WORLD CONFERENCE ON SCIENCE

A Second Chance to Make a Difference in the Third World?

Later this month, the World Conference on Science will seek to raise the profile of research worldwide. Third World scientists wonder if it will do much to help them

Twenty years ago, when hundreds of experts gathered for a global science-policy jamboree in Vienna to help the developing world boost its science and technology, genetic engineering was in its infancy and an embryonic Internet connected a few hundred U.S. computers. This month, a somewhat different cast of characters will gather just 240 kilometers away in Budapest for another international talkfest, the World Conference on Science. In the 2 decades separating the events, the world has changed dramatically: The Iron Curtain is now only a memory, cloning has become commonplace, and the Internet now connects tens of millions of computers across the globe. Yet, despite the contrasts, one aspect remains depressingly familiar: The quality of, and support for, research in the world's developing nations still lags far behind that of industrialized countries.

"Gap is widening." Mohamed Hassan of the Third World Academy of Sciences.

In fact, with a few exceptions, that divide may have deepened since 1979. "The research gap is widening for the majority of developing countries, especially the least developed countries," says Sudanese mathematician Mohamed Hassan, executive director of the Third World Academy of Sciences and president of the African Academy of Sciences. "The frontiers of science have advanced so fast and the research costs risen so rapidly in recent years that it has become difficult for some countries to keep up."

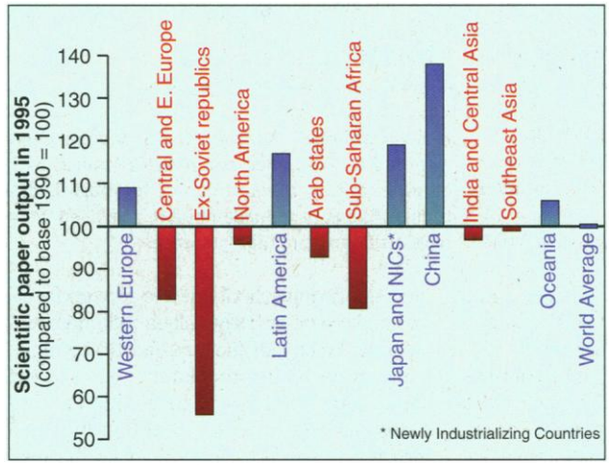
According to the United Nations Educational, Scientific and Cultural Organization's (UNESCO's) World Science Report 1998, only about one-tenth of the $470 billion invested in R&D in 1996 was spent by the developing world, where about 80% of the world's population resides. And scientists in North America, Western Europe, and Japan accounted for about 84% of all scientific papers published in 1995. With the exception of a handful of "third-tier" nations whose economies have greatly expanded—including China, Brazil, and South Korea—most Third World nations have fallen behind the North's pace. "Scientific research in the developing world is way behind. Even countries like India have great difficulty in competing," says C. N. R. Rao, president of the Nehru Center for Advanced Scientific Research in Bangalore, India.

The Vienna conference was full of good intentions to shrink the North-South science gap. It pledged to set up a fund for science and technology projects in developing nations, and the U.S. delegation even proposed setting up a national aid agency to support Third World research. However, the U.S. Congress torpedoed the agency proposal, and Northern governments in general did not come through with their promised commitments to the fund. Indian plant geneticist M. S. Swaminathan, who headed a UN advisory committee in 1980 to follow up on the action plan, says he was "extremely disappointed at the lack of commitment on the part of the industrialized nations, both in terms of finance and intellect, to achieving the goals set at the Vienna conference." Swaminathan, who will give a keynote speech at the Budapest conference, adds: "I can only hope that the Budapest plan of action will not meet with a similar fate."

The organizers of this year's meeting—UNESCO and the International Council for Science—have learned some lessons from the Vienna conference. They have broadened the agenda and shifted the focus to reflect changes in strategies for fostering science in the Third World. "We want to discuss the role of science in society. We do not want to focus—as did the 1979 conference—mainly on the question of how to help developing countries with science and technology," says Maurizio Iaccarino, an Italian molecular biologist who is UNESCO's assistant director-general for natural sciences and the chief organizer of the Budapest conference.

Iaccarino concedes, however, that North-South issues are bound to come up in a gathering of 2500 scientists, research ministry officials, and science managers from nearly 200 nations. "I don't expect major international aid commitments at this year's conference," says Hassan, who has promoted many collaborative science programs among developing countries. "But I do hope that some industrialized nations might announce more support for R&D efforts in the Third World." The main focus, however, will be on strengthening the developing world's own research. "Compared to 20 years ago," says Iaccarino, "developing countries now realize that they need indigenous research. And now there is far more emphasis on 'South-South' cooperation within the developing world."

A growing number of international development agencies have come to similar conclusions. They now view support for Third World science not just as an end in itself but as a catalyst for economic development. In a major report last fall, for example, the World Bank—the world's biggest development organization—declared that "knowledge is critical for development" and signaled a shift away from its traditional emphasis on public-works projects—such as dams and roads—and toward efforts to help developing nations acquire the knowledge they need to grow. The bank, which had closed its science office 15 years ago, is now moving to help bolster science in developing nations, including plans to help fund "Millennium Institutes"—centers of excellence that will aim to give the best Third World scientists the chance to do world-class research.



On the slide. Publication output between 1990 and 1995 has been stagnant or slumped in most developing nations.

Although it is not prepared to offer any deep-pocket commitments in

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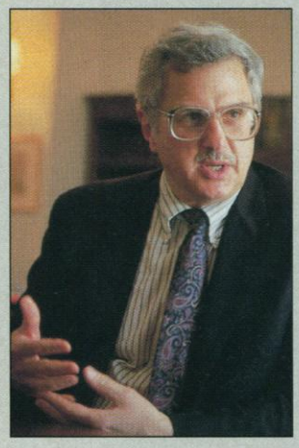
Third World Researchers See Internet as An Entry Ticket to Mainstream Science

In Guadalajara, Mexico, geneticist J. M. Cantu is setting up the Mexico Network of Molecular Biomedicine, with the aim of linking researchers at 100 research institutes and hospitals throughout Mexico via the Internet. At Nigeria's Obafemi Awolowo University, scientists are working on a project—with the help of the Abdus Salam International Centre for Theoretical Physics in Trieste, Italy—to use Internet links to bolster research in the physical sciences. And in southern India, the M. S. Swaminathan Research Foundation is hooking up about two dozen isolated villages to the Internet to provide scientific knowledge on issues such as health and agriculture.

Although use of the Internet is limited in developing countries, largely because of poor communications, many see it as a key factor in fostering Third World science. The Internet could weld together isolated centers into "virtual laboratories" and ensure they keep in science's fast lane by accessing journals via the Web. While Internet access doesn't feature prominently on the agenda of this month's World Conference on Science in Budapest, it seems likely to dominate many hallway discussions. "I would like to see the birth of a global movement in this direction," says plant geneticist M. S. Swaminathan, founder of the south Indian institute, who will deliver one of the conference's main speeches. Adds Cantu, who also will speak in Budapest: "The Internet is the best hope for globalizing science."

Bruce Alberts, president of the U.S. National Academy of Sciences, says he would like to see the world's major scientific organizations develop programs aimed at connecting all scientists to the World Wide Web, and then develop "knowledge resources" that would be made available through the Internet to all scientists. "We'd like to see a focused effort by all these organizations—UNESCO, the International Council for Science, the Third World Academy of Sciences [TWAS], and others—to better connect scientists worldwide to the Internet," Alberts told *Science*. "The problem is to convince the government organizations that this would be useful for them."



Get wired. NAS's Bruce Alberts wants Internet connections for all the world's scientists.

For scientists in developing nations, simply getting access to the Internet at all is often the biggest problem. Some governments either do not allow such links, or their telecommunication systems are not geared up for it. In a recent study, Enrique Canessa and two colleagues at the Abdus Salam center found that sub-Saharan Africa is the farthest behind on Internet connections for scientific use. Many African scientists don't even have access to computers, and when they do, congestion on the few available telecommunication links makes Internet access slow and expensive.

Another study notes, for example, that in Angola, 5 hours of Internet access per month for a year would cost an estimated $1740—more than the average Angolan's annual income. And scientists in Mozambique, Zaire, and Congo currently have no Internet access at all. Even in India, where access is more widespread, D. Balasubramanian, research director of the Hyderabad Eye Research Foundation, complains that some scientists there "wait for almost an hour before getting hooked onto the Net." He adds: "To the extent that the Internet is available, it has been a great boon. The problem in several countries, however, is the speed."

Such problems "reduce drastically the effectiveness of the Internet as a working tool and will delay the creation of South-South virtual laboratories," say Canessa and his coauthors. However, they conclude that—in regions where the Internet is functioning—virtual labs eventually "could become a valuable device for combating the brain drain from South to North." In Mexico, Cantu says that "science should get ahead of politics on this issue" and push hard at the world conference for an international program to link scientists in the North and South. Adds Mohamed Hassan, executive director of TWAS: "Every scientist should have the right of access to the Internet."

–R.K.

Budapest, the influential U.S. delegation, led by White House science adviser Neal Lane, seems eager to encourage more scientific cooperation with the developing world. Biochemist Bruce Alberts, president of the U.S. National Academy of Sciences (NAS), which is doing much of the planning, says that "just making everyone feel good about science is not going to be enough." He wants the U.S. group to help convince research ministers to beef up their own support for science. "It's important to get developing-country governments excited about the opportunities for science in their own countries, to let them know the benefits that science can provide if you support it," he says.

Alberts also has two personal goals: trying to connect all scientists through the Internet (see sidebar) and setting up an Inter-Academy Center science advisory panel that would be an international version of the NAS's National Research Council, producing high-level science-policy reports. He says that "American science is willing to contribute more if we can make the right kind of links," but he insists that developing countries should take the initiative: "It has to be a pull; it can't be a push."

But it is difficult to predict who will be pulling whom, and which national delegations will be pushing what, at the Budapest conference. The central focus of the conference will be the debate on, and likely approval of, two draft documents: a "Declaration on Science" that calls on governments to make more of a commitment to science and scientists to focus more on society's needs; and a "Science Agenda—Framework for Action" that outlines a raft of actions to help realize the declaration's goals. Although some critics contend that those draft documents are too bland, Iaccarino says they are important to help develop "a new philosophy about the relationship between science and society. This is closely related to science for development."

One of the concrete initiatives likely to emerge from the meeting will be a series of new "centers of excellence" to train researchers in the developing world—similar to the World Bank's plans. Iaccarino says he is expecting various countries to announce at least 10 such initiatives to create centers in developing nations that would train scientists in fields such as biotechnology, mathematics, hydrology, and renewable energies: "We want more centers of excellence for the training of scientists from the developing world. And I am confident that several new institutions will be set up."

Although the conference's direct impact may be modest, some scientists believe that informal "hallway meetings" and networking in Budapest will catalyze initiatives that could have a long-term impact on international science. Says Alberts: "Formal agreements are signed all the time that turn out to be meaningless. What we really want to do is to make connections with the research ministers and others from developing countries and convince them to foster science."

–ROBERT KOENIG

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