MEETINGS

Science and Technology Leaders Discuss Innovations for the Future

With the accelerated pace of scientific and technological advances, science will play an even more important role in the future as our world becomes more complex. Leaders in the world of science and technology met 1 November at a special forum at AAAS to share their visions of what that role will be.

William Haseltine

The Internet is reshaping our world, scientific innovations hold great promise for medicine and health, and the challenges of a global community are greater than ever. These topics were examined by the panelists, who represented laboratories, universities, governmental agencies, and scientific organizations. More than 200 people attended the forum.

One of the profound changes in the last two decades has been the "commercialization" of basic scientific research. In many areas the university laboratory—and the university itself—is being supplanted or transformed by financial considerations. William Haseltine's company, Human Genome Sciences, Inc., is on the cutting edge of medical advances.

Haseltine described the application of new rapid methods of gene discovery and gene function to create new means to treat and cure disease. He said a virtually complete collection of functional human genes has opened the door to a new type of medicine, which he calls regenerative medicine. Haseltine described regenerative medicine as the use of human genes, proteins, and cells to restore to normal organs and tissue that are damaged by disease, injured by trauma, or worn by time.

He gave several examples from Human Genome Sciences ongoing clinical trials, including the use of a vascular growth factor gene injected directly into heart muscle in an attempt to regenerate blood vessels to bypass blocked arteries. He described the use of a second drug, a specific growth factor protein, Repifermin, that is used to repair large wounds and the mucosal tissues. He went on to say that the next step beyond using human genes and proteins as drugs will be to use human cells to reconstruct organs, both by injection into diseased tissues and by using cells to reconstruct new healthy organs outside the body as replacements.

He praised the Human Genome Project for helping to create the underlying technology for this new field. He went on to say that public investment in technology continues to fuel both the medical and high-technology industry. The proper articulation between government research efforts and private enterprise remains a high national priority, he said.

The forum also looked at the dangers posed by chemical and biological warfare. Frank Young, former commissioner of the Food and Drug Administration, warned about the increased likelihood that one day weapons of mass destruction will be used against the United States. He cited several factors, including the loss of weapons control with the end of the Cold War, offensive capability that outstrips the defensive, the rise of individual terrorists with political and religious agendas, and the increased diffusion of biotechnology and ease of use by terrorist groups.

"The tragedy of science involved in weapons of mass destruction is that it has potential of introducing terror in the United States," Young said. "Of all the terrorist weapons, the easiest one to use is a biological agent and it's highly effective."

The conference explored other new areas of science and technology. James Ellenbogen, principal scientist at the Mitre Corporation, discussed the advances in the burgeoning nanotechnology systems field. Ellenbogen, whose work has been described as bordering on science fiction, described how the miniaturization of electronic systems will create a new class of ultra-miniaturized (molecular-sized) information systems and applications. John Gibbons, former assistant to the president for science and technology, discussed options for technology in guaranteeing a sustainable future. And Esther Dyson, chair of EDventure Holdings, spoke on how the information revolution and the Internet have shaped our world.

Other topics included providing basic food staples for a expanding population, introducing vaccines into foods, and the development of science and technology and issues of competitiveness in the global community.

CREDITS: BILL FITZ-PATRICK

INTERNET

GrantDoctor Offers Advice to Postdocs

A 52-year-old physician finishing his Ph.D. at the National Institutes of Health wants to know how to obtain postdoctoral grants so that he can continue to work in the area. The doctor, it seems, requires advice from another type of specialist—the GrantDoctor.

The GrantDoctor's office can be found at the Career Development Center on *Science*'s Next Wave, a Web site for people interested in careers in science. The center was recently launched to help postdoc students and junior faculty get ahead in the academic job market. The site offers information on funding, networking skills, and the peer-review process.

Scientists of all ages and from around the world have consulted the GrantDoctor. A lack of funding apparently is a common condition that occurs across borders. A Brazilian student wanted to know how her friend in Turkey could get a grant to study in Latin America. Another student wanted to find a fellowship that would allow her to work in France. Queries have also come from Korea and China.

The diagnosis can be tricky. Questions have been raised about where to find funding for alternative medicine, how to get funds to support a degree in veterinary science, what to do when appealing a grant review, and how to submit grants on the Internet. There's not a cure for everyone—like the scientist who wanted a minimum of $1000 to fund a laser that he claimed removes tattoo scars, or the parent who didn't know why her son couldn't find a job.

There are some steps scientists should take before checking in with the GrantDoctor.

Make sure your question is specific and include as much detail as possible—what field are you in and what type of grant are you looking for. Remember, too, that your communication will remain anonymous, so be frank in presenting your questions.

So far the GrantDoctor has a lot of patients in the waiting room. The virtual office received 1400 visitors in the month of October. The federal government funds 75 percent of all postdoctorates, primarily in the form of research grants. But information on applying for and, more importantly, winning these grants is scarce.

In addition to consulting the GrantDoctor at the Career Development Center, scientists can access articles on a variety of topics, including how to make the move to a faculty position, how to set up and maintain a lab, and the latest employment and scientific policy news. A "reading list" links to online reprints and selected resources associated with postdoc and junior faculty career development. And a discussion forum allows postdocs to swap ideas.

The Career Development Center, located at http://nextwave.sciencemag.org/feature/careercenter.shtml, is updated every 2 weeks. Access to the center is free, and funding is provided by The Burroughs Wellcome Fund and the Howard Hughes Medical Institute.

"One of the center's articles will look at how to mentor postdocs," said Vid Mohan-Ram of *Science's* Next Wave. "You're a postdoc and then virtually overnight you become a faculty member and have to deal with your own postdocs, many of whom are the same age as you. You have to know when to be a friend and when to be a boss." Intellectual property, conflicts of interest, and new regulations concerning the release of research data are other issues that will be covered at the center, Mohan-Ram said.

Mohan-Ram, who has a Ph.D. from the University of London, came to the United States for a postdoctoral fellowship at the University of Vermont where he worked on fruit fly muscles and genetics. Mohan-Ram said that as a former postdoctoral fellow, he knows firsthand how confusing and overwhelming it can be to apply for grants. "A lot of postdocs see their supervisors in the same position as themselves—looking for grants," Mohan-Ram said. "No matter how long you remain in research you have to look for grants."

AAAS STATEMENT ON THE KANSAS STATE BOARD OF EDUCATION DECISION ON THE EDUCATION OF STUDENTS IN THE SCIENCE OF EVOLUTION AND COSMOLOGY

The American Association for the Advancement of Science deplores the recent decision by the Kansas State Board of Education to remove references to evolution and cosmology from its state education standards and assessments, thereby making central principles for the scientific understanding of the universe and its history optional subjects for science education. This decision by the Board is a serious disservice to students and teachers in the State of Kansas. To become informed and responsible citizens in our increasingly technological world, students need to study and judge for themselves the empirical evidence and concepts central to current scientific understanding. The actions of the State Board of Education may place Kansas students at a competitive disadvantage in their education and work environments. By discouraging teachers from using the best available professional knowledge about the nature and history of the universe, the Board's decision will make it more difficult for Kansas to recruit capable and inspiring science teachers.

Recognizing that the State Board of Education decision is a serious setback for public education in the State of Kansas, the AAAS adopts the following resolution:

Whereas, it has never been more important for American citizens to achieve a basic understanding of contemporary science and technology; and

Whereas, the concepts and evidence inextricably linked to our understanding of the nature and history of the universe are fundamental to the basic education of all Americans; and

Whereas, learning succeeds best when teachers and students can explore, investigate, and criticize the fundamental concepts and ideas in science; and

Whereas, learning and inquiry are severely inhibited if teachers are placed in a position where they may feel pressured to alter their teaching of the fundamental concepts of science in response to demands external to the scientific disciplines,

Therefore Be It Resolved, that the AAAS urges the citizens of Kansas to restore the topics of evolution and cosmology to the state curriculum. AAAS stands ready to assist all concerned citizens of Kansas in securing the repeal of this damaging ruling by the State Board of Education.

Therefore Be It Further Resolved, that the AAAS and others committed to educational excellence in science work aggressively to oppose measures that could adversely affect the teaching of science, wherever they may occur.

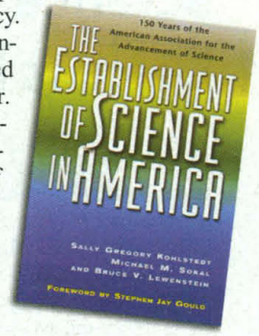
Therefore Be It Further Resolved, that the AAAS encourages its affiliated societies to endorse this resolution and to communicate their support to the citizens and appropriate public officials in Kansas.

Adopted by the AAAS Board of Directors 15 October 1999

BOOKS

150 Years of Science

On 20 September 1848, some of the most distinguished members of the nascent American scientific community took part in the first AAAS meeting in Philadelphia, Pennsylvania. It was an age when the United States stretched coast to coast for the first time and the electric telegraph was still in its infancy. Indeed, the word "scientist" had been coined only 8 years earlier. But science was proving very useful in answering a number of questions of the day.



The evolving role of scientists in American society and public attitudes toward science are some of the topics covered in a new book, *The Establishment of Science in America: 150 Years of the American Association for the Advancement of Science*. The comprehensive history of AAAS, the world's largest federation of scientists from a variety of disciplines, provides a window on the development of science in the United States during the past 150 years.

"The book coheres in its variety by subtly commingling the two great themes that make history both instructive and interesting: the flow of directional narrative to tell a story, and the persistence of general themes to grant coherence—or the arrows and cycles, the unique configurations and the immanent generalities of our standard and paired metaphors about time," writes Stephen Jay Gould, AAAS president, in a foreword to the book.

The essays by Sally Gregory Kohlstedt, Michael M. Sokal, and Bruce V. Lewenstein connect the AAAS history to issues of continuing importance in American history, such as the integration of women and minority groups into mainstream professions and the role of expert knowledge in a democratic society. Kohlstedt is professor of the history of science and technology and director of the Center for Advanced Feminist Studies at the University of Minnesota. Sokal is professor of history at Worcester Polytechnic Institute. Lewenstein is associate professor of communication and science and technology studies at Cornell University.

The volume, published by Rutgers University Press in New Brunswick, New Jersey, divides the history of the AAAS into three parts: Creating a Forum for Science in the Nineteenth Century; Promoting Science in a New Century: The Middle Years of the AAAS; and Shifting Science from People to Programs: AAAS in the Postwar Years.

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