such relationships and offers a rewarding incentive for

researchers to do so: up to \$75,000 to fund innovative research and continue collaborative dialogues that emerged from the conference. The initiative supplies \$1 million annually for such seed grants, awarded competitively to conference participants.

Another major goal of the initiative is to encourage communication of scientific discoveries and ideas to the public. At the conference, a 2005 National Academies Communication Award was given to John Barry for his book *The Great Influenza: The Epic Story of the Deadliest Plague in History*. Another was given to Gareth Cook for his coverage of the national debate on stem cells in *The Boston Globe*, and a third award was bestowed to Thomas Levenson for his television series on the evolution of life in the cosmos, WGBH NOVA's "Origins: Back to the Beginning." The \$20,000 awards recognize excellence in reporting and communicating science, engineering, and medicine to the general public, and the winners were selected from more than 200 entries.

In a tutorial on conducting team science, Mary E. Lindstrom, vice provost of research at the University of Washington, warned, "If you're going to take risks, you cannot expect 100 percent success." The *Futures Initiative* has made valuable investments in scientific risk-taking since it was launched in 2003, lauding and supporting bold efforts in both scientific research and communication.

Kiryn Haslinger, a science writer based in New York City, holds a master's degree in theoretical chemistry. She is the chief correspondent for computational biology and bioinformatics at the New York Academy of Sciences and previously an editorial assistant to James D. Watson at Cold Spring Harbor Laboratory.

For more information on the *Futures Initiative* and this conference, visit <[www.keckfutures.org](http://www.keckfutures.org)>.



## Landmark 'Intelligent Design' Decision Cites NAS

When U.S. District Judge John E. Jones III struck down a Pennsylvania school board's requirement to teach "intelligent design" as an alternative to evolution in local high school biology classes, he cited

the National Academy of Sciences as an organization recognized by experts on both sides of the trial as the "most prestigious" scientific organization in the country. In fact, in his lengthy December 2005 opinion

*Kitzmiller v. Dover Area School District*, Jones chose the following excerpt from the Academy's 1998 publication *Teaching About Evolution and the Nature of Science* as his definition of "science":

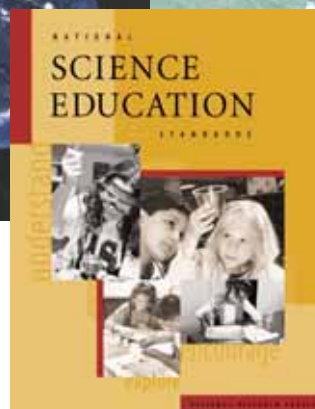
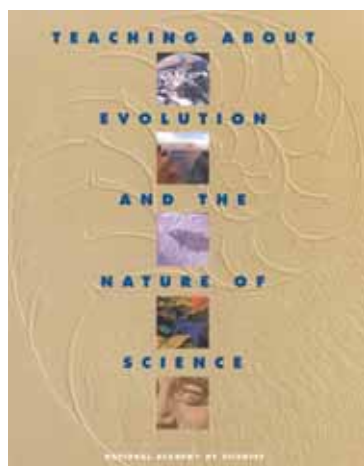
"Science is a particular way of knowing about the world. In science, explanations are restricted to those that can be inferred from the confirmable data — the results obtained through observations and experiments that can be substantiated by other scientists. Anything that can be observed or measured is amenable to scientific investigation. Explanations that cannot be based upon empirical evidence are not part of science."

Jones ruled that teaching intelligent design violates the U.S. Constitution because it illegally promotes religion in

public schools. Intelligent design, he found, was another form of biblical "creationism," the teaching of which was banned in public schools by the U.S. Supreme Court in 1987. In dismissing claims that intelligent design is a science and that there is some "irreducible complexity" in molecular systems, he also relied on and quoted NAS findings in his opinion.

*Teaching About Evolution and the Nature of Science; Science and Creationism: A View from the National Academy of Sciences, 2nd ed.*; and other NAS reports and statements on science education and evolution are available free as downloadable PDF files on the National Academies' evolution Web page, <[national-academies.org/evolution](http://national-academies.org/evolution)>.

— William Skane





## Kavli Gift to Frontiers of Science

The Kavli Foundation has made a \$5 million gift to support the National Academy of Sciences' Frontiers of Science symposia for the next 10 years. Since 1989, these symposia, which focus on the development of promising young scientists, have been held annually to bring promising researchers out of their labs and give them the opportunity to learn about the latest research outside their own fields, as well as to network and collaborate with their peers. In recent years, the Academy has expanded the symposia internationally, organizing bilateral meetings that include young researchers from China, Germany, India, and Japan.

Frontiers of Science symposia give approximately 80 young scientists — most of them under the age of 45 — a chance to learn about advances and opportunities in other fields through a series of seminars on cutting-edge areas of science, followed by intensive group and one-on-one discussions. Attendees are selected from researchers who have already made recognized contributions to science, including recipients of Sloan, Packard, and MacArthur fellowships, winners of the Waterman award, Beckman Young Investigators, and

Presidential Early Career Award for Scientists and Engineers.

“Fred Kavli and the Kavli Foundation stand out as innovators in finding important new ways to stimulate science in the 21st century,” said NAS President Ralph J. Cicerone. “We thank them for their generosity and foresight in supporting the growth of some of our nation’s most gifted young scientists.”

Established in 2000, the California-based Kavli Foundation supports basic research in nanoscience, astrophysics, and neuroscience, primarily through an international program of research institutes and the support of endowed chairs. In 2008 it will inaugurate the Kavli Prizes, three \$1 million awards to recognize scientists who have made seminal advances in these fields.

“This alliance between the NAS and the Kavli Foundation is a perfect fit on many levels,” said Fred Kavli, the founder and chairman of the foundation. “We are pleased and excited to help bring together outstanding young scientists from different fields and from all over the world to exchange ideas, learn from each other, and establish mutual bonds. We are delighted to form a partnership with the Academy in this activity.”

For more information on the Kavli Frontiers of Science of the National Academy of Sciences, visit <[www.nasonline.org/fos](http://www.nasonline.org/fos)>.

— *William Skane*

## Projects

*The following projects have been recently undertaken by units of the National Academies. The latest information about all current committee activities — including project descriptions, committee rosters, and meeting information — is available in “Current Projects” on the National Academies’ Web site.*

### Countering Radiological Terrorism.

Nuclear and Radiation Studies Board, Division on Earth and Life Studies; and Development, Security, and Cooperation, Division on Policy and Global Affairs. Project director: Micah Lowenthal. Chair: John F. Ahearne, director of the ethics program, Sigma Xi, The Scientific Research Society, and lecturer, Duke University, Durham, N.C. Sponsor: National Nuclear Security Administration’s Office of Global Radiological Threat Reduction.

### Learning Science in Informal Environments: A Review of Research and Future Directions.

Board on Science Education, Division of Behavioral and Social Sciences and Education. Project director: Jean Moon. Chair: To be selected. Sponsor: National Science Foundation.

### Meeting Work-Force Needs for the National Vision for Space Exploration.

Space Studies Board and Aeronautics and Space Engineering Board, Division on Engineering and Physical Sciences. Project director: Joseph Alexander. Co-chairs: David C. Black, president and chief executive officer, Universities Space Research Association, Houston; and Daniel E. Hastings, professor of aeronautics and astronautics and of engineering systems, and dean for undergraduate education, Massachusetts Institute of Technology, Cambridge. Sponsor: NASA.

### New Orleans Regional Hurricane Protection Projects.

National Academy of Engineering, Division on Engineering and Physical Sciences, and Division on Earth and

Life Studies. Project director: Jeffrey Jacobs. Chair: G. Wayne Clough, president, Georgia Institute of Technology, Atlanta. Sponsor: U.S. Department of the Army.

### Review of the Scientific Literature on Amyotrophic Lateral Sclerosis in Veterans.

Board on Population Health and Public Health Practice, Institute of Medicine. Project director: Abigail Mitchell. Chair: Richard T. Johnson, professor of microbiology and of neurology, Johns Hopkins University School of Medicine, Baltimore. Sponsor: U.S. Department of Veterans Affairs.

## Publications

*For documents shown as available from the National Academies Press (NAP), write to 500 Fifth St., N.W., Lockbox 285, Washington, D.C. 20055; tel. 202-334-3313 or 1-800-624-6242; or order on the Internet at <www.nap.edu>. Documents from a specific unit of the National Academies are available from the source as noted.*

### Advanced Research Instrumentation and Facilities

Committee on Science, Engineering, and Public Policy, National Academy of Sciences, National Academy of Engineering, and Institute of Medicine (2005, approx. 240 pp.; ISBN 0-309-09701-0; available from NAP).

### Application of Toxicogenomics to Cross-Species Extrapolation — A Report of a Workshop

Committee on Emerging Issues and Data on Environmental Contaminants, Board on Environmental Studies and Toxicology and Board on Life Sciences, Division on Earth and Life Studies (2005, approx. 60 pp.; ISBN 0-309-10084-4; available from NAP).

**Assessing and Managing the Ecological Impacts of Paved Roads**  
Board on Environmental Studies and Toxicology, Division on Earth and

Life Studies; and Transportation Research Board (2005, 324 pp.; ISBN 0-309-10088-7; available from NAP).

### Assessing Fitness for Military Enlistment: Physical, Medical, and Mental Health Standards

Board on Behavioral, Cognitive, and Sensory Sciences, Division of Behavioral and Social Sciences and Education (2006, approx. 302 pp.; ISBN 0-309-10079-8; available from NAP).

### An Assessment of the National Institute of Standards and Technology Measurement and Standards Laboratories: Fiscal Years 2004-2005

Board on Assessment of NIST Programs, Division on Engineering and Physical Sciences (2005, 134 pp.; ISBN 0-309-10036-4; available from NAP).

### Basic Research in Information Science and Technology for Air Force Needs

Board on Mathematical Sciences and Their Applications, Division on Engineering and Physical Sciences (2006, 116 pp.; ISBN 0-309-10031-3; available from NAP).

### Bioastronautics Roadmap: A Risk Reduction Strategy for Human Exploration of Space

Board on Health Sciences Policy, Institute of Medicine; and Space Studies Board and Aeronautics and Space Engineering Board, Division on Engineering and Physical Sciences (2006, approx. 142 pp.; ISBN 0-309-09948-X; available from NAP).

### Catalyzing Inquiry at the Interface of Computing and Biology

Computer Science and Telecommunications Board, Division on Engineering and Physical Sciences (2005, 468 pp.; ISBN 0-309-09612-X; available from NAP).

### The Changing Transitions to Adulthood in Developing Countries: Selected Studies

Committee on Population, Division of Behavioral and Social Sciences and Education (2005, 506 pp.; ISBN 0-309-09680-4; available from NAP).

**Child Health in Complex Emergencies**

Roundtable on the Demography of Forced Migration, Committee on Population, Division of Behavioral and Social Sciences and Education; and Program on Forced Migration and Health, Mailman School of Public Health, Columbia University (2006, 84 pp.; ISBN 0-309-10063-1; available from NAP).

**Controlling the Quantum World of Atoms, Molecules, and Photons — An Interim Report**

Board on Physics and Astronomy, Division on Engineering and Physical Sciences (2005, 12 pp.; ISBN 0-309-65565-X; available only online from NAP).

**Deconstructing the Computer — Report of a Symposium**

Board on Science, Technology, and Economic Policy, Division on Policy and Global Affairs (2005, 182 pp.; ISBN 0-309-09254-X; available from NAP).

**Expanding Access to Research Data: Reconciling Risks and Opportunities**  
Committee on National Statistics, Division of Behavioral and Social Sciences and Education (2005, 132 pp.; ISBN 0-309-10012-7; available from NAP).

**Extending the Effective Lifetimes of Earth Observing Research Missions**  
Space Studies Board, Division on Engineering and Physical Sciences (2005, 36 pp.; ISBN 0-309-65556-0; available online from NAP or from the board, tel. 202-334-3477 or e-mail <ssb@nas.edu>).

**Food Safety and Foodborne Disease Surveillance Systems — Proceedings of an Iranian-American Workshop**  
Office for Central Europe and Eurasia, Division on Policy and Global Affairs; in cooperation with the Research Center for Gastroenterology and Liver Diseases, Shaheed Beheshti University of Medical Sciences, Iran; World Health Organization; and Food and Agriculture Organization (2006, approx. 206 pp.; ISBN 0-309-10033-X; available from NAP).

**FORCENet Implementation Strategy**

Naval Studies Board, Division on Engineering and Physical Sciences (2005, 260 pp.; ISBN 0-309-10025-9; available from NAP).

**Improving the Social Security Disability Decision Process — Interim Report**

Medical Follow-Up Agency, Institute of Medicine (2006, 100 pp.; ISBN 0-309-10094-1; available from NAP).

**Informing the Future: Critical Issues in Health, Third Ed.**

Institute of Medicine (2005, 128 pp.; ISBN 0-309-65364-9; available only online from NAP).

**Interim Design Assessment for the Blue Grass Chemical Agent Destruction Pilot Plant**

Board on Army Science and Technology, Division on Engineering and Physical Sciences (2005, 94 pp.; ISBN 0-309-09698-7; available from NAP).

**Lessons Learned Between Hurricanes: From Hugo to Charley, Frances, Ivan, and Jeanne — Summary of the March 8, 2005, Workshop of the Disasters Roundtable**

Disasters Roundtable, Division on Earth and Life Studies (2005, 28 pp.; ISBN 0-309-65667-2; available only online from NAP).

**Linkages: Manufacturing Trends in Electronic Interconnection Technology**

Board on Manufacturing and Engineering Design, Division on Engineering and Physical Sciences (2005, 94 pp.; ISBN 0-309-10034-8; available from NAP).

**Linking Mandatory Professional Development with High-Quality Teaching and Learning — Proceedings and Transcripts**

National Academies Teacher Advisory Council, Division of Behavioral and Social Sciences and Education (2006; ISBN 0-309-09725-8; CD-ROM available from NAP).

**Managing Construction and Infrastructure in the 21st Century Bureau of Reclamation**

Board on Infrastructure and the

Constructed Environment, Division on Engineering and Physical Sciences (2006, 154 pp.; ISBN 0-309-10035-6; available from NAP).

**Mineral Tolerance of Animals, Second Revised Ed., 2005**

Board on Agriculture and Natural Resources, Division on Earth and Life Studies (2005, 510 pp.; ISBN 0-309-09654-5; available from NAP).

**Network Science**

Board on Army Science and Technology, Division on Engineering and Physical Sciences (2005, 124 pp.; ISBN 0-309-10026-7; available from NAP).

**Noise and Military Service: Implications for Hearing Loss and Tinnitus**

Medical Follow-Up Agency, Institute of Medicine (2006, 338 pp.; ISBN 0-309-09949-8; available from NAP).

**Performance Measurement: Accelerating Improvement**

Board on Health Care Services, Institute of Medicine (2006, approx. 390 pp.; ISBN 0-309-10007-0; available from NAP).

**Polar Icebreaker Roles and U.S. Future Needs: A Preliminary Assessment**

Polar Research Board, Division on Earth and Life Studies; and Marine Board, Transportation Research Board (2005, 52 pp.; ISBN 0-309-10069-0; available from NAP).

**Population, Land Use, and Environment: Research Directions**

Committee on the Human Dimensions of Global Change, Center for Economics, Governance, and International Studies, Division of Behavioral and Social Sciences and Education (2005, 344 pp.; ISBN 0-309-09655-3; available from NAP).

**Principal-Investigator-Led Missions in the Space Sciences**

Space Studies Board, Division on Engineering and Physical Sciences (2005, approx. 90 pp.; ISBN 0-309-10070-4; available from NAP or from the board, tel. 202-334-3477 or e-mail <ssb@nas.edu>).

**Priorities in Space Science Enabled by Nuclear Power and Propulsion**  
Space Studies Board and Aeronautics and Space Engineering Board, Division on Engineering and Physical Sciences (2005, approx. 326 pp.; ISBN 0-309-10011-9; available from NAP).

**Progress in Preventing Childhood Obesity: Focus on Schools — Brief Summary, Institute of Medicine Regional Symposium**  
Food and Nutrition Board, Institute of Medicine, in collaboration with the Kansas Health Foundation (2006, 36 pp.; ISBN 0-309-10040-2; available from NAP).

**Reaping the Benefits of Genomic and Proteomic Research: Intellectual Property Rights, Innovation, and Public Health**  
Board on Science, Technology, and Economic Policy, and Committee on Science, Technology, and Law, Division on Policy and Global Affairs (2005, approx. 200 pp.; ISBN 0-309-10067-4; available from NAP).

**Review of NASA Plans for the International Space Station**  
Space Studies Board, Division on Engineering and Physical Sciences (2005, approx. 80 pp.; ISBN 0-309-10085-2; available from NAP or from the board, tel. 202-334-3477 or e-mail <ssb@nas.edu>).

**Review of the Department of Defense Research Program on Low-Level Exposures to Chemical Warfare Agents**  
Committee on Toxicology, Board on Environmental Studies and Toxicology, Division on Earth and Life Studies (2005, 122 pp.; ISBN 0-309-10021-6; available from NAP).

**Review of the Lake Ontario-St. Lawrence River Studies**  
Water Science and Technology Board,

Division on Earth and Life Studies, in collaboration with the Royal Society of Canada (2005, approx. 166 pp.; ISBN 0-309-10068-2; available from NAP).

**The Richard and Hinda Rosenthal Lectures 2004: Perspectives on the Prevention of Childhood Obesity in Children and Youth**  
Institute of Medicine (2006, 60 pp.; ISBN 0-309-10072-0; available from NAP).

**Rising Above The Gathering Storm: Energizing and Employing America for a Brighter Economic Future**  
Committee on Science, Engineering, and Public Policy, National Academy of Sciences, National Academy of Engineering, and Institute of Medicine (2006, approx. 504 pp.; ISBN 0-309-10039-9; available from NAP).

**Scientific Examination of Art: Modern Techniques in Conservation and Analysis — Papers From a Colloquium**  
Arthur M. Sackler Colloquia, National Academy of Sciences (2005, 252 pp.; ISBN 0-309-09625-1; available from NAP).

**Strategic Guidance for the National Science Foundation's Support of the Atmospheric Sciences — An Interim Report**  
Board on Atmospheric Sciences and Climate, Division on Earth and Life Studies (2005, 104 pp.; ISBN 0-309-10008-9; available from NAP).

**Summary of a Workshop on Using Information Technology to Enhance Disaster Management**  
Computer Science and Telecommunications Board, Division on Engineering and Physical Sciences (2005, 40 pp.; ISBN 0-309-10037-2; available from NAP).

**Supporting Local Health Care in a Chronic Crisis: Management and Financing Approaches in the Eastern Democratic Republic of the Congo**  
Roundtable on the Demography of Forced Migration, Committee on Population, Division of Behavioral and Social Sciences and Education; and Program on Forced Migration and Health, Mailman School of Public Health, Columbia University (2006, 104 pp.; ISBN 0-309-10038-0; available from NAP).

**Systematics and the Origin of Species: On Ernst Mayr's 100th Anniversary — Papers From a Colloquium**  
Arthur M. Sackler Colloquia, National Academy of Sciences (2005, 382 pp.; ISBN 0-309-09536-0; available from NAP).

**Toxicity Testing for Assessment of Environmental Agents — Interim Report**  
Board on Environmental Studies and Toxicology and Institute for Laboratory Animal Research, Division on Earth and Life Studies (2005, approx. 244 pp.; ISBN 0-309-10092-5; available from NAP).

**Treating Infectious Diseases in a Microbial World: Report of Two Workshops on Novel Antimicrobial Therapeutics**  
Board on Life Sciences, Division on Earth and Life Studies (2006, 103 pp.; ISBN 0-309-10056-9; available from NAP).

**Valuing Health for Regulatory Cost-Effectiveness Analysis**  
Board on Health Care Services, Institute of Medicine (2006, approx. 380 pp.; ISBN 0-309-10077-1; available from NAP).

**TRANSPORTATION RESEARCH BOARD (TRB) REPORTS** — *Approximately 150 titles issued annually. Free catalog available on request from TRB, 500 Fifth St., N.W., Washington, D.C. 20001 (tel. 202-334-3213), or visit TRB's bookstore on the Internet at <national-academies.org/trb/bookstore>.*

# Upcoming Exhibitions

The Office of Exhibitions and Cultural Programs of the National Academy of Sciences presents an exploration of the intersection of art, science, engineering, and medicine.



Justine Cooper, *American Lobster (Homarus americanus)*, American Museum of Natural History, New York City, 2004, digital chromogenic print, 26 x 20 inches

## Museum Muses: Barton Lidicé Benes and Justine Cooper

Feb. 12 - May 1

This exhibition pairs Justine Cooper and Barton Lidicé Benes, two artists whose work addresses museum issues and the nature of collecting. Benes collects bits of rubbish left behind by celebrities and assembles them into his own whimsical cabinets of curiosity. Cooper spent a year as artist-in-residence at the American Museum of Natural History, photographing the institution's collections and labyrinth of storage spaces.

## Sensing Terrains: An Installation by Patricia Olynyk

Feb. 12 - June 16

In this exhibition, Patricia Olynyk juxtaposes triggers of sensation with the sensory system itself. She incorporates her own imagery of a variety of specimens, including human corneas, wild mouse taste buds, and guinea pig cochlea with photographs of Japanese gardens meant to tickle the senses.



Patricia Olynyk, *Cenesthesia: Taste* (detail), 2005, digital print on rag paper, 115 x 44 inches

### At the National Academy of Sciences

2100 C St. N.W., Washington, D.C.

**Hours: Weekdays 9 a.m. - 5 p.m.** (photo ID required)

[national-academies.org/arts](http://national-academies.org/arts)

202-334-2436

### IN FOCUS

P.O. Box 665  
Holmes, PA 19043

PRE-SORT STANDARD  
U.S. POSTAGE PAID  
PERMIT NO. 6426  
WASHINGTON, DC