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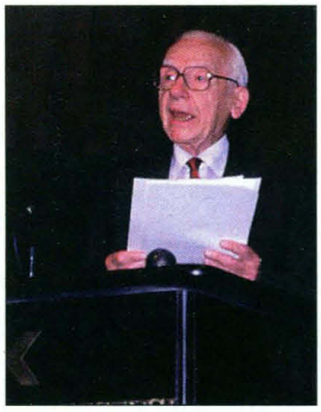
WORLD CONFERENCE ON SCIENCE

Science Blueprint Is High on Ideals, Light on Details

BUDAPEST—After 6 days of sound and fury, the 1800 scientists, activists, and policy-makers who took part in last week's World Conference on Science departed with two documents that offer a sketchy roadmap for science in the 21st century. Despite the some-times emotional debates—during which there were calls for scientists to take a form of Hippocratic Oath, for more research aid for developing countries, for women to play a greater role in science, and for universal access to the Internet for scientists—the conference's final documents managed to endorse the general concepts of ethics, equity, and access without offering up many specifics on how science should be conducted, funded, disseminated, or policed.



Ethicist. Joseph Rotblat calls for Hippocratic-style oath.

The architects of the meeting, the first such gathering in 20 years, defended the final products—a nonbinding "Declaration on Science" and "Framework for Action"—as constructive blueprints that offer each nation a chance to build up its science. Swiss Nobel laureate Werner Arber, president of the International Council for Science (ICSU), a cosponsor of the conference, said the declaration defines a "new social contract" between science and society. Spanish biochemist Federico Mayor, director-general of the United Nations' Educational, Scientific, and Cultural Organization (UNESCO), the other sponsor, told *Science*: "Scientists must have more contact with society, and more connections to power." Mayor's take-home message for delegates was: "Now that you have this in your hands, tell your governments that this is an opportunity for you."

The Budapest blueprints call for governments across the globe to support science adequately because of its importance for sustainable development. The documents also demand more support for science education at universities, and for science to be made more open to women and other groups such as the disabled, ethnic minorities, and indigenous peoples. International collaboration, the blueprints say, should be supported at all levels. Governments and professional bodies should promote ethical conduct or draw up codes of ethics, while scientists should themselves adhere to the highest ethical standards. And, in an initiative that emerged during the conference, the main declaration suggests that developing countries could take advantage of the debt relief offered recently by the G8 industrial nations by increasing their spending on science and education.

Pragmatist. UNESCO's Federico Mayor says follow-up is key.

Reaching even this modest consensus was far from easy in Budapest. The heated debates began straight after the initial session, when some women delegates pointed out that all speakers in the podium were male, and the arguments spilled over into a stormy session on "gender mainstreaming" in science. "Not one female voice came from the podium that first day," complained Canadian bioethics specialist Margaret Somerville of McGill University in Montreal. Shirley Malcom of the American Association for the Advancement of Science (the publisher of *Science*) added: "That galvanized women here, because it made it look like UNESCO is talking the talk, but not walking the walk." UNESCO's Mayor told *Science* that he was "personally concerned" by the lack of representation on the first panel, but that the conference as a whole had done much to bring gender issues to the fore.

Many of the two dozen thematic sessions, which took place in venues across Budapest, were similarly heated. Conference rooms rang with a cacophony of voices, from Australia to Zambia, representing more than 150 countries and scientific interests as diverse as particle physics and small-farm agriculture. U.S. Nobelist Leon Lederman of the Fermilab accelerator center in Illinois expressed the frustration of numerous scientists in having to distill the debate and recommendations of 3-hour sessions into a few paragraphs for the committee revising the final documents. "It's like trying to illustrate *War and Peace* in a single-frame cartoon."

As science officials from country after country expounded their national positions on the conference's main stage, there were complaints from Iraq and Cuba about how U.S. sanctions had hurt their science. And, behind the scenes, some delegates from industrialized nations grumbled that industry—which accounted for 61% of R&D expenditures in the North in 1996—was barely represented in Budapest. "The next time we do this, we should make sure that leading research industries have a voice," said Japanese parliamentarian Wakako Hironaka, a former environment minister. Mayor responded that UNESCO had invited more industry officials who did not attend, and that it would involve industry in follow-up meetings.

Meanwhile, some Third World scientists complained that—at a time of U.S. budget surpluses—the world's strongest economy was unwilling to commit itself to greater aid to science in the developing world. Some even proposed that wealthy countries earmark 0.5% or more of their national income for research aid to poorer nations. But officials from the United States—which is not a UNESCO member—steered clear of specific commitments and emphasized cooperation rather than aid. E. Michael Southwick, a deputy assistant Secretary of State, told delegates that the U.S. government has been involved in "the education and training in the United States of thousands of international scientists, joint laboratory and field projects with many

PHOTOS BY UNESCO

countries to share knowledge and technology, and cooperative research to tackle problems of global dimensions."

In the absence of firm aid commitments, a group of African delegations came up with the self-help plan to devote a portion of the Third World debt relief from the G8 to science and education. "We hope this will allow African governments to devote more resources to research and education," said Ahmadou Lamine Ndiaye, rector of Senegal's Gaston Berger University.

Ethics was another hotly debated issue, in large part due to the proposal by Joseph Rotblat—a physicist who won the 1995 Nobel Peace Prize for his work as founder of the Pugwash Conference, which pressed for nuclear disarmament—that all young scientists be required to take an oath, similar to the Hippocratic Oath taken by physicians. He suggested it include the line: "I will not use my education for any purpose intended to harm human beings or the environment." While UNESCO's Mayor told *Science* that he favored the concept, many scientists at the conference—including U.S. Nobelist Paul Berg and German biologist Hubert Markl, president of the Max Planck Society—said such an oath would have only symbolic value. "The Nazi doctors who committed atrocities at the concentration camps had taken the Hippocratic Oath," Markl told *Science*. In the end, the conference documents did not specifically back Rotblat's proposal, but urged young scientists to "adhere to the basic ethical principles and responsibilities of science."

One issue that all delegates seemed to agree on was the need for a rapprochement between science and society. Indian plant geneticist M. S. Swaminathan told the conference that, despite its great advances during this century, science has failed to address many human needs in the developing world. "The formidable power of science and technology can benefit mankind only if we know how to temper it with humanism." He called for "information empowerment" by connecting the Third World to the Internet and giving the poor greater access to scientific advances.

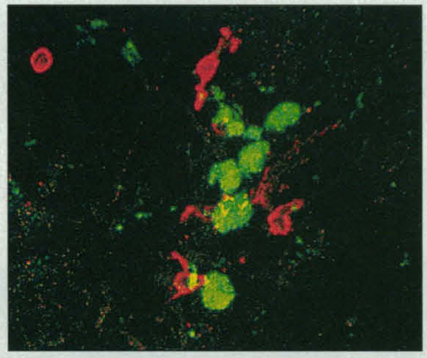
As the bleary-eyed delegates headed home from Budapest, some recalled that the noble goals of the last such conference—held in Vienna in 1979—had not been fulfilled (*Science*, 11 June 1999, p.1760). And they vowed this time around to make sure the Budapest framework goes somewhere. "The follow-up is the most important aspect of the conference," said Mayor. He said UNESCO would establish a network to meet regularly to evaluate the conference follow-up and recommend ways to implement the resolutions. "We want the Budapest conference to be more effective in the long run" than was the Vienna meeting, said Indian scientist M. G. K. Menon, a former ICSU president. Added Mohamed Hassan, a Sudanese mathematician who directs the Third World Academy of Sciences and is president of the African Academy of Sciences: "We want to send a message to the world's countries: support science, because it is in your interest." –ROBERT KOENIG

With additional reporting by Daniel Clery.

NEUROBIOLOGY

An Immunization Against Alzheimer's?

Immunization, once largely limited to fighting infectious diseases, is finding surprising new targets. Researchers have recently learned that some cancers can be eliminated by cranking up the immune system with vaccines, and now, new findings raise a startling possibility: someday immunizing people to prevent or even reverse the mental devastation of Alzheimer's disease.



Cleanup operation. Microglia, the brain's scavenger cells (red), and amyloid plaques (green) in the brain of an immunized mouse.

CREDIT: DORA GAMES, ELAN PHARMACEUTICALS

One hallmark of Alzheimer's is amyloid plaque, a protein deposit that builds up in the brains of those with the disease. A team at Elan Pharmaceuticals in South San Francisco reports this week in *Nature* that, in mice genetically engineered to develop an Alzheimer's-like condition, immunization with β-amyloid (Aβ), the protein fragment that forms the plaque, reversed or prevented plaque formation and neural damage.

The finding "raises the possibility that immunization with Aβ may eventually be used as a treatment, or prophylactically, for Alzheimer's disease," says Alzheimer's researcher Peter St. George-Hyslop, of the University of Toronto. "If so, this would be an absolutely tremendous result." Alzheimer's researcher Sam Sisodia of the University of Chicago agrees, but adds: "One has to exert caution [in thinking] about using this strategy for therapeutics. Things could work differently in humans." One big question mark, notes St. George-Hyslop, is that even if immunization prevented plaque formation in humans, no one is certain yet that plaque actually causes Alzheimer's symptoms.

Even so, plaque made up of $A\beta_{42}$, an abnormal-length fragment of a normal cellular protein, has been a central focus of Alzheimer's research. It is an early and consistent feature of the disease, and while it hasn't been proven to cause the symptoms, many researchers think multiple lines of evidence strongly suggest that it does.

Several labs have bred transgenic mice that produce Aβ and develop plaques and neuron damage in their brains. Although they don't develop the widespread neuron death and severe dementia seen in the human disease, they are used as models for its study. Dale Schenk, vice president of neurobiology at Elan, wondered whether immunization with Aβ might produce antibodies that would prevent plaque formation in the mice. The antibodies would have to cross the blood-brain barrier, but "we knew [from prior work] that everything from the blood gets into the brain at some level," says Schenk, so he thought it was worth a try.

Schenk's team injected the mutant mice with Aβ at a young age, before plaque formation had begun, and found that those mice never developed plaque or neuron damage. When they immunized older mice that already had plaque in their brains, the plaque—and the signs of disease—largely went away. In the brains of these mice the team found evidence of an immune response: bits of remaining amyloid that were dotted with antibodies, and microglia, the scavenger immune cells of the brain, chock-full of amyloid protein they had cleared away.

The presence of antibodies on the remaining plaque means that the antibodies successfully crossed the blood-brain barrier, says neurologist Lawrence Steinman, who studies immune-brain interactions and amy-