

Peer Review: A Good Model?

Peer review has long been accepted in the West as the primary mechanism for evaluating science and scientists. As such, it governs access to publication, research money, and professional status.

Now, freed from the political constraints that hampered their autonomy, scientists and engineers in eastern Europe and the

former Soviet Union are establishing or strengthening systems of peer review. But is this approach suited to countries struggling to overcome the legacy of communism?

Last fall at a workshop in Pultusk, Poland, scientists, administrators, and policy-makers from 21 countries in eastern and western Europe and the United States weighed the benefits and pitfalls

of using peer review and quantitative indicators to judge scientific research and allocate resources.

Workshop organizers Jane Cave and Mark Frankel of AAAS's Scientific Freedom, Responsibility, and Law Program said that while participants from the East stressed the practical benefit of the dialogue, many made it clear that, given the specific problems

in their own countries, they were not interested in wholesale adoption of Western institutional models. Instead, the workshop was a forum on available options.

Cave said some of the participants had reservations about peer review based on their experience under the old political systems.

Under communism, she pointed out, R&D funding was

A Scientist for the 21st Century

In 1983, Rita Colwell was well established in marine microbiology research and had come to recognize the tremendous potential of biotechnology to help tap the vast wealth of the seas. So when *Science* published a special issue on biotechnology that included no mention of marine applications—a conspicuous absence that Colwell had encountered in many meetings and discussions—she wrote a paper that laid out directions for using the techniques of genetic engineering to study and harvest the rich genetic resources of the oceans.

Published in *Science*, it essentially defined the field of marine biotechnology.

That ability to draw the big picture has been a hallmark of Colwell's career. "I've always had a holistic view of research. I don't see departments and the disciplinary separations," said Colwell, the new president-elect of AAAS.

One of the most visible monuments to her broad-based approach is taking shape in Baltimore's Inner Harbor, where the University of Maryland System, the state of Maryland, the city of Baltimore, and the private sector are building a \$160-million research, education, and exhibition center for marine biotechnology, scheduled to open to the public next year.

The project grew from Colwell's vision, and her skill in winning support from many fronts has made it a reality. The center will house the marine research center of the University of Maryland Biotechnology Institute (an independent research component of the University of Maryland System), which Colwell was instrumental in founding in 1985 and now heads.

For her contributions in building a center for research and outreach that will help biotechnology companies flourish in Maryland, the state gave Colwell its highest award for economic development in 1990.

At the University of Maryland, she also helped build the marine research program into a Sea Grant College and served as vice president of academic affairs for the University of Maryland System.

Despite the demands of functioning as president of a research

campus, Colwell has kept a hand in research and teaching. She has devoted 20 years of study to determining the origins of epidemic cholera. Much of her research has focused on the ecology and genetics of marine bacteria and viruses and the potential for genetic exchange among organisms in the natural environment.

Colwell thinks it is fitting that in the "era of the cloned gene," AAAS members chose a life scientist as incoming president of the association.

She plans to bring to the position an advocacy of increased support for basic research and a commitment to improving science education at all levels, encouraging women and minorities to pursue careers in science, and addressing the need for a scientifically literate public. She also will work to increase international scientific cooperation.

Colwell would like to see AAAS play a more active role in federal policy-making. By virtue of its independence, she said, "AAAS can say and do things that are challenging and provocative. It should be a Socratic burr under the saddle."

AAAS is "on target" with its standards project for science education, Colwell said. She also favors a comprehensive study of the teaching process, especially looking at the reward structure, "not solved only by raising salaries, although that helps." She sees the support she got from talented teachers while growing up in Massachusetts and during graduate school as highly influential in her career success.

Her own impact as a role model has hit home: Both daughters are following careers in research and medicine. She's proud of them and would like to think her own experience has made it a little easier for her daughters to

develop in their own careers. But she is realistic. "Discrimination hasn't evaporated; there's still a lot to be done," she said. "The old barriers are crumbling, but they haven't been destroyed."

During college, Colwell took the time to study another interest: creative writing. Today when she travels—often with her physicist husband, Jack—she keeps a diary. When she retires, she plans to use the material in writing a novel.



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**—Rita Colwell,
new president-elect**

awarded largely through block grants to research institutes, where resources were distributed on the basis of political factors as well as scientific merit.

Now, in the transition to market economies, state support has shrunk dramatically. Already hard hit, many scientists and engineers fear the impact of competitive peer review. "There is concern that the 'old boy network' is still in control and they'll lose out," Cave said.

Other participants, Frankel noted, voiced concerns that echo debates in the United States and other Western nations, where critics charge that current systems of peer review and quantitative indicators (such as frequency of publication) do not always result in optimal funding. "In the West, people are asking how valuable and reliable these techniques are in helping to determine the productivity of scientists and the value of their work," he said.

Cave and Frankel said some participants had expected to carry away a clear set of measures that would enable them to determine who would be funded and who would lose out. Instead, "they came away with a stronger sense of the problems associated with the design and use of these kinds of indicators," Frankel said, adding that many expressed keen interest in networking to continue the dialogue.

Participants attended from Belarus, Bulgaria, the Czech Republic, Estonia, Hungary, Latvia, Macedonia, Moldova, Poland, Romania, Russia, Slovakia, Slovenia, and Ukraine as well as the United States and countries of western Europe.

Workshop proceedings will be published in the spring. For information on this and other AAAS efforts to help scientists and engineers in Eastern Europe and the former Soviet Union address emerging issues of scientific freedom and responsibility, call Jane Cave at 202-326-6796 or send a message via Internet to jcave@aaas.org.

R&D Funding Outlook for 1994

If you've been working on the Superconducting Super Collider or a new weapons system, the numbers do not look good. But other nondefense R&D was spared in congressional allocations for federal spending in fiscal 1994, and will actually see a 5.5 percent gain over 1993.

"Defense got clobbered," with R&D funding set to drop 7.8 percent over last year, noted Kathleen Gramp, an analyst in AAAS's Science, Technology, and Government Program. "But at the same time, nondefense R&D grew at the same pace as other domestic programs, despite canceling of the SSC."

The defense downsizing and deep reductions for international programs freed up more money for all domestic programs.

Overall, Congress designated \$71.6 billion for R&D spending, about 5.2 percent less than proposed by President Clinton, according to the AAAS report, *Congressional Action on Research and Development in the FY 1994 Budget*.

Despite the boost for nondefense R&D (which rises to \$32.6 billion), the deep hit taken by defense drops total R&D spending to 2.2 percent less than last year's level. In inflation-adjusted terms, that's a 5.1 percent loss in constant dollars.

Some trends:

- For the first time, the Department of Energy will spend more on "energy" R&D than on its defense research. The 17.1 percent increase for energy programs (to \$3.2 billion) reflects resumption of funding for the Clean Coal Program and double-digit increases for solar, conservation, and electric energy programs.

- Congress made few changes in allocating 12.4 percent more (to \$2.3 billion) for National Science Foundation R&D, but debate over the agency's mission is ongoing.

- The National Institutes of

Sculptures in the Sky



COSMOS, Aerialscape III, 1992.

The next time you fly to Washington and are heading into the city by way of National Airport, look hard below along the flight path and you may catch a glimpse of the colorful rooftop "sculpture" atop an apartment complex in Rosslyn, Virginia. Residents of a tall condominium hired artist Heidi Lippman to decorate the tar-covered eyesore they overlooked.

"We don't normally think of rooftops as components of the urban fabric," said Lippman, of Garrett Park, Maryland. "Yet in any community with a wide range of building heights or steeply sloping terrain, the rooftops become highly visible."

Lippman calls the work an "aerialscape." She's done three in the Washington area, including one for a county government building. "These projects," she said, "demonstrate that even those portions of the built environment we often accept as irrevocably ugly and try to ignore can instead contribute positively to the urban scene, even become an object of civic pride."

For COSMOS (above), Lippman designed a planetary motif that integrates 11,000 square feet of surface space on three rooftops into one giant canvas. The work is composed of colored gravel of the same grade as that normally used for ballast.

Using readily available materials and incorporating the art into regular building construction or renovation makes it possible to do such projects at modest cost and with little maintenance, according to Lippman.

Her hammered lead sculptures and other works are on display at AAAS headquarters in Washington through April 1. The exhibit is part of the Association's Art of Science and Technology Program. For information, call Virginia Stern at 202-326-6672.

Health got more than it requested—a 5.9 percent increase over last year (to \$10.5 billion).

- The Department of Commerce, centerpiece of the administration's technology initiative, is the fastest growing sponsor of R&D. The advanced technology program of its National Institute of Standards and Tech-

nology is on track to double in 5 years, and the intramural R&D budget posted double-digit gains for 1994.

- The space station remained the most controversial item in NASA's \$9.3-billion R&D budget (up 4.8 percent from 1993). Lawmakers agreed to continue work on a redesigned space sta-

tion, which may be revamped for a cooperative effort with Russia.

Copies of the R&D budget analysis are available from: AAAS Distribution Center, P.O. Box 521, Annapolis Junction, MD 20701 (phone 1-800-222-7809). The cost is \$7.95 for AAAS members and \$9.95 for nonmembers.

Program to Link Biology and Chemistry

A central tenet of the movement to improve K-12 science education is that the more kids are engaged in hands-on experiments, the more "hooked" they will be on science. That same kind of experience in college—lab investigations that parallel how science is done in the real world—is critical in drawing talented students into research careers.

To help provide those opportunities, The Merck Company Foundation has teamed up with AAAS to launch a grant program designed to foster undergraduate research projects that promote an understanding of the links between the biological and chemical sciences.

The program is funded by The Merck Company Foundation and administered by AAAS. Fifteen awards of \$15,000 each will be made this year, each renewable for an additional 2 years.

Jerry Bell, director of AAAS's Science, Mathematics, and Technology Education Programs, said the program could become a model for other sponsors.

The focus is on strengthening integrated science programs and reflects the reality of modern biomedical research.

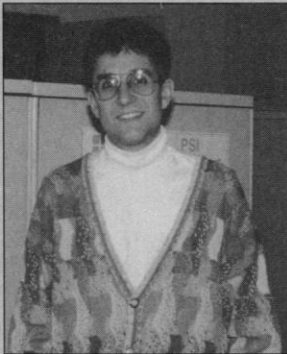
"Modern drug discovery occurs at the confluence of biology and chemistry," said Bennett M. Shapiro, M.D., Merck executive vice president for worldwide basic research. "Our most creative activities flow from interdisciplinary research involving many types of scientists." About 5000 Merck researchers around the

Making a Mark at EPA

Every summer, AAAS places up to 10 working scientists and engineers at the U.S. Environmental Protection Agency to do research on issues of public policy.

EPA managers have given consistently high marks to the research. And every fall, the Fellows can compete for a special scholarship based on the quality of their work.

Joseph Helble, principal research scientist at Physical Sciences Inc., in Andover, Massachusetts, is the 1993 winner of the Barnard Scholarship, endowed in recognition of attorney Robert C. Barnard, who is counsel to the Washington office of Cleary, Gottlieb, Steen & Hamilton and served many years on the selection committee for the AAAS Environmental Science and Engineering Fellows Program. The \$3000 scholarship is for professional purposes.



Helble worked in EPA's Office of Solid Waste analyzing dioxin emissions from hazardous waste incinerators. His research helped answer key technical questions related to EPA's implementation of a strategy Administrator Carol M. Browner announced last spring to reduce hazardous waste emissions.

His mentor, Dwight Hlustick, said Helble recommended follow-up research that would be useful to EPA and incinerator operators.

Helble said he came away having confirmed his sense that science plays too small a role in policy-making. "I was able to see how many other influences, including politics and public pressure, affect the process."

For information on the fellowship program, call AAAS Science and Policy Programs, 202-326-6600.

Joseph Helble. 1993 winner of the Barnard Scholarship.

world are engaged in research to discover new therapeutic and prophylactic agents.

Last month, nearly 150 colleges and universities in the Northeast and mid-Atlantic area were invited to compete. Schools were eligible if they offer an American Chemical Society-approved B.A. or B.S. chemistry program (no comparable certification exists for biology programs) and usually confer 10 or fewer graduate degrees a year in biology and chemistry. Winners will be announced in March.

Part of the grant money will fund lectures on topics emphasizing the interrelationship between biological and chemical sciences.

Bell said most of the targeted schools are liberal arts colleges—long regarded as important "feeder" schools for graduate students in the sciences. "Almost all of them have strong undergraduate [science] programs, but not necessarily interdisciplinary," he said. "This will be an important catalyst."

For more information, call Bell at 202-326-6786.

AAAS Fellow Nominations

Groups of three AAAS Fellows may nominate other AAAS members for election as Fellows. A Fellow is "a member whose efforts on behalf of the advancement of science or its applications are scientifically or socially distinguished." At least one of the three sponsors cannot be affiliated with the nominee's host institution.

Nominations must be received by 3 June. Forms are available from: AAAS Executive Office, 1333 H Street, NW, Washington, DC 20005. Or call 202-326-6635.

The *Directory of AAAS Fellows* is available from: AAAS Distribution Center, P.O. Box 521, Annapolis Junction, MD 20701. The price for members is \$9.95, prepaid.

New Publications

■ *Ethical and Legal Issues in Pedigree Research* (\$10 plus \$2 postage and handling; order from Kamla Butaney, AAAS Science and Policy Programs, 1333 H Street, NW, Washington, DC 20005, or phone 202-326-6792)

■ *Science, Agriculture, and Environment in the Former Soviet Union* (\$21.95; order from AAAS Global Change Program at address above, or by calling 202-326-6550)

■ *Caught in the Crossfire: A Mission Report on the Plight of the Peruvian Medical Profession* (free, but postage costs required for multiple copies; write to attention of Elisa Muñoz, AAAS Science and Human Rights Program at address above)

■ *The Genetic Frontier: Ethics, Law, and Policy* (from Science and Policy Programs; \$22.95, or \$18.35 for AAAS members; order from AAAS Distribution Center, P.O. Box 521, Annapolis Junction, MD 20701, phone 1-800-222-7809)