

## RESEARCH IN JAPAN

# Big Winners, Big Expectations

Five groups have been awarded decade-long grants in a drive to win global attention and draw international talent

**TOKYO**—Immunologist Shizuo Akira is indisputably at the top of his field. For 2 years running, the Osaka University professor has been Thomson Scientific's "Hottest Researcher" for authoring the most highly cited papers in his field. But Osaka has not won recognition as a leading world center for immunology research; Akira fears the university may even be in danger of falling behind. Advancing technology "makes it very difficult for a single laboratory" to create an international buzz, he says: "What's needed is to accumulate a research team and get a big grant."

He has just gotten a very big grant; Japan hopes the international buzz will grow. Akira's center is one of five selected to receive in the neighborhood of \$12 million per year for 10 years under a World Premier International Research Center Initiative sponsored by Japan's Ministry of Education. The grants, which must be supplemented by the host institutions, are intended to take the winners to a new level of global prominence through generous, discretionary funding and support for internationalizing research. Akira hopes to lure leading Japanese and foreign immunologists to Osaka and, in particular, push into the nascent field of in vivo imaging of the cell-cell interactions that define immune response.

The grant program is an audacious bet by Japan's Ministry of Finance, which is out to make at least this handful of centers as widely

recognized as the Massachusetts Institute of Technology's Media Lab or the U.K.'s Laboratory of Molecular Biology in Cambridge. "It's a visionary program," says Matthew Mason, director of the Robotics Institute at Carnegie Mellon University in Pittsburgh, Pennsylvania. Mason was one of six foreign scientists on an international panel that reviewed 13 short-listed applications. The objective was to "pick groups already at the peak [of their field] and give them support to make them globally visible," says Hiroshi Ikkawa, who is heading development of the program for the Ministry of Education.

Tohoku University in Sendai, for example, proposed creating an atom-molecule-materials center around its Institute for Materials Research, which is already one of the world's most prolific material science groups. Yoshinori Yamamoto, slated to direct the new center, says they hope to take their work on bulk glass materials to a new level by adding theorists and computational scientists. The University of Tokyo is partly building on the breakthrough studies of neutrinos done at its Super-Kamiokande Neutrino Observatory with a new Institute for the Physics and Mathematics of the Universe. Hitoshi Murayama, a theoretical physicist at the University of California, Berkeley, says they will bring together experimental observations, theory, and new mathematical approaches "to try to understand such

basic questions as how the universe started and where it's going."

Global visibility has eluded Japan's universities and research institutes for a variety of subtle reasons. Norio Nakatsuji, a cell biologist at Kyoto University who will be heading its new Institute for Integrated Cell-Material Sciences, cites geographical isolation and the language barrier. So the initiative has set a target for each center to have 10% to 20% of its two dozen or so principal investigators (PIs) and 30% of an expected 200 research staff be non-Japanese. And "naturally, English should be the language of the centers," says Nakatsuji.

Paul Weiss, a chemist at Pennsylvania State University in State College, who will be affiliated with the Tohoku center, says, "Another [problem] is the hierarchy typical in Japanese scientific institutions." To counter this, Weiss says, "we are making a concerted effort to encourage creativity and independence among young scientists."

And Masakazu Aono, director of the new Center for Materials Nanoarchitectonics at the National Institute for Materials Science in Tsukuba, says that probably because of rigid academic structures, "Japanese scientists have not been good at interdisciplinary collaboration." His center will bring a range of specialists together to study nanoscale structures to create new types of alloys and microelectronic devices as well as organic and biological materials.

Weiss, for one, is envious. "Where can we ask for resources in the U.S. to go after a 10-plus-year problem? What mechanism lets us put together a team of the top people from all over the world?" he asks.

Still, some researchers are concerned about the depth of commitment. "There is no tenure [in this program]," notes Murayama, who will head the new center at the University of Tokyo. "So how do we make the jobs at this institute competitive" with the best permanent jobs elsewhere? he asks. And there are questions about the involvement of the non-Japanese PIs. Most, including Weiss, will likely maintain their current positions, devoting just a percentage of their efforts to the centers.

Program backers hope the part-time presence of leading foreigners plus full-time Japanese scientists will attract younger researchers of all nationalities on a full-time basis. Kyoto's Nakatsuji says they have plans for "superpostdocs," under which select newly minted Ph.D.s could be given the money to independently run a small group, complete with technicians and graduate students. Osaka's Akira hopes some of these young scientists will become world leaders—and stay in Japan.

—DENNIS NORMILE



Host Institution	New Institute Name	Objective
Kyoto University	Institute for Integrated Cell-Material Sciences	To understand and control chemical and physical processes at the cellular scale
Tohoku University	Research Center for Atom, Molecule, Materials	To promote the development of new materials, particularly bulk glass
University of Tokyo	Institute for the Physics and Mathematics of the Universe	To study basic questions about the origin, composition, and fate of the universe
Osaka University	Immunology Frontier Research Center	To merge imaging and immunology to study immune cell activity in vivo
National Institute for Materials Science	International Center for Materials Nanoarchitectonics	To study and control materials at the nano scale

**New horizons.** Findings at the Super-Kamiokande Neutrino Observatory at the University of Tokyo (above) led to a grant for an international math and physics institute.