

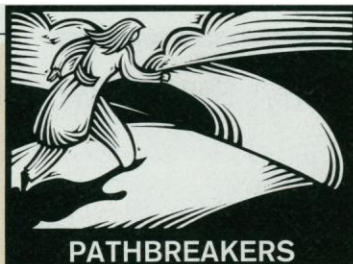
Our Thinking Is Difficult to Change

"I used to ride my bicycle every day for an hour to go to school," says population geneticist Tomoko Ohta, "and an hour to go home. It was very different then." Indeed it was. When Ohta, now 59, was a girl, her bicycle ride took her through rice fields and pine trees in Aichi Prefecture, outside Nagoya. Now the same terrain is home to the automobile manufacturing giant Toyota. And over the same period, the landscape of Japanese science has also changed—but perhaps not as much.

Today, Ohta heads the department of population genetics at Japan's National Institute of Genetics. When she was a student, the idea that a woman could hold such a position would have seemed almost laughable in Japan, and to get there she had to achieve a number of firsts or near-firsts. "I was almost the first girl student to enter a big university," she says of her entry into the University of Tokyo, where she studied cytogenetics and horticulture. And her status imposed a special responsibility. "I felt very *ishikishi* (self-conscious). I felt I had to do something."

Ohta lived up to that promise. After university, she went on to graduate studies, although lack of money prevented her from finishing her doctorate until she was 34. By that time she had moved to North Carolina State University, where she received a Ph.D. in population genetics for research on a probability-based model of how certain unique genetic features can survive in a population.

Her interest in this aspect of evolution led her back to Japan and to the National Institute of Genetics. Built in the shadow of Mt. Fuji on the site of a wartime airplane factory, the institute was established in 1949. At the in-



stitute, Ohta met population geneticist Motoo Kimura, who became a key scientific influence. At the time, Kimura was looking for evidence to back up his new idea for explaining evolution on a molecular scale. Ohta's early work at the institute estimating the rate of amino acid substitution in enzymes helped Kimura formulate his

"neutral mutation-random drift hypothesis" of molecular evolution, which he proposed formally in 1968.

The "neutral theory," as it came to be known, prompted a decade of stormy debate among geneticists, because it held that most molecular evolution was due to random processes rather than positive Darwinian selection. Today, despite some murmurs of discontent, the idea is generally viewed as an improvement on classical Darwinian theory, since it provides for the first time testable, quantitative predictions about the rate of molecular evolution.

Ohta's career has been closely linked to Kimura's work; she's spent much of her time defending and supporting the neutral theory. She has also had to defend her own spin-off from Kimura's idea, which she calls the "nearly neutral" theory of molecular evolution. The theory attempts to clarify how natural selection and random drift occur at the molecular level, and her goal has been to link understanding of molecular evolution to the overall phenotypic evolution of organisms.

In spite of her own success, Ohta believes many barriers to women in science remain in Japan. "Young lady scientists choose a very hard way if they want to become professional scientists," she says. "Until graduation from university, boys and girls are very equal." But after that, she says, barriers appear when women need to "be hired to do professional work. That is very difficult. And then to get promoted and do their own work is a second barrier." In addition, women are still subject to social pressures to get married and have children, which are often seen as incompatible with a career.

Although there have been reforms—outlawing outright gender discrimination in hiring, for example—the culture is slow to change, Ohta says. "People are not changing," she says. The reason: "How we think is very difficult to change."

—Toomas Koppel



Studied neutrality. Tomoko Ohta helped develop the "neutral drift" theory of evolution.

men—in other parts of the company. "What we talk about is business," says chemical engineer Julie England, one of the founders of the new women's network at Texas Instruments Inc. in Lubbock, Texas. England uses the network as a "sounding board" for solving work-related problems that may have no direct connection to gender.

Like networking, mentoring is an experience often crucial to corporate success, but also an area in which women sometimes lose out—because the senior personnel who do the mentoring are male and may not be as comfortable mentoring women. Some companies are trying to seed the growth of mentoring, too. Corning assigns new employees a "coach," from another area of the company, to offer advice on everything from what to say in a performance review to the management style of senior bosses.

That kind of effort pays off for female researchers—and for the company as a whole. Women in industry generally have higher rates of attrition than those of their male counterparts, perhaps in part because of isolation from senior mentors. In the mid-1980s Corning had a 5-year attrition rate of 16% for professional and managerial women in the technology group; the com-

parable rate for men was only 7%, according to human resources director John Fox.

To keep trained women on board, Corning—which now rates the uncommon grade of three from Schwartz—established not only a mentoring program, but also flexible scheduling and special training for managers. Those programs led to a sharp drop in attrition for both men and women—but the results were most dramatic for females. Today, the 5-year attrition rate for women in the Corning technology group is 3.5%—not much more than the 2.5% for men.

Often such changes must originate at the top, where the tone for corporate culture is set, management experts say. And female researchers at Corning agree that one of their strongest allies is chief executive officer Jamie Houghton.

The same is true at Xerox Corp., where only about 10% of Ph.D. researchers are women, but a high-level council investigates women's issues and reports to senior management, including CEO Paul Allaire. Such efforts, coupled to pilot programs on flex-time and family leave, put Xerox on the track for a hefty four rating, says Schwartz—though she emphasizes that the company isn't there yet. Researchers give credit to