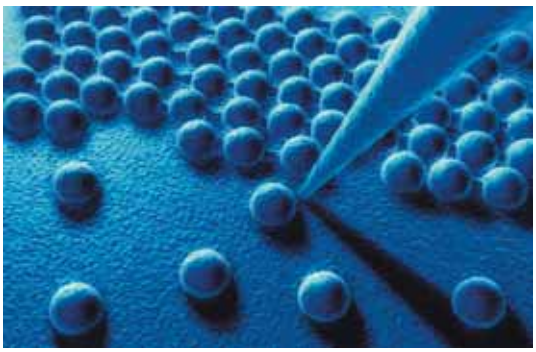
NATIONAL ACADEMY OF SCIENCES
NATIONAL ACADEMY OF ENGINEERING
INSTITUTE OF MEDICINE
NATIONAL RESEARCH COUNCIL

THE NATIONAL ACADEMIES
IN FOCUS

infocusmagazine.org



The Need for New Polar Icebreakers

Progress Report on Nanotechnology

A New Lesson Plan for K-8 Science

Counting North American Pollinators

Fall 2006
vol. 6 number 3

THE NATIONAL ACADEMIES
Advisers to the Nation on Science, Engineering, and Medicine

The nation turns to the 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 National Academies and their 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) U.S. Coast Guard Cutter Polar Sea on ice operations in the Arctic, photo by Andy Devilbiss, U.S. Coast Guard; image showing the head of an atomic force microscope moving single atoms, ©Matthias Kulka/Corbis; schoolchildren examining fossils, ©Mauro Fermariello/Photo Researchers Inc.; honeybee *(Apis mellifera)* pollinating a flower, ©James H. Robinson/ Photo Researchers Inc.
Page 1:	(col. 1) U.S. Coast Guard's icebreaker Polar Star in the ice channel near McMurdo, Antarctica, photo by Rob Rothway, U.S. Coast Guard; (col. 2, from top) three-dimensional nanostructure grown by controlled nucleation of silicon carbide nanowires on gallium catalyst particles, ©Ghim Wei Ho and Mark Welland, University of Cambridge; fourth-graders at Glenallen Elementary School in Silver Spring, Md., search for microorganisms in science class, photo by Barry Myers, image courtesy National Science Foundation
Page 2:	(from top) Speaker at "Rising Above The Gathering Storm: Energizing and Employing Regions, States, and Cities for a Brighter Economic Future," a convocation held at the National Academies on Sept. 28, 2006, photo by William Geiger; ©Royalty-Free/Corbis
Page 3:	Photo by Mark Finkenstaedt
Page 4:	©Photodisc
Page 5:	Collection of honeybees, photo by Scott Bauer, USDA Agricultural Research Service
Page 6:	Scientists from U.S. Coast Guard Cutter Polar Sea taking ice core samples in the Arctic, photo by Andy Devilbiss, U.S. Coast Guard
Page 7:	©Lael Henderson/Images.com/Corbis
Page 8:	©Photodisc
Page 9:	©ImageZoo/Images.com
Page 10:	©Dynamic Graphics/Jupiterimages
Page 11:	©Photodisc
Page 12:	Sam Jiang in the Materials Science Division at the Argonne National Laboratory's Center for Nanoscale Materials prepares nanostructured magnetic samples for X-ray diffraction studies, image courtesy Argonne National Laboratory
Pages 13&14	©Thinkstock/Jupiterimages
Page 15:	©Purestock/Superstock
Pages 16-18:	Participants and speakers at "Rising Above The Gathering Storm: Energizing and Employing Regions, States, and Cities for a Brighter Economic Future," a convocation held at the National Academies on Sept. 28, 2006, photo by William Geiger
Page 19:	Photo by Donna Coveney, Massachusetts Institute of Technology News Office
Page 20:	Winners of the 2006 National Academies Communication Awards, photo by Paul Kennedy
Page 21:	©Royalty-Free/Corbis

THE NATIONAL ACADEMIES **IN FOCUS**
Volume 6 Number 3 infocusmagazine.org

CONTENTS

FEATURES

CONTENTS

16

21

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
Maxine L. Savits, 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, Maureen O'Leary, Patrice Pages, Christine Stencel, Vanee Vines

Original Design: Francesca Moghari

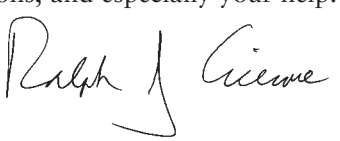
Celebrating and Rethinking Science Communication

At the National Academies Keck *Futures Initiative* interdisciplinary conference on "smart prosthetics" held recently at the Beckman Center, Bill Wulf, Harvey Fineberg, and I had the pleasure of awarding the Academies' Communication Awards. These annual prizes recognize and encourage excellence in communicating science, engineering, and medicine to the general public. Now in their fourth year, and with three prizes of $20,000 each, they have become much sought after awards for science writers, producers and their editors, publishers, and broadcast executives.

On page 20 of this issue of *In Focus,* you'll learn more about this year's prize winners. But here I'd like to reflect on something that struck me as we presented the awards. In each case, the winners focused on subjects of serious importance to society in which science, engineering, and medicine play a critical role. One winner traced human evolution back to its beginnings, explaining how the scientific evidence supports Darwinian theory. Another worked alongside archaeologists to assemble and write about scientific evidence about our earliest human ancestors in the Americas, painting a pre-1492 picture of the continent that is very different from the one we learned in grade school. The third winner and several finalists reported on global climate change and its potential impacts.

But even as we celebrate these excellent communicators, we are also seeing troubling signs that communicating science, engineering, and medicine to the general public is getting harder. With recent downsizings at newspapers, magazines, and broadcast outlets, there are now fewer full-time science writers and less space or time for serious, in-depth reporting. The Internet does offer new, nontraditional outlets, but it is still unclear whether it can successfully replace newspapers in making science news accessible to a broad general audience.

This means that scientists themselves must do a better job of communicating directly to the public. To do that at the Academies, we have started work on finding new ways of stimulating public interest in science. Specifically we are looking at new avenues to provide evidence-based information on select science-based topics to help educate the informed public, key opinion leaders, and other influential actors in appropriate fields. Our goal will be to communicate the valuable role science plays in the world and to reinforce and enhance positive attitudes toward science and the scientific process. This initiative won't be easy; some of the challenges we'll face have their roots in long-standing problems in U.S. science education. But we are making a start, and I welcome your ideas, suggestions, and especially your help.



RALPH J. CICERONE
President, National Academy of Sciences

Counting the **Birds** and the **Bees**

POLLINATOR POPULATIONS NEED TO BE BETTER MONITORED

Three-quarters of all flowering plants rely on another organism to perform a critical step in their life cycle: pollination. In fact, about one-third of the world's food supply comes from crops that depend on bees, birds, bats, or other creatures to carry pollen to complete the fertilization process. When there are not enough wild pollinators in the area, farmers often lease thousands of colonies of bees to do the job.

In recent years, however, there have been reported shortages in the number of pollinators available for agriculture, and studies showing a population decline in certain pollinator species have prompted concerns that ecosystems could be disrupted. To raise awareness of this issue, the North American Pollinator Protection Campaign, representing dozens of agencies and organizations in Canada, the United States, and Mexico, was formed. As part of its efforts, NAPPC requested that a National Research Council committee assess the status of pollinators on this continent.

The committee quickly discovered that data on North American pollinators paled in comparison to the information that has been gathered in Europe, where researchers have definitively documented declines and even extinctions. Nevertheless, enough data existed for the committee to find "demonstrably downward" population trends in some North American pollinators.

The evidence of a decline is most compelling for the honeybee, which is widely used for pollination; about 1.4 million colonies are needed to pollinate 550,000

acres of almond trees each year in California, for example. The number of honeybees in the U.S. is dropping, in part because of the toll taken by the non-indigenous varroa mite, a parasite first discovered in America in the 1980s and one that has proved stubbornly resistant to pesticides. To gain a better understanding of the extent of the honeybee decline, the U.S. Department of Agriculture's National Agricultural Statistics Service needs to collect more accurate data from the beekeeping industry, the committee said.

The shortage of honeybees is severe enough that last year it forced almond growers to import honeybees from outside North America for the first time since 1922, when the Honeybee Act banned such imports for fear they may introduce non-native pests and pathogens. Such fears should still be a concern, the committee warned, and USDA should support research to develop new pest-management and bee-breeding practices.

Among wild pollinators in North America, there is evidence of a drop in the abundance of several types of wild bees, especially bumblebees, as well as some butterflies, bats, and hummingbirds. But for most pollinator species, a lack of long-term population data makes assessments exceedingly difficult. A shortage of taxonomic resources and an incomplete biological characterization of most pollinator species further complicates efforts to catalog their numbers and diversity. The committee recommended that the United States, Canada, and Mexico establish a pollinator-monitoring network, beginning with a rapid, one-time assessment that can be used as a baseline for future comparisons.

The reasons for wild pollinator declines are not well-understood, although habitat degradation and loss have played a role, and climate change may be a factor as well. The bumblebee, like the honeybee, has suffered because of a recently introduced non-native parasite. The consequences of these declines in non-agricultural settings are not well-understood either. Few plants rely on a single pollinator, but rare and endangered plant species may be more vulnerable to extinction.

Too little is known about the basic taxonomy and ecology of most pollinators to design large-scale conservation and restoration programs at this point, the committee determined. But there are some simple steps that people can take on their own, such as planting native flowers to enhance pollinator habitat. — *Bill Kearney*

Status of Pollinators in North America. Committee on the Status of Pollinators in North America, Board on Life Sciences and Board on Agriculture and Natural Resources, Division on Earth and Life Studies (2006, approx. 396 pp.; ISBN 0-309-10289-8; available from the National Academies Press, tel. 1-800-624-6242; $56.00 plus $4.50 shipping for single copies; also on the Internet at <www.nap.edu/catalog/11761.html>).

The committee was chaired by **May Berenbaum,** Swanlund Professor and head, department of entomology, University of Illinois, Urbana-Champaign. The study was funded by the U.S. Department of Agriculture, U.S. Geological Survey, and the National Academies.

Polar Changes Heighten Need for New ICEBREAKERS

Operation Deep Freeze is launched every summer in Antarctica. The mission is to clear McMurdo Sound of ice so cargo ships can resupply U.S. scientists, including those stationed at the South Pole. For 50 years, the U.S. Coast Guard has cleared McMurdo channel, but its two most powerful — and oldest — icebreakers, the Polar Sea and Polar Star, have been beset by mechanical problems recently. This forced the National Science Foundation to hire a Russian icebreaker for the McMurdo break-in the last two years.

The lack of U.S. icebreaking capability comes at a time when the nation's interests at both poles are more important than ever, according to a congressionally mandated report from the National Research Council. The Arctic and Antarctic are real-world laboratories for observing the effects of global climate change, one of which appears to be melting sea ice in the Arctic, which is opening up new shipping routes and sparking economic activity such as exploration for natural resources and eco-tourism. In Antarctica, huge breakaway icebergs have disrupted wind and water currents, leading to thicker ice than usual in McMurdo Sound.

The report recommends that two new icebreakers be built to replace the Polar Sea and Polar Star so that the United States can "project an active and influential presence" in the regions. The Polar Sea and Polar Star are the Coast Guard's only icebreakers designed for heavy ice. But, at 30 years old, they are near the end of their expected service lives, and a lack of funding has led to delays in routine maintenance. A third polar icebreaker, the Healy, is in better shape. Although the Healy has performed well in thick ice and has been dispatched to assist at McMurdo, it is assigned primarily to support Arctic research. The report warns that when the Healy is sent to Antarctica, it leaves little or no U.S. ice-breaking capability in the Arctic.

It will be at least eight years before a new icebreaker is ready for duty, the report estimates. In the meantime, the Polar Sea should be kept mission capable. The ship recently underwent a $30 million upgrade, so it should be ready for the upcoming McMurdo break-in, but the repairs will not keep the ship in reliable condition long enough for a replacement to be built. The Polar Star should remain on standby, ready to be activated if catastrophe strikes the Polar Sea, the report adds. — *Bill Kearney*

Polar Icebreakers in a Changing World: An Assessment of U.S. Needs. Committee on the Assessment of U.S. Coast Guard Polar Icebreaker Roles and Future Needs, Polar Research Board, Division on Earth and Life Studies, and Marine Board, Transportation Research Board (2006, approx. 250 pp.; ISBN 0-309-10321-5; available from the National Academies Press, tel. 1-800-624-6242; $50.00 plus $4.50 shipping for single copies; also on the Internet at <www.nap.edu/catalog/11753.html>).

The committee was chaired by **Anita K. Jones,** Lawrence R. Quarles Professor of Engineering and Applied Science, School of Engineering and Applied Science, University of Virginia, Charlottesville. The study was funded by the U.S. Coast Guard.

RESTORING BALANCE TO FDA'S DRUG APPROVAL AND SAFETY MISSION

Could that pill you're taking be hurting you instead of healing you? That question has crossed the minds of millions of Americans in the wake of headline stories about harmful drugs on the market.

Even the most rigorously designed and controlled clinical studies may not identify every possible side effect of a new drug before it is approved for use. And many patients take multiple drugs and supplements simultaneously, and often for longer periods than they were administered during studies. Rare or undetected problems may not appear until after a medication is taken by thousands or even millions of patients.

The lingering uncertainties about new drugs make it crucial that the U.S. Food and Drug Administration has the necessary authority, resources, and capabilities to monitor products' risks and benefits as long as they are on the market, says a new report by the Institute of Medicine that assessed the nation's drug safety system. The agency and policymakers need to correct an imbalance that exists between the authority and resources available for FDA's pre-approval activities and its post-approval functions, the report says.

This imbalance is the result of internal factors — such as cultural and organizational problems within the agency — as

well as external factors, including chronic underfunding, restrictions on how FDA can use fees paid by pharmaceutical firms, and lack of regulatory enforcement tools. The report recommends a host of changes to augment FDA's post-approval safety duties.

For example, Congress should give the agency clearer and more nuanced regulatory options to ensure that drug companies comply with label changes or stipulations placed on products during approval. Currently, FDA's main enforcement tool is the "nuclear option" of withdrawing approval, which the agency hesitates to use because it suspends availability of a product to all patients while potential harmful effects are explored that may involve only a subset of users.

The report also calls on Congress to allocate sufficient funds for the agency to fulfill its post-approval monitoring duties. Funds for pre-approval activities dwarf those for post-market functions, in part because of the fees pharmaceutical firms pay to support new drug reviews, which FDA cannot redirect to other activities. The agency's safety work is so important, the report says, Congress should lift the restrictions on how the agency can apply user fees if it cannot sufficiently boost the agency's funding through general appropriations. FDA's funding also pales next to other health agencies' appropriations. It received $1.5 billion in fiscal year 2006, compared with $5.8 billion appropriated to the Centers for Disease Control and Prevention and the $28.6 billion the National Institutes of Health received. The legislation that created the user fee system is up for reauthorization in 2007.

Information about drugs' risks and benefits should be more readily available to consumers and health care providers. Drug firms should be required to post information on a public Web site about the results of clinical studies on drugs that are submitted to the agency for approval. A moratorium on direct-to-consumer advertising of newly approved products and a special package symbol denoting that a product is new would help address common misperceptions that FDA approval is a guarantee of safety. Five years after approval of a product that is in a new class of drugs, FDA should formally re-evaluate all data on it.

None of the extra resources or efforts on drug safety monitoring and surveillance should come through a de-emphasis of the agency's pre-approval responsibilities. "Getting new drugs to patients who need them as quickly as possible need not be antithetical to drug safety monitoring or vice versa," said committee chair Sheila Burke. "With the appropriate resources and authority, FDA can do both well."
— *Christine Stencel*

The Future of Drug Safety: Promoting and Protecting the Health of the Public. Committee on the Assessment of the U.S. Drug Safety System, Board on Population Health and Public Health Practice, Institute of Medicine (2006, approx. 350 pp.; ISBN 0-309-10304-5; available from the National Academies Press, tel. 1-800-624-6242; $49.00 plus $4.50 shipping for single copies; also on the Internet at <www.nap.edu/catalog/11750.html>).

The committee was chaired by **Sheila Burke,** M.P.A., R.N., deputy secretary and chief operating officer, Smithsonian Institution, Washington, D.C. The study was funded by the U.S. Food and Drug Administration, Agency for Healthcare Research and Quality, Centers for Medicare and Medicaid Services, National Institutes of Health, and U.S. Department of Veterans Affairs.

PAY for Performance

A STRATEGY TO IMPROVE HEALTH CARE QUALITY

An overweight, 68-year-old man visits a clinic for a check-up. During the exam, his doctor gives him information about weight-loss plans and encourages him to ask questions about his medications. A similar patient visiting a different clinic receives a thorough exam, but no encouragement to ask questions or change his diet. Under Medicare's fee-for-service payment system, both physicians are reimbursed the same amount. A new report from the Institute of Medicine says paying for performance could change that situation.

"Medicare's payment system encourages volume and gives health care providers and institutions little incentive to strive for higher-quality, more patient-centered care," said Steven A. Schroeder, chair of the committee that wrote the report, the last in a three-part series on accelerating the pace of quality improvements in Americans' health care. The report series was sparked in part by concerns that Medicare is not getting the best value for the $300 billion it spends annually on services for roughly 42 million citizens.

Both the public and private sectors have shown enthusiasm for pay-for-performance systems, although it is a relatively new concept in the health care industry. But the concept raises questions about how quality is measured and how the rewards will be funded at a sufficient level to encourage improvements without ballooning Medicare's already substantial costs.

Medicare should adopt the new system given its early promise in the private sector, the report says. But the switch should be made gradually so that the involved parties can build on what works and adjust if negative consequences occur, such as providers avoiding certain kinds of patients or opting out of Medicare.

To encourage participation, Medicare at least initially should reward those who make significant quality improvements as well as those who achieve excellence. Some health care providers and organizations will have more difficulty participating because performance measures do not exist yet for all fields and specialties. Moreover, not all providers have the technology to collect such data. Large, institutional providers that already have the necessary infrastructure should be required to participate in Medicare's pay-for-performance system as soon at it is launched, but participation by smaller physician practices should be voluntary at first.

The committee recommended that Congress build the pool of reward money from an initial reduction in base Medicare payments for three to five years, but other strategies to sustain the pool long term should be pursued. Congress may need to appropriate additional dollars to ensure that the bonus payments are adequate.

— *Christine Stencel*

Rewarding Provider Performance: Aligning Incentives in Medicare. Committee on Redesigning Health Insurance Performance Measures, Payment, and Performance Improvement Programs, Board on Health Care Services, Institute of Medicine (2006, approx. 280 pp.; ISBN 0-309-10216-2; available from the National Academies Press, tel. 1-800-624-6242; $39.95 plus $4.50 shipping for single copies; also on the Internet at <www.nap.edu/catalog/11723.html>).

The committee was chaired by **Steven A. Schroeder,** Distinguished Professor of Health and Health Care, University of California, San Francisco. The study was funded by the Centers for Medicare and Medicaid Services.

THE LONG DRIVE HOME

Changing Work Force Will Dramatically Shift America's Commute

Most Americans will tell you that their commute is getting worse. A new report from the Transportation Research Board says that not only is it getting worse, the transportation system is not keeping up with growth and other challenges as well as it has in the past.

Have our roads reached a saturation point? "Yes," said Alan Pisarski, author of the report. "There are weaknesses in our transportation system's services that are not being addressed as effectively as during the 1970s." He also added that people are being forced to adjust behavior to avoid heavy congestion in the peak periods.

The report analyzes census data from 1990-2004 to examine trends in commuting and consider patterns to watch.

The personal vehicle is still the most common way for people to get to work, the analysis revealed, finding that 88 percent of people commute in vehicles, with 76 percent of commuters driving alone. The number of new solo drivers grew by 13 million in 10 years. Transit use and carpooling are increasing in many areas as well, and more commuters are traveling from suburb to suburb rather than from suburbs to central cities.

A major trendsetter will be baby boomers and the effect they will have as they reach retirement age. During the coming decades, many baby boomers — who will start turning 65 in 2010 — will leave the workplace and stop commuting. The nation should see fewer commuters as this generation starts to retire, but the increase

of working immigrants will partly offset this decrease. In fact, immigration in the past decade increased far more than expected — there are about 8 million more immigrants in the country than the Census Bureau projected. This "immigration bubble" is changing the nature of the work force and overall commuting patterns. Although immigrants make up less than 14 percent of all workers, they represent about 40 percent of those in large carpools, a mode of travel whose use has spiked for the first time in 30 years.

"One of the most significant changes to commuting patterns will probably come from newly arrived immigrants," said Pisarski. "Unlike most native-born Americans or immigrants who have been in the U.S. for more than five years, many new immigrants either carpool, bike, walk, or use public transportation for their daily commute."

Another pervasive trend that could significantly affect commuting in the future is the increase in people who work from home, the report says. The latest census data shows that 4 million Americans now work from home.

The data also show that more Americans are leaving for work between 5 a.m. and 6:30 a.m., and are taking on longer commutes — between 60 and 90 minutes.

Other findings in the report include:

• Men make up the majority of early-morning commuters, from midnight to 7:30 a.m. Women tend to commute later and make up the majority of commuters after around 7:30 a.m.

• The number of Americans who "reverse" commute from the city to the suburbs has increased.

• Fewer people are walking to work.

• Older female drivers will increase dramatically as boomers work past age 65.

• Car ownership among blacks has increased significantly.

• Twice as many Hispanics carpool than non-Hispanics.

• 30 million vehicles were added to households from 1990 to 2000, and 13 million of those were added to households that already had two or more vehicles.

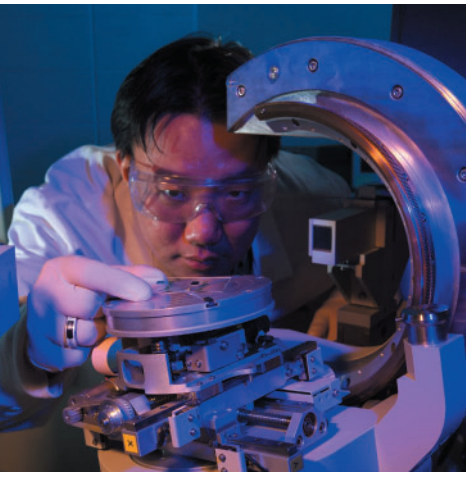
What does the future hold? Pisarski says that we will see more people making longer commutes to live and work where they want. And employers will be forced to offer more flexible schedules as well as the option of telecommuting. — *Maureen O'Leary*

Commuting in America III: The Third National Report on Commuting Patterns and Trends. Transportation Research Board (2006, 196 pp.; ISBN 0-309-09853-X; available from TRB's bookstore, tel. 202-334-3213; $60.00; also on the Internet at <national-academies.org/trb/bookstore>).

The study was authored by transportation consultant **Alan E. Pisarski** and sponsored by the National Cooperative Highway Research Program and the Transit Cooperative Research Program, both managed by TRB.

THE SCALE OF THINGS

A Look at the National Nanotechnology Initiative



By manipulating matter at the scale of one-billionth of a meter, scientists and engineers are creating new materials and devices that could detect and treat disease at the earliest stages, decrease pollution at industrial sites, vastly improve the performance of electronics, and much more. Such applications are making the science and engineering of the very small — or nanotechnology — the subject of great attention from industry, academia, and government agencies.

To realize nanotechnology's full potential and manage federally funded research in this area, the U.S. government created in 2000 the National Nanotechnology Initiative (NNI). One of the greatest achievements of the initiative so far has been successfully coordinating the participation of over 20 agencies, as well as the creation of five new DOE centers dedicated to nanoscale R&D and an NSF-developed partnership of facilities across the U.S., says a new, congressionally mandated report from the National Research Council.

NNI's contributions to scientific advances in nanotechnology make a strong case for continuing federal support of the initiative, the report concludes. Recent research discoveries include the use of nanoparticles to deliver cancer drugs directly to tumors and the creation of a nanoscale powder made from iron that cleans up contaminated groundwater and soil. But the United States is not the only country making headway in nanotechnology. Funding in Japan and the European Union for research and development in this field is each comparable to that of the United States, and the U.S. percentage of relevant published papers worldwide is declining. To maintain and enhance the nation's competitive position in this area, the federal government should sustain investments that balance applied, shorter-term efforts with longer-term R&D programs.

It's too early to make firm projections of the economic impact of nanotechnology research, and without uniform or consistent tracking of agency investments in research, any assessment of their impact on the economy thus far would be limited, the report says. With better information, it could be possible, for example, to assess how investments contribute to technology transfer and commercial applications, and to better prioritize what research receives funds.

Nanomaterials have unusual and useful properties, but the effects of their unique attributes on human health and the environment are unknown. Research to date has been inconclusive, although there is some evidence that these materials can be harmful to laboratory animals. More research is needed in this area, and a dialogue among scientists, policymakers, and the general public is encouraged on this topic, the report says. — *Patrice Pages*

A Matter of Size: Progress Review of the National Nanotechnology Initiative. Committee to Review the National Nanotechnology Initiative, National Materials Advisory Board, Division on Engineering and Physical Sciences (2006, approx. 176 pp.; ISBN 0-309-10223-5; available from the National Academies Press, tel. 1-800-624-6242; $37.50 plus $4.50 shipping for single copies; also on the Internet at <www.nap.edu/catalog/11752.html>).

James C. Williams, professor of materials science and engineering and Honda Chair, Ohio State University, Columbus, chaired the committee. The study was funded by the National Science Foundation.

Research Involving **PRISONERS**

GREATER OVERSIGHT NEEDED TO ENSURE HUMANE, RESPECTFUL TREATMENT

Prisoners are considered particularly vulnerable participants in scientific research projects. Federal guidelines specify that great care be taken when they are enrolled in studies so that they are not unduly influenced to join. But most research involving them takes place outside the scope of federal regulations and often without the scrutiny of institutional review boards (IRBs), which monitor how well studies comply with various rules.

In the past, some scientific investigators used prisoners to study illnesses and toxins when human experimentation in free society was not allowed. Many who participated did not give voluntary, informed consent or fully understand research protocols. This legacy of unethical treatment led the federal government in the late 1970s to implement regulations to protect all human subjects in research. Since then, however, the total population of the U.S. correctional system — including inmates and people on probation or parole — has increased almost fivefold. Plus, more people from disadvantaged groups, such as

racial minorities and people who have mental illnesses, are under the supervision of the criminal justice system.

A new Institute of Medicine report says greater oversight and more safeguards are needed to ensure that research involving this growing segment of society meets the highest ethical standards and seeks to improve the well-being of prisoners. To that end, Congress should mandate uniform guidelines for all human research participant protection programs regarding studies that enroll prisoners — regardless of the source of funding or the type of correctional program. Additionally, the federal government should maintain a detailed public database that tracks these studies.

The improved safeguards should cover not only research participants who are confined in prisons or jails, but also those who are on parole, probation, or in community-based alternatives to incarceration. Federal research regulations now define prisoners solely as people who are incarcerated, the report points out. The U.S. Department of Health and Human Services and other agencies that write, implement, or enforce rules governing the use of prisoners as subjects in studies ought to expand protection to this broader population, which also faces restrictions on autonomy.

These studies should fall under the oversight of the Office for Human Research Protections (OHRP) in HHS, the report says. However, HHS needs to give this office more muscle to carry out its current mission, which includes rule enforcement. OHRP would then be in a better position to provide national oversight of all research involving prisoners, a charge that would likely require more resources. If OHRP cannot effectively handle the broader assignment, Congress should create a new entity to do so.

The committee that wrote the report emphasized that research must offer prisoners potential benefits that outweigh risks. Furthermore, human research participant protection programs must guarantee that prisoners have given voluntary, informed consent.

Monitoring should be improved at the local level, too, the report says. IRBs should install independent, on-site "prison research subject advocates" to verify that procedures are being carried out as approved and to quickly detect and report any problems. Likewise, scientific investigators should get input from prisoners and other stakeholders on the design and conduct of studies. Test subjects also must have immediate access to adequate health care services, in case studies result in physical or mental harm.

Humane, respectful treatment of all prisoners, the report says, is a hallmark of decent society. — *Vanee Vines*

Ethical Considerations for Research Involving Prisoners. Committee on Ethical Considerations for Revisions to DHHS Regulations for Protection of Prisoners Involved in Research, Board on Health Sciences Policy, Institute of Medicine (2006, approx. 316 pp.; ISBN 0-309-10119-0, available from the National Academies Press, tel. 1-800-624-6242; $44.00 plus $4.50 shipping for single copies; also on the Internet at <www.nap.edu/catalog/11692.html>).

The committee was chaired by **Lawrence Gostin,** professor of law, Georgetown University Law Center, Washington, D.C. The study was sponsored by the Office for Human Research Protections in the U.S. Department of Health and Human Services, and the Greenwall Foundation.

A New Lesson Plan for K-8 SCIENCE

Science education in kindergarten through eighth grade needs a new formula. After decades of education improvement efforts and only modest gains in science performance, the need for change is clear. And the looming mandate of the federal No Child Left Behind Act, which says that states must measure students' annual progress in science beginning next year, makes the issue all the more pressing.

A new report from the National Research Council has called for major shifts in how science is taught in these grades, as well as changes in commonly held views of what children know and how they learn. Doing science entails much more than reciting facts or being able to design experiments, the report says. To be proficient, students must understand scientific ideas and demonstrate a firm grasp of scientific practices. Furthermore, the next generation of science standards and curricula at the national and state levels should be centered on a few core ideas, which should be expanded upon each year at increasing levels of complexity across grades K-8. Teachers also need more opportunities to learn how to teach science as an integrated whole — and to diverse student populations.

All children, the report adds, have reasoning skills, personal knowledge of the natural world, and curiosity that teachers can build on to achieve proficiency in science. Educators should no longer consider children simple thinkers whose minds are little more than empty vessels. Research shows that children think in surprisingly sophisticated ways.

Four intertwined and equally important strands comprise the study committee's definition of proficiency in science. First,

students should know, use, and interpret scientific explanations of the natural world. Second, they should be able to generate and evaluate scientific evidence and explanations. Third, they should understand the nature and development of scientific knowledge. And finally, students' work should include active participation in scientific collaboration and discussion.

The four strands, plus current scientific understandings of how children think, should be the basis for new science standards, assessments, and curricula, the report says. And teacher training programs ought to focus on boosting teachers' knowledge of science and how students learn the subject.

Education leaders and other officials also need to tackle persistent gaps in science achievement among different groups of students, such as those between white students and non-Asian minority students and between economically advantaged and disadvantaged students. The problems can be traced, in part, to inequities in learning opportunities and differences in how children are taught, the report says. — *Vanee Vines*

Taking Science to School: Learning and Teaching Science in Grades K-8. Committee on Science Learning: Kindergarten Through Eighth Grade, Board on Science Education, Center for Education, Division of Behavioral and Social Sciences and Education (2006, approx. 352 pp.; ISBN 0-309-10205-7, available from the National Academies Press, tel. 1-800-624-6242; $49.95 plus $4.50 shipping for single copies; also on the Internet at <www.nap.edu/catalog/11625.html>).

The panel was chaired by **Richard A. Duschl,** professor of science education, Graduate School of Education, Rutgers University, New Brunswick, N.J. The study was sponsored by the National Science Foundation, National Institute of Child Health and Human Development, and the Merck Institute for Science Education.

State and Local Leaders Explore Ways to Sharpen **AMERICA'S COMPETITIVE EDGE**

About 850 state policymakers, educators, business leaders, and researchers attended a National Academies' convocation in September to encourage bold leadership on local initiatives that could help strengthen U.S. competitiveness. At the end of the daylong meeting, participants identified various steps that state and local officials could take within the next six months to foster job growth, improve education, and enhance the environment for innovation. Ideas ranged from organizing campaigns to raise awareness about scientific and technical issues to creating summer training institutes for teachers to forming coalitions of industry representatives and academics that would nudge state authorities to act.

Several speakers also discussed the National Competitiveness Investment Act

— a bipartisan proposal to increase America's research spending, S&T educational opportunities, and support for innovation — which was introduced in the U.S. Senate that week. But ultimately, a lot of the energy and political will in this area must come from the grassroots level, they said.

"...Much of what needs to be done to bolster our national competitive position needs to be done by all of you, and not just by those who serve in Congress," Sen. Jeff Bingaman of New Mexico told a packed auditorium during the morning session.

Last year the National Academies released *Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future,* a report that has informed public policies and gained widespread attention. The convocation was an outgrowth of that study, which called for a broad national effort to create new, high-quality jobs for all Americans in the 21st century. The bipartisan legislation was a response to recommendations in the report, as well as a similar study by the Council on Competitiveness.

The unmatched vitality of the United States' economy and science and technology enterprise has made this country a world leader for decades, allowing Americans to benefit from a high standard of living and national security. But in a world where advanced knowledge is widespread and low-cost labor is readily available, U.S. advantages in the marketplace and in science and technology have begun to erode, the report stated. There will not be a "sudden warning," said Norman R. Augustine, retired chairman and CEO of Lockheed Martin Corp., and chair of the committee that wrote the *Gathering Storm* report. Instead, "we'll see a gradual erosion unless we act, and act very decisively," he told participants.

Some state leaders have recently implemented plans to improve education for both children and adults, and to make greater use of university research facilities in job-creation strategies. For example, Gov. Joe Manchin III of West Virginia told participants about the "West Virginia Competes" forum that aims to prepare students for careers of the future. And Sen. Kay Bailey Hutchison of Texas mentioned a partnership in her state among the University of Texas system, donors, and government and business officials to fund a $2.56 billion project in science, technology, engineering, and health. Manchin, who is active in the National Governors Association, said a team effort is crucial. "All of us," he said, "must take this journey together."

"...Much of what needs to be done to bolster our national competitive position needs to be done by all of you, and not just by those who serve in Congress," Sen. Jeff Bingaman of New Mexico told a packed auditorium.

Improving the quality of K-12 instruction and learning is absolutely essential, agreed participants, who represented each

of the 50 states. Civil rights leader and educator Bob Moses is the founder and president of The Algebra Project Inc., which promotes math literacy in inner-city and rural schools. At an afternoon workshop on ways to increase the participation of women and certain minorities in science, technology, engineering, and mathematics, he stressed the importance of making students themselves participants in

such dialogues. "What we do in this country is talk to the country about the kids. We don't need to do that. We need to talk to the kids about the kids, and we need to be in their classrooms talking to them. ...We need to talk to the country about the country. ...There are very deep legacies [of educational inequality] which led us into the situation we're in."

At another session, Dean Kamen, head of DEKA Research and Development Corp. in Manchester, N.H., said policymakers and the scientific community also must do more to spark students' interest in science and technology. In 1989 he founded a robotics organization for high school students called FIRST (For Inspiration and Recognition of Science and Technology). Last year it held more than 30 regional robotics competitions and one national competition; 45,000 volunteers — including scientists and engineers — helped students prepare for the events. In the S&T arena, Kamen said, "finding ways to convince the feds, or the states, or some coalition...to just make fun, broad-based activities accessible — particularly to women and minorities" is key to continued U.S. leadership. — *Vanee Vines*

MIT's Charles Vest Nominated to Be Next NAE President

The National Academy of Engineering's 2007 nominating committee has unanimously recommended Charles M. Vest, president emeritus of the Massachusetts Institute of Technology, to stand as the sole candidate to be the next president of the Academy. Voting by NAE members will take place in March 2007 for a six-year term to begin on July 1, 2007.

"I could not be more pleased that Chuck Vest has accepted the nomination for the NAE presidency," said NAE Chair Craig Barrett, who is also chairman of the board of Intel Corp. "Chuck's broad experience and leadership at the national level will benefit the NAE greatly and allow it to continue the distinguished service to the nation that has been a hallmark of Bill Wulf's presidency."

If elected, Vest will succeed Wm. A. Wulf, whose second term as NAE president ends on June 30. Ineligible to run for a third term under the NAE bylaws, Wulf will return to the University of Virginia as a Chaired University Professor.

Vest, age 65, served as MIT's president from 1990 through 2004. During that time, he worked to strengthen federal-university-industry relations and undertook a number of initiatives to bring education and research issues to broader public attention. Vest placed special emphasis on enhancing science and engineering in undergraduate education. While stressing the importance of racial and cultural diversity among faculty and students at MIT, Vest also worked to build a stronger international dimension to the university's programs.

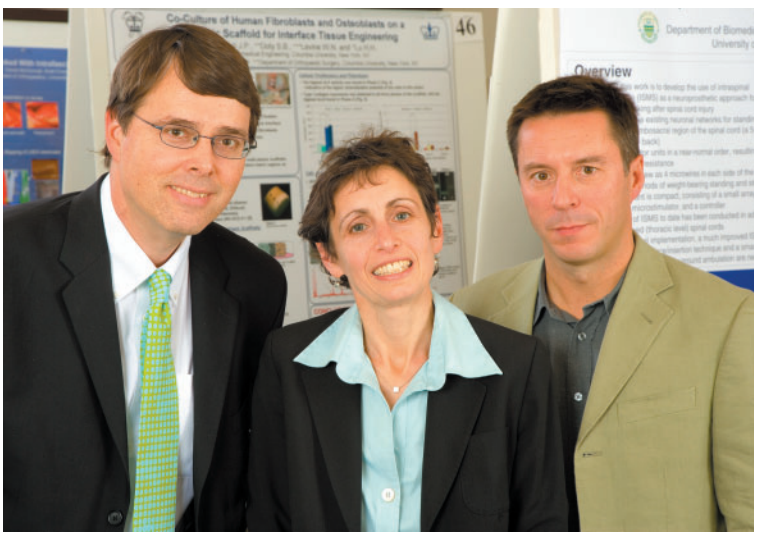
Vest earned a bachelor's degree in mechanical engineering from West Virginia University in 1963. He received both his M.S. and Ph.D. degrees from the University of Michigan in 1964 and 1967, respectively, where he later held the positions of dean of engineering, provost, and vice president for academic affairs. He is the recipient of 10 honorary doctoral degrees.

Vest was elected to the NAE in 1993 "for technical and educational contributions to holographic interferometry and leadership as an educator," and he currently serves on the NAE Council. Among Vest's career honors is NAE's Arthur M. Bueche Award in 2000 "for his outstanding university leadership, commitment, and effectiveness in helping mold government policy in support of research, and forging linkages between academia and industry." Vest has served on numerous National Academies studies, most recently on the highly cited *Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future,* which highlights the roles of science and engineering in U.S. economic growth and competitiveness.

— *Randy Atkins*

Academies Recognize Excellent Communication on Evolution, Human History, and Climate Change

The top prizes from the National Academies for excellence in reporting and communicating science, engineering, and medicine to the general public during 2005 go to works about climate change, evolution, and human history. Now in its fourth year, the National Academies Communication Awards program presents $20,000 prizes to winners in three categories — book, newspaper/magazine/Internet, and radio/TV. The 2006 book winner is author Charles Mann for *1491: New Revelations of the Americas Before Columbus*. The judges called his work an engaging and thought-provoking rediscovery of early human history in the Americas. Other winners are writer Elizabeth Kolbert of *The New Yorker,* for her authoritative treatment of the science and politics of global climate change in the three-part series "The Climate of Man." And Nic Young, Anna Thomson, and Bill Locke won for the documentary "Ape to Man" — an accurate and entertaining overview of human evolution made accessible to broad audiences.



"It is an honor to recognize these individuals and the important role they play in increasing the public's understanding of science, engineering, and medicine," said NAS President Ralph Cicerone. "We hope that our awards inspire many others to report clearly and creatively about the world we live in."

The winners were honored in November at "Smart Prosthetics: Exploring Assistive Devices for the Body and Mind," a conference sponsored by the National Academies Keck *Futures Initiative*. Top researchers from different fields attended this conference to discuss advances in prosthetics and other assistive devices, and to compete for approximately $1 million in research seed grants for interdisciplinary collaborative projects. The event took place at the Academies' Arnold and Mabel Beckman Center in Irvine, Calif. — *Maureen O'Leary*

L'Oréal Honors Women in Science

L'Oréal USA Fellowships for Women in Science — a national awards program that recognizes American women at the start of their scientific careers — is now selecting its 2007 class of outstanding

postdoctoral researchers. Each year the U.S. subsidiary of the international cosmetic maker recognizes and rewards five researchers who are pursuing careers in science, math, engineering, and computer sciences; this year marks the first that $40,000 grants will be given, double the amount previously awarded.

Launched in 2003 as the U.S. companion to the UNESCO- L'Oréal International Fellowships program, L'Oréal USA's fellowship program aims to raise the awareness of the contributions of women to science, as well as to identify exceptional female researchers who can serve as role models for young science students. The fellowship is open only to women postdoctoral researchers who are either U.S.-born, naturalized citizens, or permanent residents living in the United States. A jury of eight scientists, led by NAS President Ralph Cicerone, selects the five winners based on research projects proposed by applicants and according to stringent eligibility criteria.

"To continue to succeed in science and technology, our nation must nurture the potential of all the bright young minds at work in all fields of science," said Cicerone. "L'Oréal USA's fellowships offer support for some extraordinary talents and will help women entering science to continue and advance." — *William Skane*

For additional information, visit <www.lorealusa.com>.

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.

Adolescent Health Care Services and Models of Care for Treatment, Prevention, and Healthy Development.
Board on Children, Youth, and Families, Institute of Medicine and National Research Council. Project director: Jennifer Gootman. Chair: Robert S. Lawrence, professor of health policy and management and professor of environmental health sciences, Johns Hopkins Bloomberg School of Public Health, Baltimore. Sponsor: Atlantic Philanthropies.

Assessment of Resource Needs for Development of Fuel Cell and Hydrogen Technology.
Board on Energy and Environmental Systems, Division on Engineering and Physical Sciences. Project director: James Zucchetto. Chair: Michael P. Ramage, executive vice president, ExxonMobile Research and Engineering Co. (retired), Moorestown, N.J. Sponsor: U.S. Department of Energy.

Enhancing the Master's Degree in the Natural Sciences.
Board on Higher Education and Workforce, Division on Policy and Global Affairs. Project director: Peter Henderson. Chair: To be selected. Sponsor: Alfred P. Sloan Foundation.

Grand Challenges for Engineering.
National Academy of Engineering. Project director: Randy Atkins. Chair: William J. Perry, former U.S. secretary of defense, and Michael and Barbara Berberian Professor, and senior fellow, Hoover Institution, Stanford University, Stanford, Calif. Sponsor: National Science Foundation.

Identifying the Needs of the Forensic Science Community.
Committee on Science, Technology, and Law, Division on Policy and Global Affairs; and Committee on Applied and Theoretical Statistics, Board on Mathematical Sciences and Their Applications, Division on Engineering and Physical Sciences. Project co-directors: Anne-Marie Mazza and Scott Weidman. Chair: To be selected. Sponsor: National Institute of Justice.

Improving Risk Analysis Approaches Used by the U.S. Environmental Protection Agency.
Board on Environmental Studies and Toxicology, Division on Earth and Life Studies. Project director: Eileen Abt. Chair: Thomas A. Burke, professor of health policy and management, and founding co-director, Risk Sciences and Public Policy Institute, Johns Hopkins Bloomberg School of Public Health, Baltimore. Sponsor: U.S. Environmental Protection Agency.

Technologies to Benefit Farmers in Africa and South Asia.
Board on Agriculture and Natural Resources, Division on Earth and Life Studies. Project director: Michael Ma. Chair: To be selected. Sponsor: Bill & Melinda Gates Foundation.

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.

Addressing Foodborne Threats to Health: Policies, Practices, and Global Coordination — Workshop Summary
Forum on Microbial Threats, Board on Global Health, Institute of Medicine (2006, 304 pp.; ISBN 0-309-10043-7; available from NAP).

Aging in Sub-Saharan Africa: Recommendations for Furthering Research
Committee on Population, Division of Behavioral and Social Sciences and Education (2006, 368 pp.; ISBN 0-309-10281-2; available from NAP).

Assessing the Human Health Risks of Trichloroethylene: Key Scientific Issues
Board on Environmental Studies and Toxicology, Division on Earth and Life Studies (2006, approx. 472 pp.; ISBN 0-309-10283-9; available from NAP).

Assessment of NASA's Mars Architecture 2007-2016
Space Studies Board, Division on Engineering and Physical Sciences (2006, 62 pp.; ISBN 0-309-10273-1; available from NAP or from the board, tel. 202-334-3477 or e-mail <ssb@nas.edu>).

Battling Malaria: Strengthening the U.S. Military Malaria Vaccine Program
Medical Follow-Up Agency, Institute of Medicine (2006, 144 pp.; ISBN 0-309-10168-9; available from NAP).

Beyond Bias and Barriers: Fulfilling the Potential of Women in Academic Science and Engineering
Committee on Science, Engineering, and Public Policy, National Academy of Sciences, National Academy of Engineering, and Institute of Medicine (2006, approx. 364 pp.; ISBN 0-309-10042-9; available from NAP).

CLEANER [Collaborative Large-scale Engineering Analysis Network for Environmental Research] and NSF's Environmental Observatories
Water Science and Technology Board, Division on Earth and Life Studies (2006, 76 pp.; ISBN 0-309-10229-4; available from NAP).

Community Disaster Resilience: A Summary of the March 20, 2006, Workshop of the Disasters Roundtable
Disasters Roundtable, Division on Earth and Life Studies (2006, 15 pp.; ISBN 0-309-66660-0; available from NAP).

Condensed-Matter and Materials Physics: The Science of the World Around Us — An Interim Report
Solid State Sciences Committee, Board on Physics and Astronomy, Division on Engineering and Physical Sciences (2006, 15 pp.; ISBN 0-309-66540-X; available from NAP).

Defense Modeling, Simulation, and Analysis: Meeting the Challenge
Board on Mathematical Sciences and Their Applications, Division on Engineering and Physical Sciences (2006, 96 pp.; ISBN 0-309-10303-7; available from NAP).

Developing Biomarker-Based Tools for Cancer Screening, Diagnosis, and Treatment: The State of the Science, Evaluation, Implementation, and Economics — Workshop Summary
National Cancer Policy Forum, Institute of Medicine (2006, 112 pp.; ISBN 0-309-10134-4; available from NAP).

Dietary Reference Intakes Research Synthesis — Workshop Summary
Food and Nutrition Board, Institute of Medicine (2006, approx. 300 pp.; ISBN 0-309-10322-3; available from NAP).

Dietary Reference Intakes: The Essential Guide to Nutrient Requirements
Food and Nutrition Board, Institute of Medicine (2006, 560 pp.; ISBN 0-309-10091-7; available from NAP).

Discussion of the Committee on Daubert Standards — Summary of Meetings
Committee on Science, Technology, and Law, Division on Policy and Global Affairs (2006, 46 pp.; ISBN 0-309-10248-0; available from NAP).

Drinking Water Distribution Systems: Assessing and Reducing Risks
Water Science and Technology Board, Division on Earth and Life Studies (2006, approx. 437 pp.; ISBN 0-309-10306-1; available from NAP).

Effect of the HIPAA [Health Insurance Portability and Accountability Act] Privacy Rule on Health Research — Proceedings of a Workshop Presented to the National Cancer Policy Forum
National Cancer Policy Forum, Institute of Medicine (2006, 102 pp.; ISBN 0-309-10291-X; available from NAP).

Ending the War Metaphor: The Changing Agenda for Unraveling the Host-Microbe Relationship
Forum on Microbial Threats, Board on Global Health, Institute of Medicine (2006, 306 pp.; ISBN 0-309-09601-4; available from NAP).

Evaluation of the Sea Grant Program Review Process
Ocean Studies Board, Division on Earth and Life Studies (2006, approx. 246 pp.; ISBN 0-309-10234-0; available from NAP).

Facing Hazards and Disasters: Understanding Human Dimensions
Division on Earth and Life Studies (2006, 408 pp.; ISBN 0-309-10178-6; available from NAP).

Future Air Force Needs for Survivability
Air Force Studies Board, Division on Engineering and Physical Sciences (2006, 116 pp.; ISBN 0-309-10219-7; available from NAP).

The Genomic Revolution: Implications for Treatment and Control of Infectious Disease — Working Group Summaries, Conference, Irvine, Calif., Nov. 10-13, 2005
National Academies Keck Futures Initiative (2006, 132 pp.; ISBN 0-309-10109-3; available from NAP).

Green Schools: Attributes for Health and Learning
Board on Infrastructure and the Constructed Environment, Division on Engineering and Physical Sciences (2006, approx. 208 pp.; ISBN 0-309-10286-3; available from NAP).

Gulf War and Health, Vol. 4: Health Effects of Serving in the Gulf War
Board on Population Health and Public Health Practice, Institute of Medicine (2006, approx. 310 pp.; ISBN 0-309-10176-X; available from NAP).

Gulf War and Health, Vol. 5: Infectious Diseases
Board on Population Health and Public Health Practice, Institute of Medicine (2006, approx. 224 pp.; ISBN 0-309-10106-9; available from NAP).

Hearing Loss Research at NIOSH: Reviews of Research Programs of the National Institute for Occupational Safety and Health
Board on Health Sciences Policy, Institute of Medicine; and National Research Council (2006, 224 pp.; ISBN 0-309-10274-X; available from NAP).

Here or There? A Survey of Factors in Multinational R&D Location — Report to the Government-University-Industry Research Roundtable
Government-University-Industry Research Roundtable, Division on Policy and Global Affairs (2006, 48 pp.; ISBN 0-309-10184-0; available from NAP).

ICT [Information and Communications Technology] Fluency and High Schools — A Workshop Summary
Board on Science Education, Center for Education, Division of Behavioral and Social Sciences and Education (2006, 102 pp.; ISBN 0-309-10246-4; available from NAP).

Improving Business Statistics Through Interagency Data Sharing — Summary of a Workshop
Committee on National Statistics, Division of Behavioral and Social Sciences and Education (2006, 156 pp.; ISBN 0-309-10261-8; available from NAP).

Math/Science Partnerships (MSP) — Six Proceedings and Transcripts From 11 MSP Workshops (CD-ROM)
Mathematical Sciences Education Board, Center for Education, Division of Behavioral and Social Sciences and Education (2006; ISBN 0-309-10294-4; available from NAP).

Mitigating Shore Erosion Along Sheltered Coasts
Ocean Studies Board, Division on Earth and Life Studies (2006, approx. 188 pp.; ISBN 0-309-10346-0; available from NAP).

NOAA's Role in Space-Based Global Precipitation Estimation and Application
Board on Atmospheric Sciences and Climate, Division on Earth and Life Studies (2006, approx. 166 pp.; ISBN 0-309-10298-7; available from NAP).

Nutrient Requirements of Horses, Sixth Revised Edition
Board on Agriculture and Natural Resources, Division on Earth and Life Studies (2006, approx. 340 pp.; ISBN 0-309-10212-X; available from NAP).

Once, Only Once, and in the Right Place: Residence Rules in the Decennial Census
Committee on National Statistics, Division of Behavioral and Social Sciences and Education (2006, approx. 376 pp.; ISBN 0-309-10299-5; available from NAP).

Opportunities to Address Clinical Research Workforce Diversity Needs for 2010
Committee on Women in Science and Engineering, Division on Policy and Global Affairs; and Board on Health Sciences Policy, Institute of Medicine (2006, 146 pp.; ISBN 0-309-09248-5; available from NAP).

Path to Effective Recovering of DNA From Formalin-Fixed Biological Samples in Natural History Collections — Workshop Summary
Board on Life Sciences, Division on Earth and Life Studies (2006, 64 pp.; ISBN 0-309-10293-6; available from NAP).

Posttraumatic Stress Disorder: Diagnosis and Assessment
Board on Population Health and Public Health Practice, Institute of Medicine (2006, 74 pp.; ISBN 0-309-10207-3; available from NAP).

Preventing HIV Infection Among Injecting Drug Users in High Risk Countries: An Assessment of the Evidence
Board on Global Health, Institute of Medicine (2006, approx. 270 pp.; ISBN 0-309-10280-4; available from NAP).

Progress in Preventing Childhood Obesity: How Do We Measure Up?
Food and Nutrition Board, Institute of Medicine (2007, approx. 544 pp.; ISBN 0-309-10208-1; available from NAP).

Progress Toward Restoring the Everglades: The First Biennial Review, 2006
Water Science and Technology Board and Board on Environmental Studies and Toxicology, Division on Earth and Life Studies (2006, approx. 276 pp.; ISBN 0-309-10335-5; available from NAP).

Renewing U.S. Telecommunications Research
Computer Science and Telecommunications Board, Division on Engineering and Physical Sciences (2006, 92 pp.; ISBN 0-309-10265-0; available from NAP).

Review of the Space Communications Program of NASA's Space Operations Mission Directorate
Aeronautics and Space Engineering Board, Division on Engineering and Physical Sciences (2006, approx. 112 pp.; ISBN 0-309-10297-9; available from NAP).

The Richard and Hinda Rosenthal Lectures 2005: Next Steps Toward Higher Quality Health Care
Institute of Medicine (2006, 40 pp.; ISBN 0-309-10214-6; available from NAP).

The Scientific Context for Exploration of the Moon — Interim Report
Space Studies Board, Division on Engineering and Physical Sciences (2006, 50 pp.; ISBN 0-309-10329-0; available from NAP).

Seafood Choices: Balancing Benefits and Risks
Food and Nutrition Board, Institute of Medicine (2007, approx. 608 pp.; ISBN 0-309-10218-9; available from NAP).

Space Radiation Hazards and the Vision for Space Exploration — Report of a Workshop
Space Studies Board, Division on Engineering and Physical Sciences (2006, 104 pp.; ISBN 0-309-10264-2; available from NAP).

Staffing Standards for Aviation Safety Inspectors
Board on Behavioral, Cognitive, and Sensory Sciences, Division of Behavioral and Social Sciences and Education (2006, approx. 150 pp.; ISBN 0-309-10326-6; available from NAP).

Strategies for Preservation of and Open Access to Scientific Data in China — Summary of a Workshop
Board on International Scientific Organizations, Division on Policy and Global Affairs (2006, 152 pp.; ISBN 0-309-10230-8; available from NAP).

Studying Media Effects on Children and Youth: Improving Methods and Measures — Workshop Summary
Board on Children, Youth, and Families, Institute of Medicine and National Research Council (2006, 36 pp.; ISBN 0-309-10275-8; available from NAP).

Tech Tally: Approaches to Assessing Technological Literacy
National Academy of Engineering and National Research Council (2006, 376 pp.; ISBN 0-309-10183-2; available from NAP).

The Telecommunications Challenge: Changing Technologies and Evolving Policies — Report of a Symposium
Board on Science, Technology, and Economic Policy, Division on Policy and Global Affairs (2006, 194 pp.; ISBN 0-309-10087-9; available from NAP).

Understanding and Responding to Multiple Environmental Stresses — Report of a Workshop
Board on Atmospheric Sciences and Climate, Division on Earth and Life Studies (2006, approx. 170 pp.; ISBN 0-309-10331-2; 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>.

IN**FOCUS**
P.O. Box 665
Holmes, PA 19043

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

THE NATIONAL ACADEMIES
Advisers to the Nation on Science, Engineering, and Medicine