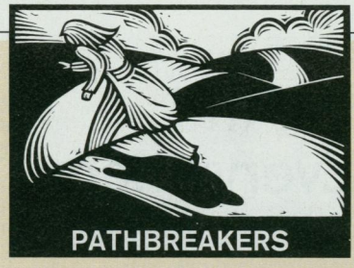

Writing a New Script for Science

Ten years ago, Keiko Nakamura began dreaming of a concert hall for science. "In a concert hall the specialist plays music and audiences come and enjoy the playing. I think scientists can do their research and lay people can come and enjoy what is going on," she says. It's an offbeat idea—watching researchers do their thing on a stage. But this summer the concept will become reality, when the $25 million (¥ 3 billion) Biohistory Research Hall (BRH) opens in the suburban city of Takatsuki, midway between Osaka and Kyoto.

Though Nakamura cringes at the term "science museum," the hall is modeled after innovative science museums such as San Francisco's Exploratorium and the Ontario Science Center in Toronto. It will combine public aspects of a museum, such as high-tech exhibits and glass-walled laboratories for people to watch research in developmental biology and cell biology, along with private facilities, including a library, private research offices, and meeting rooms for symposia.

If the concept of science theater is a first, it isn't the only first in the career of Nakamura, who at 57 is professor in the School of Human Sciences at Waseda University in Tokyo. In a chemistry class at the University of Tokyo in 1958, her professor showed her a picture of DNA. She recalls: "I had never seen such a beautiful molecule before. I started to make a model with my classmates from clay and bamboo sticks. It was 2 meters high. I think it was the first model in Japan of DNA."

In spite of such ingenuity, it wasn't easy going for a woman in chemistry in Japan. "Chemistry was so interesting at that time," she says. "Plastics and new synthetic fibers were being invented. Many chemical industries were growing. So all of my classmates—boys—were invited to enter companies. But there was nothing offered to me....So I thought it would be better for me to go into an academic field."

The next year Nakamura started graduate school at the University of Tokyo in biochemistry, concentrating on phage genetics. In the mid-60s she joined the National Institute of Health in Tokyo. She left her career for 5 years when she had her children (a daughter and a son), a decision she says many Japanese women in science still make because "there is no good system to support young women who have babies."

In 1971, Nakamura finally landed a job with a chemical company—though not as a chemist. Her professor at the University of Tokyo, biochemist Fujio Egami, was starting the Mitsubishi-Kasei Institute of Life Sciences, an innovative bioresearch center near Tokyo financed by Mitsubishi Chemical. Egami invited Nakamura to head a new Laboratory of Social Life Science. "In the early '70s," she says, "we suffered from environmental problems, such as Miyamata disease [mercury poisoning due to industrial pollution]. Egami felt it was necessary to think about the relationship between science and society." In her new role she followed the development of technologies such as genetic engineering and lectured and wrote books explaining the life sciences to adults and children.

Those books caught the eye of the president of Waseda University, who invited Nakamura in the mid-1980s to be professor in the newly created School of Human Sciences, made up of the life sciences, psychology, and social science. In addition, out of the experience of explaining the workings of science to a lay audience grew the notion of a place where the public could watch how science works.

Her partner in that endeavor is Japan Tobacco, to which she became an advisor 2 years ago, when the tobacco monopoly was looking to expand into pharmaceuticals and other life sciences (*Science*, 29 January, p. 556). Japan Tobacco sponsors the BRH, whose aim, Nakamura says, is to broaden both science and society. "Researchers do their work with such a narrow view. They want to make some new invention or discover some new facts. And society only wants to utilize the results. They don't want to know what scientists are thinking. I don't think the relationship is very good." Nakamura is well placed to make it better.

–Toomas Koppel

DENNIS B. GRAY

Big-budget production. Keiko Nakamura with a model of the Biohistory Research Hall, where scientists will "perform" for the public in glass-walled labs.

Toomas Koppel is a Tokyo-based science writer.

says Mildred Dresselhaus, a solid-state physicist at MIT and former president of the American Physical Society. But the mores of any particular community evolve slowly, says Dresselhaus, and such changes in the scientific ethos won't be effected overnight. "For at least one generation more, we are going to have to play by the men's rules," she insists. And that's why she trains her female students to excel under those rules, with faith that "as women get more numerous, they will have more input into what the rules really are...and the [system] will become more friendly to women."

To many senior members of the profession, such as Dresselhaus, being a scientist meant jumping into a world where toughness is a virtue, colleagues are for competing with, students had to sink or learn to swim, and signs of "femininity" were better kept hidden. But more and more of the younger women scientists of today are questioning whether science has to be that way. They're beginning to envision a time when a critical mass of women will be reached, and the rules themselves could begin to change. They are eager, in the words of Baylor University neuroscientist Sarah Pallas, "to change science" rather than changing women "until they fit this funny mold that has been created in their absence." Although female scientists are not shouting out those thoughts at public gatherings where their male colleagues are present, in hallway conversations among themselves they are beginning to wonder if they are the generation that could break the mold once and for all.

–Marcia Barinaga