



## SCIENCE AND ENVIRONMENT

## Abelson Seminar: It's "Time for Microbes to Have Their Due"

A visitor to Earth during most of the planet's history would have been greeted only by microbes, and those ubiquitous organisms continue to help shape both the planet's destiny and ours, according to researchers who spoke at the Philip Hauge Abelson Advancing Science Seminar at AAAS.

"It's definitely time for microbes to have their due," said David Stahl, a professor of environmental engineering and science at the University of Washington. "We live on the planet of the microbes," he said, with very large numbers of those organisms controlling the key cycles of planetary chemistry that produce such essentials to life as oxygen and organic forms of carbon and nitrogen.

But in many cases, he said, scientists still don't know which populations of bugs are in control of specific cycles. There have been surprising discoveries just within the past few years. An anaerobic organism that digests ammonia, first described in 1999, represents a major part of the nitrogen cycle that had been missed during a century of investigation, according to Stahl. Another bug, discovered in 1992, accounts for about 20% of the bacterial component of the plankton that drifts in ocean waters.

Speakers at the symposium told how genomics, microbiology, mineralogy, geochemistry, and materials science have provided new insights on the history of microbes and their potential for such practical applications as cleaning up polluted sites, mitigating the effects of climate change, or producing electricity.

The 26 October seminar "Microbes, Minerals and the Environment" honored the late Philip Abelson, editor of *Science* for 22 years and then senior adviser to AAAS. He founded and sponsored the seminar series to encourage participants to think about where science is going, not where it has been.

"We're so lucky to work on a diverse group of organisms that we know so little about," said Anna-Louise Reysenbach, a professor of microbial biology at Portland State University who has been studying the heat-loving microbes found around hydrothermal vents,

seafloor geysers that spew superhot, mineral rich water. She showed an image of one organism, which she calls the "devilheterotrophentblob," whose cell wall had formed two horn-like structures. It turns out to be the first truly acid-loving microbe in the neighborhood of such hydrothermal vents.



Microbiologist Derek R. Lovley; human microbiota *Lactobacillus*, which produces lactic acid (right).



The durability and variety of microbes continue to astonish researchers. Keynote speaker Derek R. Lovley, a microbiologist at the University of Massachusetts, Amherst, mentioned Strain 121, a deep-sea organism discovered in 2003 that survives at 121°C (250°F). That is the highest temperature at which life is known to exist—equivalent to the heat in autoclaves used to sterilize surgical instruments.

Species of bacteria called *Geobacter* are of interest because of their novel abilities to transfer electrons. They can harvest electricity from aquatic environments and may prove useful as power sources for underwater monitoring instruments, Lovley said. It is likely that fuel cells can be made from pure cultures of *Geobacter* organisms, he added, perhaps initially to power electronic gadgets like cell phones.

There are other practical applications on the horizon, speakers said, including use of *Geobacter* species and other microbes to bind uranium, plutonium, and other metals in polluted groundwater or soils. Bruce Hungate, an ecologist at Northern Arizona University, offered a cautionary note, however, on one proposed "biological fix" for rising carbon dioxide levels in the atmosphere. While plants may

grow more in response to elevated carbon dioxide levels, Hungate said, microbes in the soil apparently have a reverse effect, limiting the amount of carbon that the soils can sequester.

Paul Falkowski, a professor in the Institute of Marine & Coastal Sciences and the Department of Geological Sciences at Rutgers University, was wary of human tinkering with natural cycles. "We are messing with something we don't really know much about," he said. "We have, in the last 150 to 200 years, so critically altered the carbon, phosphorus, sulfur, nitrogen, water cycles," Falkowski said, that society is on a path toward unsustainable development.

Falkowski urged reductions in carbon dioxide and sulfur emissions and in the use of nitrogen-containing fertilizers so that we can return to a world "where microbes basically are taking care of the cycles for us, because we cannot take care of the cycles for ourselves."

—Earl Lane

## EDUCATION

## Digital Architects Ponder the Library of the Future

The emergence of the Internet over the last decade as an everyday data and communication tool has created enormous possibilities in science education, but also inefficiencies and distractions. If you doubt it, go to your favorite Internet search engine and type in v-e-n-u-s.

What do you get? Not just the second planet from the Sun, but a line of women's clothing, the Roman goddess of love and beauty, and an e-zine about women in the arts.

For the past 11 years, the U.S. National Science Foundation (NSF) and a corps of visionaries funded by NSF have been building a library that sharpens the focus of the Internet and makes it an effective, efficient tool of 21st-century education for science, technology, engineering, and mathematics (STEM). It's called the National Science Digital Library (go to your search engine and type in n-s-d-l). Nearly 200 of the library's architects—including representatives from industry, major universities, and government—gathered at AAAS 18 to 20 October to consider its future.

"You know all the reports that are out now about the conditions of the STEM disciplines in the United States and how few kids are going into them, the whole pipeline issue," said Kaye Howe, executive director of NSDL Core Integration. "We would really like to be part of the solution on this, both by creating a community

and by giving that community the material, the tools, and the services it needs in order to master these very important areas that are sometimes difficult to master.”

Aside from providing services to the average science classroom, Howe said, the NSDL might be crucial in providing education support in poor states where textbooks are in short supply, or in areas like New Orleans where schools have been devastated by natural disasters. And, she said, it might provide a critical connection to science for a student who is otherwise bored and inclined to drift away from STEM fields.

Since the NSDL was conceived 11 years ago, NSF has funded over 200 related projects. Among them is the AAAS-managed BiosciEd-Net (BEN) portal, which offers more than 4500 reviewed resources covering 77 biological sciences topics.

“AAAS is involved with the NSDL because of its mission related to science literacy for all and increasing public understanding of science,” said Yolanda George, deputy director of Education and Human Resources at AAAS. “Also, the NSDL provides an opportunity for AAAS to work with its affiliated organizations to strengthen teaching and learning in the biological sciences.”

Before the Internet, a library was evaluated in part on the number of volumes on its shelves, Howe said. But with “the growth of information on the Internet, material itself was no longer scarce. What did begin to happen very quickly was that finding that material and finding material that you could trust, and use—that really became the great exercise.”

Today, the NSDL works as a more discerning version of Google. Type in v-e-n-u-s and you get nearly 2000 up-to-date resources about every aspect of Earth’s neighboring planet, all carefully reviewed by experts, suitable for students and teachers at various levels from kindergarten through undergraduate studies.

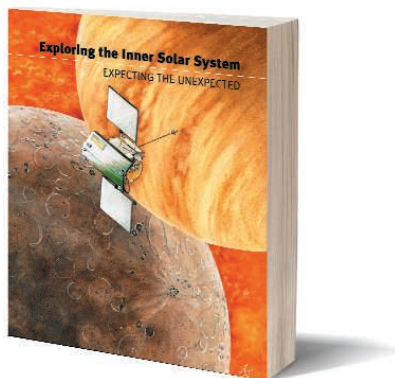
But behind that seemingly simple service is a stream of interests working to refine a futuristic science of collecting, storing, and distributing data. From a process of constant evaluation and reevaluation, NSF and the NSDL have developed a system of “pathways”—collaborative administration centers which oversee the collection, management, and organization of the material.

The BEN Collaborative is one such pathway. Founded in 1999 by AAAS with 11 other professional societies and coalitions, it has since grown to 25 partners. Educational e-resources from all the collaborators are aggregated into a one-stop, searchable catalog at the BEN portal. In 2005, BEN was awarded a 4-year, \$2.8-million NSF grant that would allow it to increase its collection to more than 27,000 scientific papers, illustrations, images, lab exercises, and other materials deemed helpful for teachers in the biological sciences.

## SPACE EXPLORATION

# AAAS, NASA Team Up on Solar System Book

With NASA’s MESSENGER spacecraft streaking past Venus on its way to Mercury, AAAS has joined with the space agency to publish *Exploring the Inner Solar System: Expecting the Unexpected*, a book designed to inspire student interest in space sciences.



The 72-page book, aimed at science educators and students, focuses on the Moon and the solar system’s four terrestrial planets: Mars, Earth, Venus, and Mercury. It features dozens of pictures and detailed discussion of both past missions and future expectations for MESSENGER, which is due to make its first Mercury flyby in January 2008.

“Millions of people, from professional scientists to science-engaged citizens, first got excited about science by following NASA space missions,” said Bob Hirshon, AAAS senior project director. “The MESSENGER mission to Mercury is a chance to excite a new generation of budding scientists.”

Mercury is the planet closest to the Sun; it is the hottest planet and it has the oldest surface. More than 35 years have passed since NASA’s Mariner 10 craft sent the most recent images of Mercury’s terrain. NASA hopes that MESSENGER will provide extraordinary images—along with new insights into how Earth was formed.

“We’re trying to put the MESSENGER mission to Mercury in a broader context by showing

how we reached our current understanding of the inner solar system,” said the book’s author, Justin Warner, who serves as a reporter for AAAS’s daily Science Update radio program.

*Exploring the Inner Solar System* is being distributed through the MESSENGER Educator Fellows program, an initiative training 30 science educators to conduct national outreach workshops on the mission. To date, NASA estimates over 3800 teachers have been trained by the Fellows.

As a key partner in the MESSENGER education and outreach campaign, AAAS also was asked to produce other education materials for the mission, including Web sites with engaging, game-like interactive modules for students and detailed lesson plans for teachers. K-12 teachers and other educators interested in receiving copies of the book should contact [bhirshon@aaas.org](mailto:bhirshon@aaas.org).

After three flybys, MESSENGER is scheduled to enter Mercury’s orbit in 2011.

—Benjamin Somers

## HUMAN RESOURCES

# Role Models with Disabilities Sought for AAAS Directory

Scientists and engineers with disabilities are invited to be listed in and to nominate others for inclusion in the AAAS Resource Directory of Scientists and Engineers with Disabilities. The fourth edition of the directory, now under development, will be used as a source of experts and role models for educators, journalists, and others.

Individuals with disabilities who hold graduate or undergraduate degrees in fields of science, technology, engineering, mathematics, social and behavioral sciences, or economics can submit a listing at <http://ehrweb.aaas.org/resource>. The directory will be available upon request in print and CD-ROM formats, but participants’ information will not be posted to the Internet.

The project is funded by the U.S. National Science Foundation. For more information, contact Tesa Leon at [tleon@aaas.org](mailto:tleon@aaas.org) or (202) 326-6582 (v/tdd).

## 2007 ELECTION

# A Call for Nominations

AAAS members may suggest nominees (including themselves) for president-elect and the Board of Directors for election in the fall of 2007. For a list of this year’s candidates, see AAAS News and Notes in the 28 July 2006 issue of *Science*; for a list of current Board members, see the masthead page of any recent issue of *Science*.

Please send the suggested nominee’s curriculum vitae no later than 30 December to Gretchen Seiler, AAAS Executive Office, 1200 New York Avenue, N.W., Washington, DC 20005. Suggested nominees will be considered by the AAAS Committee on Nominations at their winter meeting.

# AAAS Members Elected as Fellows

In October, the AAAS Council elected 449 members as Fellows of AAAS. These individuals will be recognized for their contributions to science and technology at the Fellows Forum to be held on 17 February 2007 during the AAAS Annual Meeting in San Francisco. The new Fellows will receive a certificate and a blue and gold rosette as a symbol of their distinguished accomplishments. Presented by section affiliation, they are:

## Section on Agriculture, Food, and Renewable Resources

Robert E. Davis, United States Department of Agriculture • Paul E. Fixen, Potash and Phosphate Institute • Jacqueline Fletcher, Oklahoma State University • David R. Gealy, United States Department of Agriculture • Robert L. Gilbertson, University of California, Davis • Tissa H. Illangasekare, Colorado School of Mines • Molly Jahn, Cornell University • Richard L. Lindroth, University of Wisconsin • Karen Ann Kuenzel Moldenhauer, University of Arkansas • Joseph G. Morse, University of California, Riverside • William A. Payne, Texas A&M University • Ian L. Pepper, University of Arizona • Pamela C. Ronald, University of California, Davis • Cynthia Rosenzweig, NASA Goddard Institute for Space Studies • Coby Schal, North Carolina State University • David Warren Stanley, United States Department of Agriculture • Chris van Kessel, University of California, Davis • Joachim von Braun, International Food Policy Research Institute

## Section on Anthropology

Marina Cords, Columbia University • Christine Ward Gailey, University of California, Riverside • Terry Harrison, New York University • Clark Spencer Larsen, Ohio State University • William Leonard, Northwestern University • Jonathan M. Marks, University of North Carolina at Charlotte • Margaret C. Nelson, Arizona State University • Alfred L. Rosenberger, Brooklyn College, CUNY • Margaret J. Schoeninger, University of California at San Diego • Jeffrey H. Schwartz, University of Pittsburgh • Elwyn Laverne Simons, Duke University • Olga Soffer, University of Illinois • Carol V. Ward, University of Missouri

## Section on Astronomy

Steven V. W. Beckwith, Space Telescope Science Institute • France A. Cordova, University of California, Riverside • Philip E. Kaaret, University of Iowa • Kwok-Yung Lo, National Radio Astronomy Observatory • Rosaly M. C. Lopes, Jet Propulsion Laboratory • David J. McCormas, Southwest Research Institute • William B. McKinnon, Washington University • Jean L. Turner, University of California, Los Angeles • William R. Ward, Southwest Research Institute

## Section on Atmospheric and Hydrospheric Sciences

Paulo Artaxo, Universidade Sao Paulo, Brazil • James Alexander Coakley Jr., Oregon State Uni-

versity • Franco Einaudi, NASA Goddard Space Flight Center • Michael C. Gregg, University of Washington • William R. Holland, National Center for Atmospheric Research • Eugenia Kalany, University of Maryland, College Park • Ray Franklin Weiss, University of California, San Diego • Hugh Edward Willoughby, Florida International University

## Section on Biological Sciences

Michael Edwin Akam, University of Cambridge • Robert R. H. Anholt, North Carolina State University • Barbara A. Baird, Cornell University • Dipak K. Banerjee, University of Puerto Rico • David A. Baum, University of Wisconsin • Stewart H. Berlocher, University of Illinois Urbana-Champaign • Katherine A. Borkovich, University of California, Riverside • George Timothy Bowden, Arizona Cancer Center • Wlodzimierz Marian Bujalowski, University of Texas • Sydney A. Cameron, University of Illinois, Urbana-Champaign • Akira Chiba, University of Illinois, Urbana-Champaign • Vincent L. Chiang, North Carolina State University • John S. Condeelis, Albert Einstein College of Medicine of Yeshiva University • William E. Conner, Wake Forest University • M. Fevzi Daldal, University of Pennsylvania • Julie Sloan Denslow, USDA Forestry Service • Shou-wei Ding, University of California, Riverside • Evan Eichler, University of Washington • Shelagh M. Ferguson-Miller, Michigan State University • Malcolm J. Fraser Jr., University of Notre Dame • James K. Fredrickson, Pacific Northwest National Laboratory • David Michael Geiser, Pennsylvania State University • Gregory C. Gibson, North Carolina State University • Pamela J. Green, Delaware Biotechnology Institute • Patrick L. Green, Ohio State University • Joanna Groden, Ohio State University • James R. Halpert, University of Texas • John J. Harada, University of California, Davis • Gerhard J. Haas, Fairleigh Dickinson University • Nyla A. Heerema, Ohio State University • Jodie S. Holt, University of California, Riverside • Barry Honig, Columbia University • Arthur Horwich, Yale University • Tim Hui-Ming Huang, Ohio State University • Barbara L. Illman, USDA Forest Service • John Jaenike, University of Rochester • Mark Johnson, Washington University • Barbara B. Kahn, Beth Israel Deaconess Medical Center • Leonard Katz, Kosan Biosciences, Inc. • Kenneth Keegstra, Michigan State University • Thomas J. Kelly, Sloan-Kettering Institute •

Bruce E. Kemp, St. Vincent's Institute of Medical Research • Judith Kimble, University of Wisconsin • Donald T. Krizek, U.S. Department of Agriculture • James W. Kronstad, University of British Columbia • Raju Kucherlapati, Harvard University • Kyung J. Kwon-Chung, NIAID/NIH • Ulrich L. Laemmli, Université de Genève • Amy S. Lee, University of Southern California • Bai-lian Li, University of California, Riverside • Howard B. Lieberman, Columbia University • Jennifer J. Loros, Dartmouth College • Scott William Lowe, Cold Spring Harbor Laboratory • Arthur J. Lustig, Tulane University Health Sciences Center • Paul T. Magee, University of Minnesota • Lynne E. Maquat, University of Rochester • Kenneth J. Mariani, Memorial Sloan-Kettering Cancer Center • Steven L. McKnight, University of Texas • Thomas Melendy, State University of New York at Buffalo • Janet E. Mertz, University of Wisconsin • Kenneth R. Miller, Brown University • G. Wayne Minshall, Idaho State University • Mark E. Nelson, University of Illinois, Urbana-Champaign • Carol S. Newlon, University of Medicine and Dentistry of New Jersey • Timothy W. Nilsen, Case Western Reserve University • Howard Ochman, University of Arizona • Scott O'Neill, The University of Queensland • Stephen A. Osmani, Ohio State University • Deborah S. Parris, Ohio State University • John C. Priscu, Montana State University • Robert R. Reisz, University of Toronto at Mississauga • William Robertson IV, Andrew W. Mellon Foundation • F. James Rohlf, Stony Brook University • Forest Rohwer, San Diego State University • Oliver A. Ryder, Zoological Society of San Diego • Coby Schal, North Carolina State University • Oswald Joseph Schmitz, Yale University • Olaf Schneewind, University of Chicago • Julian I. Schroeder, University of California, San Diego • Lawrence J. Shimkets, University of Georgia • Sandra Shumway, University of Connecticut • Shauna Somerville, Stanford University • David Lawrence Stern, Princeton University • Ann M. Stock, Center for Advanced Biotechnology and Medicine • Jack Szostak, Harvard Medical School • William A. Toscano Jr., University of Minnesota • Hans D. Van Etten, University of Arizona • Elizabeth Van Volkenburgh, University of Washington • Inder M. Verma, The Salk Institute • Jean-Philippe Vielle-Calzada, CINVESTAV • P. Kirk Visscher, University of California, Riverside • Robert Carsten von Borstel, University of Alberta • Daniel F. Voytas, Iowa State University • Barbara T. Wakimoto, University of Washington • Teresa S. F. Wang, Stanford University • Clifford F. Weil, Purdue University • William B. Whitman, University of Georgia • Juergen K. Wiegand, University of Georgia • Susan L. Williams, University of California, Davis • Jeffrey J. Wine, Stanford University • Mariana F. Wolfner, Cornell University •

H. Boyd Woodruff, Soil Microbiology Associates, Inc. • Eleanore T. Wurtzel, Lehman College, The City University of New York • Shizhong Xu, University of California, Riverside • Ning-Sun Yang, Academia Sinica • Martin Yanofsky, University of California, San Diego • Marylynn Yates, University of California, Riverside

### Section on Chemistry

Hector D. Abruna, Cornell University • Joanna Aizenberg, Lucent Technologies • Louie J. Allamandola, NASA Ames Research Center • Philip Anfimrud, National Institutes of Health • Eric V. Anslyn, University of Texas, Austin • Andreja Bakac, Iowa State University • Barbara A. Baird, Cornell University • David Penfield Ballou, University of Michigan Medical School • Rudy M. Baum, American Chemical Society • Guy Bertrand, University of California, Riverside • Rafael P. Bruschweiler, Florida State University • Stephen Z. D. Cheng, University of Akron • Geoffrey William Coates, Cornell University • M. Bonner Denton, University of Arizona • Joseph M. DeSimone, University of North Carolina, Chapel Hill • Olof Einarsdottir, University of California, Santa Cruz • Jonathan Ellman, University of California, Berkeley • Carol Ann Fierke, University of Michigan • Gregory C. Fu, Massachusetts Institute of Technology • Joseph A. Gardella Jr., University of Buffalo, SUNY • Robert E. Gawley, University of Arkansas • Wayne L. Gladfelter, University of Minnesota • Craig Hill, Emory University • Keith O. Hodgson, Stanford University • Angela M. Hoffman, University of Portland • Catherine T. Hunt, Rohm and Haas Chemicals LLC • Kenneth Allen Johnson, University of Texas, Austin • Kenneth David Jordan, University of Pittsburgh • Pravin T. P. Kaumaya, Ohio State University • Mary M. Kirchhoff, American Chemical Society • Jack F. Kirsch, University of California, Berkeley • James M. Lisy, University of Illinois, Urbana-Champaign • Thomas E. Mallouk, Pennsylvania State University • Todd J. Martinez, University of Illinois, Urbana-Champaign • James A. Miller, Sandia National Laboratories • Odayan Mohanty, Boston College • Gaetano T. Montelione, Rutgers University • David W. Oxtoby, Pomona College • Reginald M. Penner, University of California, Irvine • William F. Polik, Hope College • Buddy D. Ratner, University of Washington • Mary Fedarko Roberts, Boston College • Peter J. Rossky, University of Texas, Austin • William R. Roush, The Scripps Research Institute of Florida • Steven J. Sibener, University of Chicago • Richard D. Smith, Pacific Northwest National Laboratory • Brian Stoltz, California Institute of Technology • Steven R. Tannenbaum, Massachusetts Institute of Technology • Shelby Freland Thames, University of Southern Mississippi • David M. Tiede, Argonne National Laboratory • Peter A. Tipton, University of Missouri-

Columbia • Douglas J. Tobias, University of California, Irvine • William B. Tolman, University of Minnesota • Albert F. Wagner, Argonne National Laboratory • Roderick E. Wasylshen, University of Alberta, Edmonton • David F. Wiemer, University of Iowa • Christian P. Whitman, University of Texas, Austin • Alec N. Wodtke, University of California, Santa Barbara • Kurt W. Zilm, Yale University

### Section on Dentistry and Oral Health Sciences

Mary MacDougall, University of Alabama • David T. Wong, University of California, Los Angeles

### Section on Education

Jan Blacher, University of California, Riverside • Melanie Margaret Cooper, Clemson University • Goery Delacote, At-Bristol, United Kingdom • Carol Dwyer, Educational Testing Service • Bat-Sheva Eylon, Weizmann Institute • Michael Feuer, National Academy of Sciences • Maria Alicia Lopez Freeman, University of California, Los Angeles • George Hammons, Philander Smith College • Jack G. Hehn, American Institute of Physics • Paul Horwitz, Concord Consortium • Shirley Ann Jackson, Rensselaer Polytechnic Institute • Mary Nakhleh, Purdue University • Nancy Nersessian, Georgia Institute of Technology • Su-Seng Pang, Louisiana State University • Nancy Songer, University of Michigan • Barbara S. Spector, University of South Florida

### Section on Engineering

Reza Abbaschian, University of California, Riverside • Dereje Agonafer, University of Texas at Arlington • Kristi S. Anseth, University of Colorado • Norman Augustine, Retired President and CEO, Martin Marietta Aerospace • David D. Awschalom, University of California, Santa Barbara • Supriyo Bandyopadhyay, Virginia Commonwealth University • Ray M. Bowen, Texas A&M University • Linda J. Broadbelt, Northwestern University • Robert J. Budnitz, Lawrence Livermore National Laboratory • Wilfred Chen, University of California, Riverside • Marc Deshusses, University of California, Riverside • Yasuhiko Fujii, Tokyo Institute of Technology • Alice P. Gast, Lehigh University • Chris T. Hendrickson, Carnegie Mellon University • Linda P. B. Katehi, University of Illinois, Urbana-Champaign • Mujid S. Kazimi, Massachusetts Institute of Technology • Robert M. Kelly, North Carolina State University • Chaitan Khosla, Stanford University • Gyungho Lee, University of Illinois, Chicago • Sang Yup Lee, Korea Advanced Institute of Science and Technology • Mark S. Lundstrom, Purdue University • Susan McCahan, University of Toronto • Robert G. Parker, Ohio State University • Victor G. J. Rogers, University of California, Riverside • A. David Rossin, Stanford University • Kirk H. Schulz, Mississippi

State University • Krishna Shenai, Utah State University • Michael L. Shuler, Cornell University • William H. Steier, University of Southern California • S. K. Sundaram, Pacific Northwest National Laboratory • Thomas George Thundat, Oak Ridge National Laboratory • Fawwaz T. Ulaby, The University of Michigan • Usha Varshney, National Science Foundation • Zhong Lin Wang, Georgia Institute of Technology • Richard C. Warder Jr., University of Memphis • Charles Wyman, University of California, Riverside

### Section on General Interest in Science and Engineering

Edwin M. Brogie, Laurel Senior High School • Marilee A. Long, Colorado State University • Dennis L. Meredith, Duke University • Joan Messer, Mississippi Academy of Science • Donna Gerardi Riordan, California Council on Science and Technology • Jocelyn D. Steinke, Western Michigan University • William J. Valdez, U.S. Department of Energy

### Section on Geology and Geography

Timothy Beach, Georgetown University • Robert Bodnar, Virginia Polytechnic Institute and State University • Gregor Paul Eberli, University of Miami • Lucy E. Edwards, U.S. Geological Survey • Glen MacDonald, University of California, Los Angeles • Marcus E. Milling, American Geological Institute (deceased) • Samuel B. Mukasa, University of Michigan • M. Duane Nellis, Kansas State University • Bernardus A. van der Pluijm, University of Michigan • Douglas J. Sherman, Texas A&M University • Nobumichi Shimizu, Woods Hole Oceanographic Institution • Richard H. Sibson, University of Otago • Lars Stixrude, University of Michigan • Peter K. Swart, University of Miami • Stephen Walsh, University of North Carolina-Chapel Hill • Pinxian Wang, Tongji University • John Zachara, Pacific Northwest National Laboratory

### Section on History and Philosophy of Science

James R. Bartholomew, Ohio State University • Sandra Herbert, University of Maryland Baltimore County • Robert Pennock, Michigan State University • William C. Wimsatt, University of Chicago

### Section on Industrial Science and Technology

Manuel Gomez, University of Puerto Rico, Rio Piedras • Boris Mizaikoff, Georgia Institute of Technology

### Section on Information, Computing, and Communication

Hsinchun Chen, University of Arizona • Susan J. Eggers, University of Washington • Ronald Fagin, IBM Almaden Research Center • Tio

Jiang, University of California, Riverside • Michael Jordan, University of California, Berkeley • Henry A. Kautz, University of Washington • Vipin Kumar, University of Minnesota • David D. Lewis, David D. Lewis Consulting, LLC • Michael Rung-Tsong Lyu, The Chinese University of Hong Kong • Sanjay Ranka, University of Florida • Daniel A. Reed, University of North Carolina, Chapel Hill • Terrence J. Sejnowski, The Salk Institute • Marc Snir, University of Illinois, Urbana-Champaign • Robert F. Sproull, Sun Microsystems Laboratories • Albert Y. Zomaya, The University of Sydney

#### **Section on Linguistics and Language Sciences**

Brian Daniel Joseph, Ohio State State University • Bjorn Lindblom, University of Texas, Austin • Kenji Hakuta, University of California, Merced • Johanna Nichols, University of California, Berkeley

#### **Section on Mathematics**

Amy Cohen, Rutgers University • Evans M. Harrell II, Georgia Institute of Technology • Warren Page, Retired Professor, Yeshiva University • Alan S. Perelson, Los Alamos National Laboratory

#### **Section on Medical Sciences**

James Allison, Memorial Sloan-Kettering Cancer Center • Nancy Andrews, Children's Hospital Boston • Arleen D. Auerbach, Rockefeller University • Sanford H. Barsky, Ohio State University • Charles C. Capen, Ohio State University • Martin A. Cheever, National Cancer Institute/NIH • George Q. Daley, Children's Hospital Boston • Beverly Davidson, University of Iowa • Betty Diamond, Columbia University • Paul E. DiCorleto, Cleveland Clinic Lerner Research Institute • Richard W. Dutton, Trudeau Institute • Michael Aaron Eddin, Johns Hopkins University • Serpil C. Erzurum, Cleveland Clinic • Alan Ezekowitz, Massachusetts General Hospital • Raif Geha, Children's Hospital Boston • Philip D. Greenberg, Fred Hutchinson Cancer Research Center • Randal J. Kaufman, University of Michigan • Elliott Dan Kieff, Brigham and Women's Hospital • Norman L. Letvin, Beth Israel Deaconess Medical Center • Joseph S. Lipsick, Stanford University • JoAnn Manson, Brigham and Women's Hospital • Nina A. Mayr, Ohio State University • Dimitrios Morikis, University of California, Riverside • Hugo Wolfgang Moser, Kennedy Krieger Institute • Kenrad E. Nelson, Johns Hopkins University • Alison Davis O'Brien, Uniformed Services University of Health Services • Anne O'Garra, National Institute for Medical Research • Richard A. Rudick, Cleveland Clinic Foundation • Charles E. Samuel, University of California, Santa Barbara • Philippe Joseph Sansonetti, Unité de Pathogé-

nie Microbienne Moléculaire • Andrew I. Schafer, University of Pennsylvania • Alan L. Schwartz, Washington University • Ronald N. Schwartz, NIAID/NIH • Arlene H. Sharpe, Harvard University • Susan L. Swain, Trudeau Institute • Dennis J. Thiele, Duke University • Bert Vogelstein, Johns Hopkins University • Christopher M. Walker, Columbus Children's Hospital Research Institute • Thomas E. Wellem, NIAID/NIH • Mary Ellen Wewers, Ohio State University

#### **Section on Neuroscience**

Cornelia Bargmann, Rockefeller University • John R. Carlson, Yale University • Vivien A. Casagrande, Vanderbilt University • Susan Fitzpatrick, James S. McDonnell Foundation • Lloyd A. Green, Columbia University • Duane E. Haines, University of Mississippi • Nathaniel Heintz, Rockefeller University • Thomas M. Jessel, Columbia University • Eugene M. Johnson, Washington University • Carol A. Mason, Columbia University • William C. Mobley, Stanford University • Robert Y. Moore, University of Pittsburgh • John H. Morrison, Mount Sinai School of Medicine • Henry J. Ralston III, University of California, San Francisco • Robert L. Sprague, University of Illinois, Urbana-Champaign • Susumu Tonegawa, Massachusetts Institute of Technology

#### **Section on Pharmaceutical Sciences**

William T. Beck, University of Illinois, Chicago • Charles Chavkin, University of Washington School of Medicine • Charles N. Falany, University of Alabama, Birmingham • Alan Douglas Kinghorn, Ohio State University • H. George Mandel, George Washington University

#### **Section on Physics**

Daniel N. Baker, University of Colorado, Boulder • Alan Reginald Bishop, Los Alamos National Laboratory • Steven M. Block, Stanford University • Felix Hans Boehm, California Institute of Technology • Aviva Brecher, DOT Volpe Center • Joseph I. Budnick, University of Connecticut • Moses Chan, Pennsylvania State University • Robert F. Christy, California Institute of Technology • Gordon T. Danby, Polytechnic University • Sara L. Dawson, Brookhaven National Laboratory • Stuart J. Freedman, University of California, Berkeley • Roy W. Gould, California Institute of Technology • Deborah S. Jin, University of Colorado • V. Alan Kostelecky, Indiana University • Dennis Kovar, U.S. Department of Energy • Vasudevan Lakshminarayanan, University of Missouri, Saint Louis • Steven G. Louie, University of California, Berkeley • Derek I. Lowenstein, Brookhaven National Laboratory • Aden Baker Meinel, University of Arizona • Umar Mohideen, University of California, River-

side • Roberto Peccei, University of California, Los Angeles • Martin Perl, Stanford Linear Accelerator Center • Robert J. Perry, Ohio State University • Peter Pesic, St. Johns College • Jorge Pullin, Louisiana State University • Daniel Rugar, Almaden Research Center • Sashi Satpathy, University of Missouri • Arthur L. Smirl, University of Iowa • Antoinette J. Taylor, Los Alamos National Laboratory • John M. Tranquada, Brookhaven National Laboratory • Karl A. Van Bibber, Lawrence Livermore National Laboratory • Evgeny Pavlovich Velikhov, Russian Research Center "Kurchatov Institute" • Tassilo Andreas Reisenegger von Oepen, Pontificia Universidad Católica de Chile • Gwo-Ching Wang, Rensselaer Polytechnic Institute • William J. Weber, Pacific Northwest National Laboratory • Jory A. Yarmoff, University of California, Riverside

#### **Section on Psychology**

Jeffrey Reiss Alberts, Indiana University • Judy S. DeLoache, University of Virginia • Martha Julia Farah, University of Pennsylvania • Klaus A. Miczek, Tufts University • Peter Shizgal, Concordia University • Michael Tanenhaus, University of Rochester • Janet F. Werker, University of British Columbia

#### **Section on Social, Economic, and Political Sciences**

Henry Brady, University of California, Berkeley • Richard B. Freeman, Harvard University • Douglas S. Massey, Princeton University • Constance Nathanson, Columbia University • Harold Shapiro, Princeton University

#### **Section on Societal Impacts of Science and Engineering**

Frederick M. Bernthal, Universities Research Association, Inc. • Matthew Bunn, Harvard University • Vary Coates, Journal of the Washington Academy of Sciences • John de la Mothe, University of Ottawa • Barry D. Gold, The Gordon and Betty Moore Foundation • Henry T. Greely, Stanford University • Andrew A. Rosenberg, University of New Hampshire • Daniel Sarewitz, Arizona State University • Robert M. Simon, Committee on Energy and Natural Resources, U.S. Senate • Caroline Wagner, George Washington University • Chris G. Whipple, ENVIRON International

#### **Section on Statistics**

William G. Cumberland, University of California, Los Angeles • Marie Davidian, North Carolina State University • Joseph F. Heyse, Merck Research Laboratories • Edward L. Korn, National Cancer Institute/NIH • David J. Marchette, Naval Surface Warfare Center • Hans-Georg Muller, University of California, Davis • Javier Rojo, Rice University • Peter H. Westfall, Texas Tech University • S. Stanley Young, National Institute of Statistical Sciences