

THE NATIONAL ACADEMIES **INFOCUS**

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Nutrition Standards for School Foods

Veterans and PTSD

Education for Global Awareness

Ending the Tobacco Problem

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THE NATIONAL ACADEMIES

Advisers to the Nation on Science, Engineering, and Medicine

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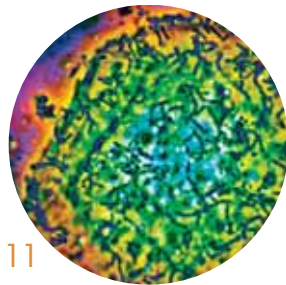
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- Page 2: NAS President Ralph Cicerone and Banh Tien Long, Vietnam's vice minister of education and training, signing joint statement at the National Academy of Sciences, Washington, D.C., to encourage mutual learning and cooperation in science, technology, and education, photo by Vaneé Vines
- Page 3: Photo by Bachrach
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- Page 10: ©Comstock/JupiterImages
- Page 11: Jo Handelsman (right), co-chair of recent Research Council report on metagenomics, in her laboratory at University of Wisconsin, Madison, photo by Jeff Miller
- Page 12: Soil sample being prepared for metagenomic analysis at University of Wisconsin, Madison, photo by Jo Handelsman
- Page 13: ©Vincent Hazat/PhotoAlto/Getty Images
- Page 14: ©Photodisc
- Page 15: U.S. Army soldiers in Babil, Iraq, March 2005, DOD photo by Edward Martens, U.S. Navy
- Page 16: Photo by Todd Goodman, courtesy U.S. Army
- Page 17: ©Stockbyte/Getty Images
- Page 18: Photo courtesy Boston University
- Page 20: (col. 1) NAS President Ralph Cicerone (third from left) and the presidents of 12 other national academies of science met with German Chancellor Angela Merkel (fourth from left) in Berlin, May 2007, photo courtesy German Academy of Sciences Leopoldina; (col. 2) Ralph Cicerone and Banh Tien Long, Vietnam's vice minister of education and training, at the National Academy of Sciences in March 2007, photo by Vaneé Vines
- Page 21: (from left to right) NAE Treasurer William Friend; NAS President Ralph Cicerone; Emilio Bizzi, president of the American Academy of Arts and Sciences; Baruch Blumberg, president of the American Philosophical Society; and IOM President Harvey Fineberg; photo courtesy American Academy of Arts and Sciences

FEATURES

HEALTH & SAFETY

4 Nutrition Standards
Ensuring that all school foods make the grade

6 No Butts About It
A plan to end the tobacco problem

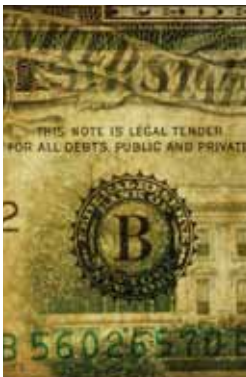


11

ENGINEERING & TECHNOLOGY

8 Grand Challenges for Engineering
A blue-ribbon committee charts a technological road map for the future

10 Fighting Fake Money
Options to combat next-generation counterfeiters



10

ENVIRONMENT & RESOURCES

11 Revealing Our Microbial Planet
New science may revolutionize understanding of the living world

13 Transforming Toxicity Testing
Report envisions new way to test chemicals for hazards

EDUCATION & SOCIAL ISSUES

15 Veterans and PTSD
Ensuring fair and consistent compensation



15

17 Speaking Up for Foreign Languages & International Education
Meeting the nation's demand for globally aware citizens

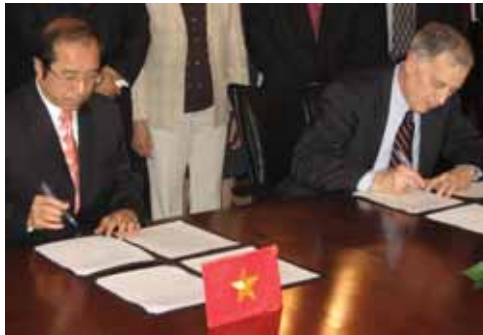
18 Opinion
Transforming the Future of Disability in America

By Alan Jette

From the chair of an Institute of Medicine committee that recently examined disability in the U.S.

20 Brief Takes

- **Science Academies Issue Statements on Energy, Innovation**
- **NAS President, Vietnamese Official Sign Accord**



20

- **Academies and Learned Societies Celebrate Basic Knowledge and Research**

22 New Projects & Publications

THE NATIONAL ACADEMIES

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Advisers to the Nation and You

The National Academies traditionally provide advice to government agencies, the Congress, and other policymakers. More and more often, we also offer advice to individuals. In an area such as health, responsible decisions by the public go hand in hand with policy decisions guided by evidence.

Two articles in this issue of *In Focus* on nutrition standards for foods in schools and ending the tobacco problem highlight topics that simultaneously inform national policy and guide the day-to-day habits of people of all ages. In keeping with the advice from a number of Institute of Medicine studies, and based on my own experience in medicine and public health, I have developed a set of 12 tips you can use to take charge of your health. Here are a few of them:

If you smoke, quit. If you don't smoke, don't start. Despite extensive evidence that proves the deleterious effects of smoking, more than one in five American adults still smoke. Tobacco use remains the leading preventable cause of premature death and disability in the United States. Each year, billions of dollars are spent on tobacco-related illness.

Eat a variety of foods, none to excess. Many diet fads have come and gone over the years — did you know that graham crackers were first introduced as a health food? The best diet for you — featuring a varied and proportionate menu — is one that you can stay on forever. Some key elements of a healthy diet can be simply described: eat more fruits and vegetables, decrease your saturated fat intake, eliminate trans fats from your diet, and reduce your use of salt.

Make exercise a routine part of your day. Abetted by a poor diet and lack of exercise, obesity has become the second leading cause of preventable death in the U.S. The most reliable and lasting way to get the exercise you need is to incorporate physical activity into your daily routine: walk up the last flight or two of stairs, get off the bus or subway a stop early, and be physically active for a part of every day.

Here is probably the most important tip of all: **Enjoy life.** When Eubie Blake, the great jazz pianist, was asked about how he felt as he approached his 99th birthday, he responded, “If I knew I was going to live this long, I would have taken better care of myself!”

If you would like to hear or read all 12 tips for taking charge of your health, a *Sounds of Science* podcast and a PDF file can be downloaded from media.nap.edu/podcasts.



HARVEY V. FINEBERG
President, Institute of Medicine





NUTRITION STANDARDS

Ensuring That All School Foods Make the Grade

Students who once would've had to choose between a standard-issue school meal and a lunchbox from home often have a smorgasbord of options these days, ranging from fast-food burgers and pizza to chips and soda sold in vending machines. Nearly 90 percent of American schools now offer foods that compete with federally funded meals, according to a study by the U.S. Government Accountability Office.

Many of these “competitive” foods are nutritionally wanting — low in nutrients children need, and high in calories, fat, or sodium. While foods sold through the federal meal program are required to meet nutritional standards, those sold outside of the program are usually accountable only

to kids' taste, and research suggests that students may be choosing them instead of healthier foods. One study, for example, found that the more a la carte menu items were available, the fewer fruits and vegetables middle schoolers ate.

Worried about the proliferation of unhealthy products in schools and the rising obesity rate in children and teens, Congress asked the Institute of Medicine to recommend nutrition standards for competitive foods.

Given that students get a significant portion of their calories during the school day, schools are in a unique position to encourage healthy eating habits, the IOM said in a new report. And competitive foods don't have to be unhealthy foods, it added.

The report recommends that two “tiers” of competitive foods be allowed in schools. To be available for purchase by kids at any grade level, a food should provide at least one serving of fruits, vegetables, whole grains, or dairy. It also needs to meet limits on calories, total fat, saturated fat, trans fat, sodium, and added sugars. Examples of snacks that would satisfy these requirements include whole fruit, carrot sticks, and certain granola bars and tortilla chips. Entrees such as a turkey sandwich or a fruit salad with yogurt would also pass muster.

Another, broader tier of foods should be allowed only in high schools after classes are over for the day, the report says. These foods don’t need to provide a serving of fruits, vegetables, whole grains, or dairy, but they still must meet limits for calories, fat, sodium, and added sugar. Snacks such as baked potato chips, graham crackers, and pretzels would fit within these requirements. Still, promotion of these snacks should be minimized — for example, by locating vending machines outside of high-traffic areas.

Schools also should nix the sale of caffeinated beverages because headaches, shakiness, and other symptoms of caffeine dependency and withdrawal could interfere with students’ learning. And diet sodas and other beverages with artificial sweeteners should only be available in high schools after the end of the regular school day, the report adds. Plain water should be available throughout the day at no cost to students.



Although the guidelines are stringent, they do allow for a few exceptions. Low fat and skim versions of kids’ cherished chocolate milk should be spared, for example, because the benefit of its calcium content outweighs the downside of its added sugars.

Some schools have reported using foods and beverages as rewards for good behavior or academic accomplishment, the report observes. It recommends against this practice,

pointing out that establishing an emotional connection between accomplishment and food fosters poor eating habits.

Making the standards work in practice will take the effort of many groups — legislators, health professionals, school boards, and parents,

to name a few. The committee that wrote the report also expressed the hope that the new requirements will encourage the food and beverage industry to develop healthier products targeted to kids. — *Sara Frueh*

■ **Nutrition Standards for Foods in Schools: Leading the Way Toward Healthier Youth.** Committee on Nutrition Standards for Foods in Schools, Food and Nutrition Board, Institute of Medicine (2007, approx. 300 pp.; ISBN 0-309-10383-5; available from the National Academies Press, tel. 1-800-624-6242; \$42.95 plus \$4.50 shipping for single copies; also on the Internet at <www.nap.edu/catalog/11899.html>).

The committee was chaired by **Virginia A. Stallings**, Jean A. Cortner Endowed Chair in Pediatric Gastroenterology, director of the nutrition center, and director of faculty development at the Joseph Stokes Jr. Research Institute at the Children’s Hospital of Philadelphia. The study was funded by the U.S. Department of Agriculture.



No Butts About It

A PLAN TO END THE TOBACCO PROBLEM

Actors portraying doctors once touted tobacco's virtues in primetime TV spots.

Smokers could light up in planes and trains as well as their own automobiles.

Today, however, cigarette ads in most media have disappeared, and air travelers must put away their packs of smokes even before entering the airport.

In fact, smoking rates have plummeted by 50 percent since 1965. To borrow from one cigarette maker's tagline: You've come a long way, America.

But continuing the present course of control and prevention efforts likely will not end the tobacco problem, says a new report from the Institute of Medicine. Some 45 million adults in America — one out of every five — still smoke, and just under 10 million use other tobacco products. The rate at which kids take up tobacco use has hovered around 20 percent for most of the past two decades, although it is down at the moment. All this puffing claims 440,000 lives every year, including 50,000 deaths from secondhand smoke.

To really reduce this annual death toll and help individuals avoid or escape the grip of addiction, the nation — and the federal government in particular — needs to take additional, aggressive steps, the report says. It offers a two-pronged strategy that involves strengthening current tobacco control measures and at the

same time fundamentally transforming the regulatory environment, including giving the U.S. Food and Drug Administration oversight of tobacco production, sale, and marketing. “The dangerous properties of tobacco and its impact on public health are now beyond dispute and, as our report shows, aggressive measures to reduce smoking rest on a solid scientific and ethical foundation,” said Richard J. Bonnie, chair of the committee that wrote the report.

The committee urged public and private groups to keep up and intensify their efforts to control and prevent tobacco use through such strategies as excise tax increases, media-based prevention campaigns, indoor smoking bans, licensing of tobacco retailers, and support for cessation therapies and services. Evidence shows that these strategies do work. If fully supported, current control and prevention strategies could help bring smoking rates down to 10 percent by 2025, which would equate to about 11 million fewer smokers.

However, without greater regulatory oversight, tobacco prevention efforts will always struggle to maintain the upper hand against marketing efforts that seek to downplay the products’ risks, the report notes. Moreover, smoking rates need to be brought down well below 10 percent before the health care costs and deaths from tobacco no longer present a significant public health burden.

The report therefore calls on Congress to empower FDA to regulate the manufacture, marketing, and distribution of tobacco products. And it says the states should not be pre-empted from enacting their own tougher intervention efforts. Key elements of the committee’s vision

for expanded regulatory oversight include requiring graphic warnings on product packages; limiting advertising to a text-only, black-and-white format; banning any activities by tobacco companies that target youths; and regulating retail outlets more aggressively, including supporting state experiments to reduce the number of retail outlets. As a long-term stratagem, FDA also should explore the feasibility of gradually reducing the nicotine content of cigarettes, the committee urged.

This bilateral approach would not only reduce demand for tobacco products, but also address the addictive aspects of tobacco and curb manufacturers’ incentives to attract more smokers. A principal goal is to further limit young people’s access to these products given that the vast majority of smokers pick up the habit during adolescence when they overestimate their ability to escape addiction and fail to appreciate fully the later health consequences.

— *Christine Stencel*

■ **Ending the Tobacco Problem: A Blueprint for the Nation.** Committee on Reducing Tobacco Use: Strategies, Barriers, and Consequences, Board on Population Health and Public Health Practice, Institute of Medicine (2007, approx. 400 pp.; ISBN 0-309-10382-7; available from the National Academies Press, tel. 1-800-624-6242; \$64.95 plus \$4.50 shipping for single copies; also on the Internet at <www.nap.edu/catalog/11795.html>).

The committee was chaired by **Richard J. Bonnie**, John S. Battle Professor of Law and director, Institute of Law, Psychiatry, and Public Policy, University of Virginia School of Law, Charlottesville. The study was funded by the American Legacy Foundation.

Grand Challenges for **ENGINEERING**



From urban centers to the remotest corners of Earth, and the depths of the oceans to the far reaches of space, humans have sought to transcend barriers and create opportunities to improve life in our part of the universe. Engineering, science, and technology have truly shaped our world.

A few years ago, the National Academy of Engineering published *A Century of Innovation*, a coffee-table book that highlighted 20 great engineering achievements in the last century that have improved the quality of life — most of which we now take for granted. Technology has made it possible for us to provide an abundant supply of food and safe drinking water for much of the world. We rely on electricity for many of our daily activities, and we can travel the globe with relative ease. Goods and services can be delivered wherever they are needed. Growing computer and communications technologies are opening up vast stores of knowledge and entertainment.

As remarkable as these engineering achievements were, great challenges and

opportunities still lie ahead. The NAE has enlisted a blue-ribbon committee to develop a technological road map that charts a path to the future and serves as a basis for public analysis and debate. The committee is chaired by William J. Perry, University Professor of Engineering at Stanford University and former U.S. secretary of defense. The project is sponsored by the National Science Foundation.

The Grand Challenges for Engineering committee will develop a list of world challenges that can be addressed, at least in part, by engineering. They are drawing upon many sources of expertise and ideas from the general public.

“The generation and use of energy has such a huge impact on the economy, politics, security, and the environment that it is our Grand Challenge.”

— *Ed Catmull, president of Pixar and Disney Animation Studios*

“One of the most outstanding challenges for engineers in the next century will be the complete treatment of effluent from a plant.”

— *Mahzarul Islam, Bangladesh University of Engineering and Technology*

“I would suggest that we spend our immediate energy attempting to understand and develop solutions for the pathogenic threats we face, such as viruses, parasites, prions, etc...”

— *Jack Apple, Chandler, Ariz.*

“I believe that the greatest scientific, technological, and societal challenge of the 21st century will be to meet the world’s growing energy needs while protecting Earth’s delicate and increasingly threatened climate and ecological balances.”

— *Frances Arnold, California Institute of Technology*

Anyone can participate in the discussion or submit ideas at the Grand Challenges Web site — <www.engineeringchallenges.org> — where committee member profiles are also available. In addition, you will find exclusive essays from a former U.S. president and a presidential candidate, among others.

The committee will identify areas of engineering research and innovation with the potential to address aspects of each challenge, suggest avenues of exploration, and explain it all in a way that will be easily understood by the general public. The results of the committee’s deliberations will be revealed in late 2007. — *Randy Atkins*

“My own hope is that the engineering community will devote part of its effort to devise and apply technological advances to meet some of the rudimentary needs of water, fuel, housing, health, and information.”

— *Jimmy Carter, former U.S. president*

FIGHTING FAKE MONEY

Options to Combat Next-Generation Counterfeiters

In five to 10 years, advances in digital imaging technology could potentially allow the casual counterfeiter with little or no counterfeiting experience to operate nearly on the same level as professional counterfeiters. The nation's current countermeasures will fall short and likely fail to stop any opportunist with the right skills and the criminal intent.



To combat this threat, the U.S. government will have to incorporate new security features into our paper currency. A dedicated R&D program will be needed to establish the feasibility of possible new features and to make them ready for implementation, says a new report from the National Research Council. The Department of the Treasury's Bureau of Engraving and Printing currently has no such program.

Previous Research Council reports explored the counterfeiting risks associated with the commercial availability of high-quality color scanners and printers and their likely spread to a wider consumer base. In response, the bureau made significant changes in the 1990s to successfully thwart these threats and as a result, U.S. currency has one of the lowest counterfeiting rates in the world at five counterfeitings per million banknotes in 2002.

The new report explores the impending threat posed by emerging digital technologies such as advanced image-processing software, incredibly efficient and accurate printing technology, as well as the ability to communicate counterfeiting methods over the Internet. Rather than recommending a particular strategy or new feature, the report evaluates a range of possible

new security features, allowing the Bureau of Engraving and Printing to make the final decision on which ones to pursue.

Some of the features are highly advanced like using nanocrystal pigments to create unique inks that would be essentially impossible to reproduce, while others are less high-tech

such as using color-shifting ink, which changes color when an LED is shined on it, or including complex, hard-to-reproduce graphic designs on the bills.

Employing microperforation, currently used by other countries, presents an option that would be almost immediately available to the bureau. The technology uses a laser to create a distinct pattern of holes on bills that is nearly impossible to reproduce without considerable investment. "Smart" nanomaterials or chemical sensors represent some of the more advanced options that could be implemented in the long term.

The report concludes that in order to stay a step or two ahead of the technology available to counterfeiters, government efforts need to embrace a proactive strategy focused on innovation rather than their traditional focus on integrating existing security features. — *Paul Jackson*

■ **A Path to the Next Generation of U.S. Banknotes: Keeping Them Real.** Committee on Technologies to Deter Currency Counterfeiting, Board on Manufacturing and Engineering Design, Division on Engineering and Physical Sciences (2007, 328 pp.; ISBN 0-309-10578-1; available from the National Academies Press, tel. 1-800-624-6242; \$57.00 plus \$4.50 shipping for single copies; also on the Internet at <www.nap.edu/catalog/11874.html>).

The committee was chaired by **Robert E. Schafrik**, general manager, materials and process engineering department, GE Aviation, Cincinnati. The study was funded by the U.S. Department of the Treasury's Bureau of Printing and Engraving.

Revealing Our Microbial Planet



New Science May Revolutionize Understanding of the Living World

Without microbes, all complex plants and animals — including humans — would die. The trillions of microbes that inhabit the human gut and the billions that can be found in a handful of soil are essential to life as we know it.

An emerging field of science called metagenomics offers a revolutionary new approach to studying microbes by applying genomic analysis to entire microbial communities. Just as 17th-century microscopes gave scientists their first glimpse of the microbial world, metagenomics gives today's scientists a new tool for the study of complex communities of microorganisms, opening the door to a realm that was previously inaccessible to science.

“Metagenomics may be the most important event in microbiology since the invention of the microscope,” suggested Jo Handelsman, co-chair of the National Research Council's new report on metagenomics, during an interview with Public Radio International's Living on Earth. And a greater understanding of microbes could be key to addressing some of today's most complex medical, environmental, agricultural, and economic challenges, the report says.

A minuscule fraction of the microbial species on Earth — most scientists estimate less than 1 percent — can be cultured using current methods. Metagenomics allows researchers to access the genomes of an entire microbe community without the need to culture individual organisms, making it possible to simultaneously study millions of species that cannot be examined in the laboratory.

Metagenomics studies begin by obtaining a sample from a particular environment such as seawater, soil, or the human gut, extracting genetic material from all the organisms in the sample, and then analyzing it to gain insights on how members of

the community interact and perform complex functions. One of the biggest challenges will be manipulating the enormous amount of data that is generated to better understand single species, selected parts of the sample, or the dynamics of the entire community.

Shedding light on thousands of new microorganisms may change the way scientists understand fundamental biological concepts as well as lead to practical applications for human health, agriculture, and environmental stewardship, according to the report. Microbes naturally perform complex biochemical transformations that help clean up such hazardous pollutants as gasoline leaks, oil spills, sewage, and nuclear waste. Some microbes create byproducts such as hydrogen, methane, and butanol — potential sources of renewable energy. Studying the characteristics of such microbes can help scientists learn to channel microbial capabilities to help us manage tough environmental and economic problems.

Microbes even play a major role in maintaining human health. “We have 10 times more bacterial cells in our bodies than human cells, so we’re 90 percent bacteria,” said Handelsman. These microbial inhabitants help our bodies digest food and even defend us from pathogens. Given that hundreds of drugs available today were derived from chemicals first found in microbes, studying microbial communities holds great potential for developing new ways to diagnose, treat, and prevent disease.



The Research Council report was requested by several federal agencies interested in the potential of metagenomics and how best to encourage its success. In particular, the committee was asked to recommend promising directions for future studies. It concluded that the most efficient way to boost the field of metagenomics overall would be to establish a Global

Metagenomics Initiative that includes a few large-scale, internationally coordinated projects and numerous medium- and small-size studies.

“Because the challenges and opportunities presented by metagenomics are so enormous, a large-scale commitment equivalent to that of the Human Genome Project is both justified and necessary,” said committee co-chair James M. Tiedje. Interdisciplinary collaboration and an array of federal agencies would help to build the foundation of standard methods and databases necessary for this new field to reach its full potential. — *Anne Jurkowski*

■ ***The New Science of Metagenomics: Revealing the Secrets of Our Microbial Planet.*** Committee on Metagenomics: Challenges and Functional Applications, Board on Life Sciences, Division on Earth and Life Studies (2007, 170 pp.; ISBN 0-309-10676-1; available from the National Academies Press, tel. 1-800-624-6242; \$36.50 plus \$4.50 shipping for single copies; also on the Internet at <www.nap.edu/catalog/11902.html>).

The committee was co-chaired by **Jo Handelsman**, professor of plant pathology, University of Wisconsin, Madison, and **James M. Tiedje**, University Distinguished Professor and director, Center for Microbial Ecology, Michigan State University, East Lansing. The study was funded by the National Institutes of Health, National Science Foundation, and U.S. Department of Energy.

TRANSFORMING TOXICITY TESTING

Report Envisions New Way to Test Chemicals for Hazards

By countless paths, chemicals find their way into the environment — and from there into our bodies. Farmers spray herbicides and pesticides on their fields, for example, and rain washes their residual chemicals into rivers and oceans. Chemical components of gasoline are released by car exhaust into the air we breathe. And chemicals such as flame retardants surround us in our homes and offices every day.



Tests are conducted on some of these chemicals to determine whether contact with them might be harmful to humans. These tests, many of which are overseen by the U.S. Environmental Protection Agency, inform regulations about what industrial, commercial, and agricultural chemicals should be permitted for use, and at what concentrations.

The tests are typically conducted by administering large doses to groups of animals and watching them for obvious symptoms of disease. But how relevant these experiments are for humans, who are usually exposed to far lower doses, has often been called into question. And this process is time-consuming and costly, leaving the testing system overburdened and many chemicals unexamined — despite potential human exposure to them.

Recognizing the limitations of the current system, EPA asked the National Research Council to develop a new vision and strategy for toxicity testing.

Instead of relying so heavily on animal testing, the new report says, EPA should move in the direction of using “in vitro” tests — lab tests that use cells or cell lines to assess a chemical’s potential effects. The new approach would take advantage of evolving scientific understanding of how genes, proteins, and molecules interact to maintain normal cell function, and how



some of these interactions can be altered in ways that could lead to health problems.

The new testing approach would focus on toxicity pathways — cellular response pathways that, when sufficiently disrupted, are expected to lead to adverse health effects. The report recommends the use of “high-throughput” tests — rapid, automated experiments that can test hundreds or thousands of chemicals over a wide range of concentrations — to evaluate how chemicals affect these pathways. On the basis of data from these and other experiments, researchers can develop models to estimate the level of exposure needed to trigger a response in humans.

The new approach would generate data more relevant to humans and reduce the time and money needed for testing, the report says. Moreover, the need for animal testing could be greatly reduced over time, and possibly even eliminated someday. For the foreseeable future, however, targeted tests in animals should be used to complement the in vitro tests, because current

methods cannot yet adequately mirror the metabolism of a whole animal.

Studies observing human populations will be needed to provide information on human susceptibility and “background” exposures to chemicals that people face every day, so that results of the in vitro tests can be properly interpreted. In addition, the data can be used to select appropriate doses for toxicity testing, based on realistic exposures. These studies may also reveal health risks not previously identified through toxicity testing.

A substantial research initiative will be needed to develop the new approach’s components and confirm their effectiveness, the report says. It adds that creating a core institution that can foster and organize multidisciplinary research will be key to the effort’s success.

Given how long current toxicity-testing practices have been established, and how deeply ingrained they are in some sectors, the new approach might encounter some resistance, the report acknowledges. But it emphasizes that the proposed changes will generate better data on the risks humans face from chemicals, which in turn will improve regulatory decisions to mitigate those risks. — *Sara Frueh*

■ **Toxicity Testing in the 21st Century: A Vision and a Strategy.** Committee on Toxicity Testing and Assessment of Environmental Agents, Board on Environmental Studies and Toxicology and Institute for Laboratory Animal Research, Division on Earth and Life Studies (2007, approx. 146 pp.; ISBN 0-309-10992-2; available from the National Academies Press, tel. 1-800-624-6242; \$35.00 plus \$4.50 shipping for single copies; also on the Internet at <www.nap.edu/catalog/11970.html>).

The committee was chaired by **Daniel Krewski**, professor of epidemiology and community medicine at the University of Ottawa. The study was funded by the U.S. Environmental Protection Agency.



Veterans and PTSD

Battle fatigue, shell shock, combat neurosis — it's been called many things over the years. Post-traumatic stress disorder (PTSD) is likely as ancient as war itself. The United States has long recognized the sacrifices of its military personnel by compensating veterans for disabilities suffered as a result of their service, such as loss of limbs, chronic disorders, and, more recently, mental conditions including PTSD.

In the past few years, PTSD in the military has risen to public prominence as surveys indicate relatively high rates among soldiers serving in Iraq and Afghanistan and media accounts feature wrenching stories of service members' struggles to cope with their mental battle scars. At the same time, veterans of previous conflicts have been filing disability claims for PTSD in greater numbers. The U.S. Department of Veterans Affairs (VA) recorded an almost 80 percent jump in claims between 1999 and 2004. These trends have sparked questions about when and how PTSD can

ENSURING FAIR AND CONSISTENT COMPENSATION

happen as well as whether VA's current tools and methods for assessing veterans for PTSD disability and determining the level of compensation they merit are reliable and up to date.

To ensure that all veterans receive consistent and appropriate assessments of the severity of their PTSD-related disability, the VA needs to develop new evaluation methods and rating criteria specific to PTSD to replace the overly general, "one-size-fits-all" standards it currently uses, says a new report by the Institute of Medicine and National Research Council. Unlike physical ailments with obvious symptoms, evaluation of PTSD severity entails greater subjectivity. Although mental disorders vary in their characteristics and effects, the VA rates the severity of all using criteria based on symptoms of schizophrenia and mood and anxiety disorders.

Hearing from veterans and clinicians that some PTSD evaluations last as little as 20 minutes, the committee that wrote the report also urged the agency to ensure that



all claimants receive a complete and thorough assessment by professionals trained in spotting and assessing the symptoms of PTSD. These evaluations are important because they inform the nonclinical professionals who rate the severity of veterans' disabilities, which determines what level of compensation they will receive.

By federal statute, veterans with service-connected disabilities are eligible for payments intended to compensate for their loss of potential earning power. Severity ratings and payment amounts for PTSD and other mental conditions depend on how greatly a veteran's ability to work is impaired, with a maximum monthly tax-free benefit of \$2,471 for a veteran without a spouse, children, or dependent parent. While beneficiaries with mental disorders may be able to hold full-time jobs even as their symptoms negatively affect other aspects of their lives, current rating criteria only award

maximum compensation to those who do not work. This is a marked disparity with veterans who have physical impairments. They may still receive maximum disability benefits even as they engage in full-time employment thanks to assistive technologies and services.

The report urges the VA to base compensation decisions on how greatly PTSD affects all aspects of a veteran's daily life, not just his or her ability to be gainfully employed. The current emphasis on occupational impairment penalizes veterans who can and do work despite their symptoms, and does not acknowledge other potential negative outcomes of service-connected ailments, the committee said.

The committee also found abundant evidence that PTSD can develop at any time after exposure to trauma. Some cases that are labeled "late onset" may instead be flare-ups of low-level symptoms or may be longstanding conditions that have gone undiagnosed for years. Aging, loss of mental acuity, the death of friends or spouses, and other factors can trigger or exacerbate symptoms as well, which may explain in part the increase in claims from older veterans. — *Christine Stencel*

■ PTSD Compensation and Military Service.

Committee on Veterans' Compensation for Posttraumatic Stress Disorder, Board on Military and Veterans Health, Institute of Medicine; and Board on Behavioral, Cognitive, and Sensory Sciences, Division of Behavioral and Social Sciences and Education (2007, 262 pp.; ISBN 0-309-10552-8; available from the National Academies Press, tel. 1-800-624-6242; \$36.00 plus \$4.50 shipping for single copies; also on the Internet at <www.nap.edu/catalog/11870.html>).

The committee was chaired by **Nancy C. Andreasen**, Andrew H. Woods Chair of Psychiatry and director, Neuroimaging Research Center, Carver College of Medicine, University of Iowa, Iowa City. The study was funded by the U.S. Department of Veterans Affairs.

Speaking Up for Foreign Languages & International Education



When it comes to foreign language skills and knowledge of other cultures, most Americans are stuck in “Smallville.” Yet, today, the United States faces unprecedented demands for expertise in languages and cultures, as well as globally aware citizens. A new National Research Council report calls for more support from the U.S. education system to develop an integrated approach to improving such skills and knowledge, beginning in the primary grades.

The U.S. Department of Education should take a leadership role in ensuring that its foreign language and international education programs respond to both current and future needs. The department does not have an overall view of or master plan for its range of language and international programs, including the higher education programs known collectively as Title VI and Fulbright-Hays. And that lack does not bode well for the nation’s security and competitiveness, the report says.

Consolidating oversight of the programs under a high-ranking official, preferably a presidential appointment, would be an important first step. Furthermore, Congress should require the U.S. secretary of education to lead development of an interagency biennial public report outlining national needs in this area, plans to tackle them, and progress toward goals.

Universities should play key roles, partnering with federal officials to continuously improve the programs. The more Americans who can communicate in a broad range of languages, the better the nation can respond to new and unanticipated challenges across the globe, the report says.

The Title VI and Fulbright-Hays programs were created nearly 50 years ago following

the Soviet Union’s launch of the Sputnik 1 satellite. The surprise launch shocked the United States, leading to large increases in federal spending on education and scientific research to meet U.S. national security needs. Over the years, the programs’ scope has grown to encompass undergraduate and graduate education in foreign languages, international studies, and area studies, which focus on particular regions of the world. They also promote greater use of technology, international business training, and the recruitment of minorities into international service professions.

The endeavor has been fruitful, the report says. For example, the programs have boosted the teaching of more than 250 less commonly taught languages, such as Mandarin, and developed instructional materials that are used in the federal government, K-12 education, and academia. However, funding and staff resources have trailed the programs’ expanded mission.

Also lacking are national data on the programs’ impact. The department’s effort to improve its new data system should provide uniform standards for data collection and allow comparisons across programs and over time, the report says. Moreover, information on their performance should be publicly available. — *Vanee Vines*

■ **International Education and Foreign Languages: Keys to Securing America’s Future.** Committee to Review the Title VI and Fulbright-Hays International Education Programs, Center for Education, Division of Behavioral and Social Sciences and Education (2007, 412 pp.; ISBN 0-309-10494-7, 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/11841.html>).

The committee was chaired by **Janet L. Norwood**, a counselor and senior fellow at the Conference Board Inc., and former U.S. commissioner of labor statistics. The study was sponsored by the U.S. Department of Education.

BY ALAN JETTE



Alan Jette, Ph.D., M.P.H., is a professor of health policy and management and director of the Health and Disability Research Institute at the Boston University School of Public Health.

Transforming the Future of **Disability in America**

In recent months, the nation's attention has turned to the thousands of military personnel returning from Iraq and Afghanistan to face new challenges. In many cases, these men and women will come home with disabilities that will change their lives from what they were before. An estimated one in four veterans from Iraq or Afghanistan has filed claims for a war-related disability. Although staggering, the number is dwarfed by the total number of Americans who experience disabilities. How individuals, families, and society will cope with the challenges of disability in America during coming decades is an underappreciated and uncomfortable question, but one that we must answer.

Today, between 40 million and 50 million people in the United States have disabilities. That number will grow significantly as the population ages 65 and over — who are at the highest risk of disability — doubles in the next 30 years. Considering the numbers who now have disabilities, those likely to develop a disability, and those who are or will be affected by the disabilities of family members or others close to them, it becomes clear that disability will affect the lives of most Americans.

A new report by the Institute of Medicine, *The Future of Disability in America*, underscores the growing evidence that disability is not an unavoidable consequence of injury and chronic disease, but is shaped by actions society and individuals take — in the public arena, in commerce, and in our private lives.

In medicine and public health, a range of preventive measures have contributed to reductions in the incidence of certain kinds of injuries, developmental disorders, and other health conditions that contribute to disability. Recent reductions in the risk of disability

among older Americans, in particular, are encouraging, although trend data for younger and middle-aged adults suggest a growing risk for disability. State Medicaid programs have increased resources to support community and home services that allow more beneficiaries with serious disabilities to avoid institutional care, and programs to serve children and adults with special health care needs have also increased.

While the Americans with Disabilities Act (ADA) enacted in 1991 raised awareness of disability and improved access to public facilities, significant environmental barriers remain, sometimes in places one would not expect. Too many hospitals and professional offices lack facilities, equipment, and services suitable for people with physical mobility, hearing, vision, or other disabilities. Particularly limiting are outmoded restrictions in Medicare and other health programs on coverage of assistive technologies, as well as health and personal care services known to improve the lives of individuals with disabilities.

The IOM report urges concerted action — taken sooner rather than later — to achieve changes that will help people with disabilities lead independent and productive lives. The IOM recommends more federal support for disability research; a national disability monitoring program to track trends in disability and inform policymakers; reform of coverage of assistive technologies and services in Medicare, Medicaid, and other health plan policies; the prevention of common secondary health problems among those with disabilities; the creation of more accessible environments for those with disabilities; and a national campaign to educate consumers and professionals about the availability and benefits of assistive technologies.

Disability is one of this nation's most significant social, public health, and moral challenges. Inaction will cost individuals and society with avoidable dependency, increased stress on individuals and families, and lost productivity. By working to harness the innovative spirit of American science and industry, promote compliance with civil rights laws, and remove outdated restrictions in public and private health plans, we can transform the future of disability in America.

Today, between 40 million and 50 million people in the United States have disabilities. That number will grow significantly as the population ages 65 and over — who are at the highest risk of disability — doubles in the next 30 years.

Science Academies Issue Statements on Energy, Innovation

The leaders of several national science academies met with German Chancellor Angela Merkel in May to discuss the organizations' collective call for world leaders to address global climate change, energy efficiency, and innovation.

In two joint statements released before the June meeting of G-8 leaders in Heiligendamm, Germany, the academies



said world powers should tackle these issues by promoting low carbon-emission energy systems and taking decisive steps to facilitate scientific and technical innovation, among other actions. Leaders also should balance intellectual-property rights and free access to knowledge and information.

The documents were written by science academies from the Group of Eight industrialized nations, including the United States, and five developing countries, including China and India. At a May 16 press conference in Berlin, Merkel, who is also the G-8 president, appeared with NAS President Ralph J. Cicerone and other

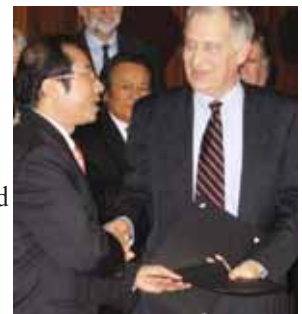
academy representatives to voice her support and applaud their commitment.

Energy security and climate change are the “defining issues of our time, and bring together the themes of growth and responsibility in a way that highlights our duties to future generations,” one statement says. The second statement frames scientific and technical innovation as “the engine that drives economies.”

Cicerone noted that the issues “are oblivious to national borders. The scientific community and policymakers worldwide must work together to bring about necessary changes.” To read the two statements online, visit national-academies.org/president/cicerone.html. — *Vanee Vines*

NAS President, Vietnamese Official Sign Accord

NAS President Ralph Cicerone and Banh Tien Long, Vietnam’s vice minister of education and training, signed a joint statement in March to encourage mutual learning and cooperation between the two nations in science, technology, and education. Pham Gia Khiem, Vietnam’s deputy prime minister and minister of foreign affairs, also attended the signing ceremony at the National Academy of Sciences building in Washington, D.C.



The U.S. National Academies and the Ministry of Education and Training of Vietnam will work together on several

activities, including exchange visits and exploring at least one project related to scientific cooperation — with an eye toward implementing that project if it would benefit both the United States and Vietnam. The Academies also will give the ministry advice and technical assistance to help it further develop Vietnam’s higher education system, the statement says.

In the near future, Vietnam plans to establish at least one world-class university and grow its pool of doctoral scholars in higher education. Additionally, the ministry will focus on screening and selecting qualified candidates for graduate education and research in the United States, among other measures.

Vietnamese officials at the event described science and technology training as key to their nation’s socio-economic advancement. To read the statement online, visit <national-academies.org/president/cicerone.html>. — *Vanee Vines*

Academies and Learned Societies Celebrate Basic Knowledge and Research

The National Academies came together with the nation’s two oldest learned societies in a historic two-day convocation held during the 144th annual meeting of the National Academy of Sciences in April. Members of the American Philosophical Society, begun in 1743 by Benjamin Franklin, and the American Academy of Arts and Sciences, founded by John Adams, John Hancock, and other leaders in 1780, joined NAS, NAE, and IOM members at

a series of symposia on the state of our democracy, jurisprudence, religion, economy, and media.

NAS President Ralph Cicerone chaired presentations on global warming and our future energy choices. IOM President



Harvey Fineberg led a symposium on science and health in a rapidly aging society. Other speakers included retired U.S. Supreme Court associate justice Sandra Day O’Connor, economist and Nobel laureate Robert Solow, broadcaster Tom Brokaw, and novelist E.L. Doctorow.

During ceremonies at the Smithsonian Institution’s National Portrait Gallery, leaders of the five organizations issued a joint declaration about the key role knowledge plays in service to the public good. “Each generation,” the groups stated, “must reaffirm and reinforce the founders’ reverence for scholarship and knowledge as the cornerstones of progress and the building blocks of enduring institutions. We live in an age of instantaneous access to unimaginably rich sources of information, but truly useful information continues to depend on underlying research and basic knowledge.”

— *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.

Developmental Outcomes and Assessments for Young Children
Board on Children, Youth, and Families, National Research Council and Institute of Medicine. Project director: Susan Van Hemel. Chair: Catherine Snow, Henry Lee Shattuck Professor of Education, Harvard Graduate School of Education, Cambridge, Mass. Sponsor: Office of Head Start, Administration for Children and Families, U.S. Department of Health and Human Services.

Evaluating the Efficiency of Research and Development Programs at the Environmental Protection Agency
Committee on Science, Engineering, and Public Policy, National Academy of Sciences, National Academy of Engineering, and Institute of Medicine; and Board on Environmental Studies and Toxicology, Division on Earth and Life Studies. Project director: Richard Bissell. Chair: Gilbert Omenn, professor of internal medicine, human genetics, and public health, and director of the Center for Computational Medicine and Biology, University of Michigan, Ann Arbor. Sponsor: U.S. Environmental Protection Agency.

Gulf War and Health: Brain Injury in Veterans and Long-Term Health Outcomes
Board on Population Health and Public Health Practice, Institute of Medicine. Project director: Carolyn Fulco. Chair: George W. Rutherford, director, Institute for

Global Health, Salvatore Pablo Lucia Professor of Epidemiology and Preventive Medicine, and vice chair, department of epidemiology and biostatistics, School of Medicine, University of California, San Francisco. Sponsor: U.S. Department of Veterans Affairs.

A Plan for Interstate Interoperability of State Voter Registration Databases
Computer Science and Telecommunications Board, Division on Engineering and Physical Sciences. Project director: Herb Lin. Co-chairs: Sharon Priest, former Arkansas secretary of state, and executive director, Downtown Partnership, Little Rock, Ark.; and Olene Walker, former governor, state of Utah. Sponsor: U.S. Election Assistance Commission.

Reducing Storm Water Discharge Contributions to Water Pollution
Water Science and Technology Board, Division on Earth and Life Studies. Project director: Laura Ehlers. Chair: Claire Welty, director, Center for Urban Environmental Research and Education, and professor of civil and environmental engineering, University of Maryland, Baltimore County. Sponsor: U.S. Environmental Protection Agency.

Relationships Among Development Patterns, Vehicle Miles Traveled, and Energy Consumption
Pollution Studies and Special Programs, Transportation Research Board; and Board on Energy and Environmental Systems, Division on Engineering and Physical Sciences. Project director: Stephen Godwin. Chair: José A. Gómez-Ibáñez, Derek C. Bok Professor of Urban Planning and Public Policy, Harvard University, Cambridge, Mass. Sponsor: U.S. Department of Energy.

Review of Louisiana Coastal Protection and Restoration (LACPR) Program
Water Science and Technology Board and Ocean Studies Board,

Division on Earth and Life Studies; and Board on Infrastructure and the Constructed Environment, Division on Engineering and Physical Sciences. Project director: Jeffrey Jacobs. Chair: Robert A. Dalrymple, Willard and Lillian Hackerman Professor of Civil Engineering, Whiting School of Engineering, Johns Hopkins University, Baltimore. Sponsor: U.S. Army Corps of Engineers.

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.

2007 Amendments to the National Academies’ Guidelines for Human Embryonic Stem Cell Research
Board on Life Sciences, Division on Earth and Life Studies; and Board on Health Sciences Policy, Institute of Medicine (2007, 46 pp.; ISBN 0-309-10559-5; available from NAP).

A 21st Century System for Evaluating Veterans for Disability Benefits
Board on Military and Veterans Health, Institute of Medicine (2007, approx. 430 pp.; ISBN 0-309-10631-1; available from NAP).

Advancing Quality Improvement Research: Challenges and Opportunities — Workshop Summary
Forum on the Science of Health Care Quality Improvement and Implementation, Board on Health Care Services, Institute of Medicine (2007, 60 pp.; ISBN 0-309-10623-0; available from NAP).

Adverse Drug Event Reporting: The Roles of Consumers and Health-Care Professionals — Workshop Summary
Forum on Drug Discovery, Development, and Translation, Board on Health Sciences Policy, Institute of Medicine (2007, 82 pp.; ISBN 0-309-10276-6; available from NAP).

Agricultural Water Management: Proceedings of a Workshop in Tunisia (Series: Strengthening Science-Based Decision making in Developing Countries)
Science and Technology for Sustainability Program, Division on Policy and Global Affairs (2007, 158 pp., ISBN 0-309-10603-6, available from NAP).

Assessment of the Continuing Operability of Chemical Agent Disposal Facilities and Equipment
Board on Army Science and Technology, Division on Engineering and Physical Sciences (2007, 78 pp.; ISBN 0-309-10351-7; available from NAP).

Assessment of the Performance of Engineered Waste Containment Barriers
Board on Earth Sciences and Resources, Division on Earth and Life Studies (2007, approx. 244 pp.; ISBN 0-309-10809-8; available from NAP).

Assessment of the Results of External Independent Reviews for U.S. Department of Energy Projects
Committee on Assessing the Results of External Independent Reviews for U.S. Department of Energy Projects, Board on Infrastructure and the Constructed Environment, Division on Engineering and Physical Sciences (2007, 74 pp.; ISBN 0-309-10639-7; available from NAP).

Assessment of Wingtip Modifications to Increase the Fuel Efficiency of Air Force Aircraft
Air Force Studies Board, Division on Engineering and Physical Sciences

(2007, approx. 98 pp.; ISBN 0-309-10497-1; available from NAP).

An Astrobiology Strategy for the Exploration of Mars
Space Studies Board, Division on Engineering and Physical Sciences; and Board on Life Sciences, Division on Earth and Life Studies (2007, 130 pp.; ISBN 0-309-10851-9; available from NAP).

Building a Better NASA Workforce: Meeting the Workforce Needs for the National Vision for Space Exploration
Space Studies Board and Aeronautics and Space Engineering Board, Division on Engineering and Physical Sciences (2007, 80 pp.; ISBN 0-309-10764-4; available from NAP).

Cancer Biomarkers: The Promises and Challenges of Improving Detection and Treatment
Institute of Medicine (2007, 252 pp.; ISBN 0-309-10386-X; available from NAP).

Cancer in Elderly People — Workshop Proceedings
National Cancer Policy Forum, Institute of Medicine (2007, 106 pp.; ISBN 0-309-10476-9; available from NAP).

Coal: Research and Development to Support National Energy Policy
Committee on Earth Resources, Board on Earth Sciences and Resources, Division on Earth and Life Studies (2007, approx. 198 pp.; ISBN 0-309-11022-X; available from NAP).

Conventional Prompt Global Strike Capability — Letter Report
Naval Studies Board, Division on Engineering and Physical Sciences (2007, 14 pp.; available only online from NAP).

Decadal Science Strategy Surveys — Report of a Workshop
Space Studies Board, Division on Engineering and Physical Sciences

(2007, 76 pp.; ISBN 0-309-10664-8; available from NAP).

Distributed Remote Sensing for Naval Undersea Warfare: Abbreviated Version
Naval Studies Board, Division on Engineering and Physical Sciences (2007, 42 pp.; ISBN 0-309-10180-8; available from NAP).

Emergency and Continuous Exposure Guidance Levels for Selected Submarine Contaminants
Committee on Toxicology, Board on Environmental Studies and Toxicology, Division on Earth and Life Studies (2007, 316 pp.; ISBN 0-309-09225-6; available from NAP).

Engaging Privacy and Information Technology in a Digital Age
Computer Science and Telecommunications Board, Division on Engineering and Physical Sciences (2007, 452 pp.; ISBN 0-309-10392-4; available from NAP).

Environmental Impacts of Wind-Energy Projects
Board on Environmental Studies and Toxicology Division on Earth and Life Studies (2007, approx. 346 pp.; ISBN 0-309-10834-9; available from NAP).

Environmental Public Health Impacts of Disasters: Hurricane Katrina — Workshop Summary
Roundtable on Environmental Health Sciences, Research, and Medicine, Board on Population Health and Public Health Practice, Institute of Medicine (2007, 100 pp.; ISBN 0-309-10500-5; available from NAP).

Ethical and Legal Considerations in Mitigating Pandemic Disease — Workshop Summary
Forum on Microbial Threats, Board on Global Health, Institute of Medicine (2007, 250 pp.; ISBN 0-309-10769-5; available from NAP).

Exploration of Antarctic Subglacial Aquatic Environments: Environmental and Scientific Stewardship

Polar Research Board, Division on Earth and Life Studies (2007, 162 pp.; ISBN 0-309-10635-4; available from NAP).

The Future of Disability in America
Board on Health Sciences Policy, Institute of Medicine (2007, approx. 680 pp.; ISBN 0-309-10472-6; available from NAP).

The Future of U.S. Chemistry Research: Benchmarks and Challenges

Board on Chemical Sciences and Technology, Division on Earth and Life Studies (2007, 160 pp.; ISBN 0-309-10533-1; available from NAP).

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Board on Healthcare Services, Institute of Medicine (2007, 162 pp.; ISBN 0-309-10468-8; available from NAP).

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Sciences and Education (2007, 396 pp.; ISBN 0-309-10720-2; available from NAP).

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Medical Follow-Up Agency, Board on Military and Veterans Health, Institute of Medicine (2007, 142 pp.; ISBN 0-309-10210-3; available from NAP).

Mining Safety and Health Research at NIOSH

Committee on Earth Resources, Board on Earth Sciences and Resources, Division on Earth and Life Studies; and Institute of Medicine (2007, approx. 314 pp.; ISBN 0-309-10342-8; available from NAP).

Models in Environmental Regulatory Decision Making

Board on Environmental Studies and Toxicology, Division on Earth and Life Studies (2007, 286 pp.; ISBN 0-309-11000-9; available from NAP).

National Land Parcel Data: A Vision for the Future

Board on Earth Sciences and Resources, Division on Earth and Life Studies (2007, approx. 238 pp.; ISBN 0-309-11030-0; available from NAP).

The National Science Foundation's Materials Research Science and Engineering Center Program:

Looking Back, Moving Forward
Solid State Sciences Committee, Board on Physics and Astronomy, Division on Engineering and Physical Sciences (2007, approx. 240 pp.; ISBN 0-309-10961-2; available from NAP).

Nutrigenomics and Beyond: Informing the Future — Workshop Summary

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Board on Global Health, Institute of Medicine; and Board on Children, Youth, and Families, Institute of Medicine and National Research Council (2007, approx. 420 pp.; ISBN 0-309-10388-6; available from NAP).

Plasma Science: Advancing Knowledge in the National Interest

Plasma Science Committee, Board on Physics and Astronomy, Division on Engineering and Physical Sciences (2007, approx. 232 pp.; ISBN 0-309-10943-4; available from NAP).

Portals to the Universe: The NASA Astronomy Science Centers

Space Studies Board, Division on Engineering and Physical Sciences (2007, 66 pp.; ISBN 0-309-10734-2; available from NAP).

Prospective Evaluation of Applied Energy Research and Development at DOE (Phase Two)

Board on Energy and Environmental Systems, Division on Engineering and Physical Sciences (2007, 234 pp.; ISBN 0-309-10467-X; available from NAP).

Putting People on the Map: Protecting Confidentiality with Linked Social-Spatial Data

Committee on the Human Dimensions of Global Change, Division of Behavioral and Social Sciences and Education (2007, 176 pp.; ISBN 0-309-10414-9; available from NAP).

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Committee on National Statistics, Division of Behavioral and Social

Sciences and Education (2007, 94 pp.; available only online from NAP).

The Role of Naval Forces in the Global War on Terror: Abbreviated Version

Naval Studies Board, Division on Engineering and Physical Sciences (2007, 46 pp.; ISBN 0-309-10179-4; available from NAP).

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Nuclear and Radiation Studies Board, Division on Earth and Life Studies (2007, approx. 88 pp.; ISBN 0-309-10821-7; available from NAP).

Science and Technology to Counter Terrorism: Proceedings of an Indo-U.S. Workshop

Committee on International Security and Arms Control, the National Academies, in cooperation with International Strategic and Security Studies Programme of the National Institute of Advanced Studies, Bangalore, India (2007, 180 pp.; ISBN 0-309-10499-8; available from NAP).

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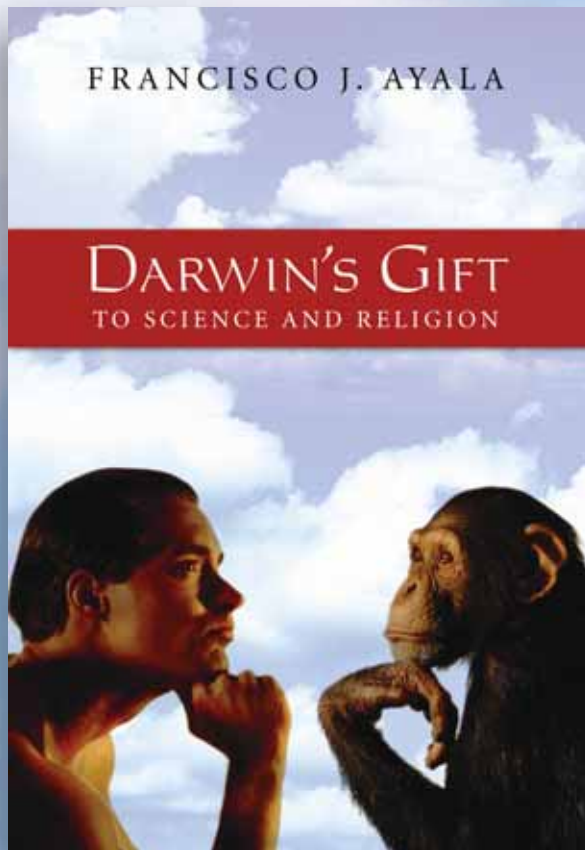
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With the publication in 1859 of *On the Origin of Species by Means of Natural Selection*, Charles Darwin established that evolution by common descent was the dominant scientific explanation for nature's diversity. This was to be his greatest gift to science and society.

Scientists agree that the evolutionary origin of animals and plants is a scientific conclusion beyond reasonable doubt. They place it beside such established concepts as the roundness of the Earth, its revolution around the sun, and the molecular composition of matter.

Yet as the bicentennial celebration of Darwin's birth approaches, the world finds itself divided over evolutionary theory. Consistently endorsed as "good science" by experts and overwhelmingly accepted as fact by the scientific community, it is not always accepted by the public – and our nation's schools continue to be battlegrounds for this conflict. From the 1925 Tennessee trial of a biology teacher who dared to teach Darwin's theory to his students, to 11 parents' battle in 2005 to keep the teaching of "intelligent design" out of public schools in a Pennsylvania school district, the need to cut through the propaganda is clear.

Darwin's Gift to Science and Religion provides a voice at once fresh and familiar that brings a rational, measured perspective to the discussion of evolution. An acclaimed evolutionary biologist with a background in theology, author Francisco J. Ayala offers clear explanations of the science, reviews the history that led the scientific community to ratify Darwin's theories, and ultimately provides a clear path through the confusion.

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