

Japan's Human Frontiers Program Advances

The Toronto economic summit gave the program a nudge forward; it has been scaled down since it was proposed in 1986

"We note the successful conclusion of the Japanese feasibility study on the Human Frontiers Science Program and are grateful for the opportunity our scientists were given to contribute to the study."

"We look forward to the Japanese government's proposals for implementation of the program in the near future."

—Extract from the final communiqué of the economic summit meeting held in Toronto, 20 and 21 June 1988.

Paris

THE MENTION in the summit communiqué was brief and fell short of a full-fledged endorsement, but it was nevertheless significant. Japan's Human Frontiers Science Program is finally close to being launched—albeit in a more modest form than initially envisioned.

It is now more than 2 years since former Japanese Prime Minister Yasuhiro Nakasone first proposed to the leaders of the six other largest Western nations that a major international program of basic research aimed at the "elucidation of biological functions" be established. Initial plans drawn up by Japan's Ministry for International Trade and Industry (MITI) spoke of a possible budget of several billion dollars, of which Japan would provide about half.

Over the past 2 years, the program's goals have been whittled down and, in the eyes of many Western scientists, become more realistic. A detailed list of ambitious scientific objectives, such as an understanding of the origins of aging or memory, has been reduced to two fields—brain behavior and the molecular basis of biological functioning. Precise activities in each area should be determined by a 20-member international scientific committee, according to the latest proposal.

It is now generally accepted that most of the initial financial support should come from the Japanese government, rather than from a large international fund established for the program. Current estimates are that about \$100 million will be needed over the first 3 years, the money being divided among fellowships, international workshops, and research projects, each involving teams from at least two of the seven summit



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Noboru Takeshita. Much depends on his willingness to push the program in Japan.

countries.

Several conditions agreed over the past year have helped overcome some initial skepticism that the program was intended primarily to provide Japan with direct access to the most advanced biological research being carried out in the United States and Europe. For example, long-term fellowships will be restricted to "young scientists," all research proposals will be subject to peer review, and patent rights will belong to the scientists or their institutions carrying out research "according to national patent law."

As a result, the proposals that have emerged from a 1-year \$1.4-million feasibility study set up by Japan's Science and Technology Agency (which has taken over responsibility for the human frontiers program from MITI) after last year's summit meeting in Venice "express all the right sentiments" says an official from Britain's Medical Research Council who has been closely involved in the negotiations.

Ever since the idea was first launched by Nakasone, many members of the Western biological research community, particularly in Europe, have been enthusiastic. For example, 20 scientists and science administrators from Japan, Europe, and the United States who met in Bonn in April at the

invitation of the Alexander Humboldt Foundation issued a statement emphasizing that enhanced support for basic biological sciences "would provide the underpinnings for future scientific and technological development," and urging that the human frontiers program "be started as soon as possible." The meeting was held to review the final draft of the feasibility study.

Masao Ito, dean of the faculty of medicine at the University of Tokyo and vice-chairman of the feasibility study, said after the meeting that there were "many kinds of international cooperation" in science, and that the kind of support being proposed through the human frontiers program was necessary "to accomplish genuine progress."

Alvin G. Lazen, executive director of the National Research Council's Commission on Life Sciences at the U.S. National Academy of Sciences, says that the anticipated launch of the program will be "a historically significant event," marking the Japanese government's commitment both to increasing its funding of basic science and to the support of scientific research on a global basis.

Enthusiasm in the political community has been more muted, and has not been helped by some diplomatic gaffes by the Japanese in the early days. The French government, for example, was not amused to discover that Japan had sent questionnaires to more than a dozen of its top biological scientists working in government laboratories, asking for information about their research; they were informed by Paris not to provide the information requested.

Others point out that the Japanese government is not promising a vast sum of money for the venture. The total sums currently being talked about are "peanuts" compared to the annual \$4-billion research budget of the National Institutes of Health, says one official with the Reagan Administration, adding that "if the Japanese are really serious about this initiative, then they should pick up the ball and run with it."

Some U.S. scientists, such as Rockefeller University President Joshua Lederberg and Howard Schneiderman, vice president for research at Monsanto, have tried—so far unsuccessfully—to persuade the Japanese government that the program should focus on specific problems of concern to the Third World, such as infectious diseases, deforestation, and food production. So far, however, the Japanese (as well as several of the European scientists involved) have firmly resisted moving away from a procedure under which research proposals are considered purely on the grounds of scientific merit.

There remains some uncertainty, both inside and outside the human frontiers pro-

gram, over how much it will restrict itself to the direct support of basic science, and how much it will venture into providing funds for the development of the "key technologies" required by biological research.

In particular, no clear decision has yet been made on whether the program should support research and development in advanced genome sequencing technology. Early descriptions suggested that it would; and one of the strongest supporters of the program has been Akiyoshi Wada, professor of physics at the University of Tokyo, who has been promoting an international project to develop a "super-sequencer" capable of reading 1 million bases a day, at a cost of 1 cent per base.

Furthermore, Victor McKusick of the Johns Hopkins Medical School says he has been told that human frontiers program funds may be made available to support the creation of an international Human Genome Organization, currently under discussion as a way of coordinating scientific activities in the three continents.

So far, however, companies and research teams developing their own sequencing technologies have been reluctant to enter into cooperation with those they feel could soon become their commercial competitors. The final version of the feasibility study makes no specific reference to genome sequencing, merely saying that research on technology for DNA analysis "might be included."

Nor is there any precise indication of how scientists from nonsummit countries—including where appropriate those from the developing nations—or those who might share an interest in the outcome of the research are likely to be involved.

Given the continuing uncertainties over what will emerge from the program, the six other nations, together with the Commission of the European Economic Community, represented at the economic summit are each holding back before deciding whether to commit any of their own funds directly to the human frontiers program. Almost all have now said that they are prepared to contribute "in kind," however.

Thus the ball now rests firmly in the court of Japan's Ministry of Finance. And the Ministry's reaction is itself said to depend heavily on the energy with which Prime Minister Noboru Takeshita—like his predecessor Nakasone, a keen supporter of the program in public—can be persuaded to follow through on the expressions of interest gathered from the other six leaders at last week's summit meeting.

■ DAVID DICKSON

Additional reporting was provided by Don Kirk, a free-lance writer based in Bonn.

U.S.—Japan Science Pact Signed

The United States and Japan have formally agreed to a framework on cooperation in science and technology, pledging to provide "comparable access" to each other's government-sponsored research and to make "equitable contributions" to the relationship. The agreement caps year-long negotiations between the two countries in which the United States has pressed the Japanese to reciprocate American openness in access to research and shoulder a greater share of basic research funding (*Science*, 1 January, p. 13; 31 July 1987, p. 476.).

The pact was signed by President Reagan and Japanese Prime Minister Noboru Takeshita on 20 June during the economic summit in Toronto. It replaces a joint agreement signed in 1980. The new agreement substantially expands cooperation into several broad new areas, including superconductivity, sets up three committees to implement the agreement, and lays down rules for handling intellectual property rights and potentially sensitive military information that might arise from joint research.

But it is most notable for the principles agreed to on the issues of access to government-sponsored research and funding of fundamental research, which, during the past couple of years, have become an increasingly sore point among American science leaders. While American government and university laboratories have been open to Japanese researchers, Americans have felt blocked from Japanese labs.

Solutions to the problem have been complicated by the fact that the structures of American and Japanese basic research are so different. In the United States, about half of all research and development is funded by the government while the Japanese government supports only about 20%. Japanese industry funds 80% of the country's total R&D.

With that in mind, the new agreement is limited in its impact because it applies only to government-sponsored research, not corporate. Nevertheless, said White House science adviser William Graham in an interview with *Science*, "The agreement is trailblazing. It will do a great deal to redress an imbalance of the past. The real accomplishment here is that we did bridge a gap between our structural differences. The agreement is quite different from the previous agreement in that it's a stronger statement of imperatives of cooperation."

Negotiators very carefully chose the word "comparable" to describe the kind of access the two countries are committed to providing. The word is meant to take into account the countries' different research structures and to convey their intention to provide equivalent access in a qualitative sense, rather than numerical. Under this concept, if a Japanese scientist conducts research at the National Institutes of Health, the United States might request access to a laboratory in another field. The word comparable is meant to avoid the idea that there should be a strict one-to-one exchange of visiting Japanese and American scientists.

Under the new agreement, the two countries plan to conduct joint research in the life sciences, including biotechnology, information science, manufacturing, automation, global geosciences and environment, joint database development, and advanced materials.

The inclusion of superconductivity as a topic of joint research is noteworthy, given that Graham barred foreign companies from a national conference on superconductivity held almost a year ago. Graham said, "This agreement deals with research and scientific aspects of superconductivity, not commercialization" as the conference did.

The two governments also settled their differences on language acknowledging the need to protect information related to national security interests. Japan had vigorously objected to an American proposal to refer to military research in the pact because the agreement covers only basic research for peaceful purposes. To the Japanese, it was important to maintain a clear separation between military and civilian research. In a letter issued with the agreement, both countries agreed that if militarily sensitive information "is unexpectedly created" by joint research, it may "be protected from unauthorized disclosure."

Kaname Ikeda, science counselor at the Japanese embassy in Washington, D.C., said in an interview, "This is a well-designed agreement. Now we need to have a good environment so we can implement it successfully and in a productive manner."

■ MARJORIE SUN