Key Issue:

Tenure

Does the old-boy network keep women from leaping over this crucial career hurdle?

by Ann Gibbons

When Neena Schwartz became a member of the first National Academy of Sciences (NAS) committee on women, in 1974, she was an optimist about the prospects for women in academia. "We thought all you had to do was get more women into the pool—into graduate schools and tenure-track positions—and automatically they would move onto the faculty and into industry and so on," says Schwartz, William Deering professor of biological science at Northwestern University. "Well," she says, "we were naive."

Today, the number of women getting Ph.D.s has grown in almost every field of science and engineering: the total is up from 21% in 1979 to 28% in 1989. But not enough of those new Ph.D.s are making it all the way to tenured jobs in universities and colleges. In 1979, according to National Science Foundation (NSF) figures, women held 5% of all tenured positions. By 1989, the figure had risen—but only to 7%. "Sex differences in rank and tenure status continue to exist in a major way, and the recent data do not show a significant improvement," says a report prepared last year by Margrete S. Klein, director of women's programs at the NSF.

And that's a huge problem for women in science, because tenure is the gateway to a successful career in academic research. Only when a researcher gets tenure can she put aside the struggle for the next job and concentrate on research, which is the key to further career advancement. And it is tenured researchers who attract the best graduate students and postdocs and get appointed to the most important committees, meeting organizing groups, and editorial boards.

Yet because the criteria for tenure are flexible—and often subjective—it is an area where women can be easily discriminated against, sometimes for subtle reasons. Some women don't fare well because they are isolated, lacking the alliances with older male colleagues that younger male scientists develop (*see article on mentoring, page 1368*). Others are denied tenure or promotion because of entrenched attitudes that women are not as good at science or are less committed to research due to family responsibilities.

ART WISE FOR NORTHWESTERN PERSPECTIVE

"We were naive." Neena Schwartz now thinks it will take more than simply increasing the number of female Ph.D.s to get women to the top in science.

In recent years, the NSF, private foundations, and some universities have begun to create programs aimed at keeping tenure-track women on track for the long haul (*see box on facing page*). But these efforts have a dispiriting legacy to overcome. Sex differences in rank and tenure persist even when men and women are matched for field of science, for the quality of the institution from which they earned their doctorate, and for the number of years since their doctorates were earned, says the NSF report. In 1989, women held just 8% of the full professorships in science and engineering. That's an increase of just 2 percentage points since 1979, which is "not significant" compared with the growing number of women eligible for promotion during that time, says the NSF's Klein.

PENN STATE

Productivity maven. Mary Frank Fox.

"You would think there was something mystical about the figure for the proportion of women at full professor, because it just doesn't change," says Mary Frank Fox, an associate professor of sociology and women's studies at Pennsylvania State University, and an expert on scientists' productivity in research. "It just sits there stagnating—almost independent of the changing pool of female Ph.D.-level scientists."

Klein thinks the basic obstacle is simply "the old-boy network," which is "still very much in place." She adds: "There are lots of hard-charging women out there, so the only reason I can see [why women aren't making it to the top] is that men feel comfortable working with men." Schwartz recalls that on an NIH study section she was surprised by the attitude of male colleagues, who were much more likely to question whether a woman's work was independent of her advisor than they were to ask the same question about a man's research.

When it comes to tenure, the only chink in women's armor is that their overall productivity—measured by publication rates—is not as high as men's. No one knows why that is, although sociologists like Fox say women's lower productivity is both "a cause and an effect of their lower status in science." Lower status limits their chances to collaborate and win grants—which, in turn, reinforces the perception that women are less productive.

The productivity differential isn't simply a function of women's need to spend time raising their children. Recent studies, including a decade of work by Jonathan Cole and Harriet Zuckerman of Columbia University, find "that women with children were more productive than women without," says Cole. But the perception that having children reduces a woman's productivity persists—and it may be hurting women in their effort to get tenure at the top schools.

Can these perceptions be changed? The answer to that question isn't clear, but the stakes are high when it comes to women and tenure. Unless the obstacles to tenure come down and women are allowed to reach the career pinnacles in research, their participation won't do science much good. Says Fox: "If we're not going to disassemble the barriers, and if we're not going to help assure the sustained participation and performance of women in science, then you really have to question whether increasing these numbers of women in doctoral education is going to make any difference for the enterprise of science." ♀

Creative Solutions: Foundations Lend a Hand

Applied mathematician Anna Nagurney of the University of Massachusetts at Amherst is a Renaissance woman who holds degrees in applied math and Russian studies. She is also an expert in computers, which she uses to model complex business, transportation, and engineering problems. It's no surprise, then, that Nagurney won tenure in a record 4 years and was recently promoted to full professor. Even a rising female star like Nagurney, however, is grateful for the boost she got from two National Science Foundation (NSF) fellowships designed to help women advance their careers: the Visiting Professorships for Women and the Faculty Awards for Women. She calls the awards a "phenomenal" help. After getting them, she says, she could hire her own graduate students and get access to "computers that the males were dominating" without having to "bow down to the academic hierarchy." Programs aimed at keeping women on the track to tenure are a godsend in Nagurney's opinion, because although "there's a lot of pressure to hire female faculty…schools aren't very good at developing these resources once they get them."

The NSF fellowships are two of a handful of new programs that are trying to help women get over the tenure hump and help them gain "visibility" outside their own departments, says Margrete S. Klein of the NSF—visibility that women, sometimes isolated in their fields, have trouble obtaining. The Visiting Professorships for Women, begun in 1982, annually give 25 women funding to spend a year at a major university other than their own pursuing research. The Faculty Awards for Women free recipients from some teaching responsibilities, giving them more time to pursue research—with the help of $50,000 a year for 5 years. Little wonder that the program attracted more than 600 applications for 100 slots last year.

These NSF programs have been supplemented by private initiatives. One approach is to fund named professorships that give junior faculty prestige and the confidence to persist in academia—along with a healthy dose of funding. When Clare Booth Luce died in 1987, she left funds to provide support for women in tenure-track positions. So far, 30 women at 22 institutions have been awarded a total of $18 million as Clare Booth Luce professors. The awards range from $200,000 to $500,000 for 5 years, depending on the position and salary of the applicant.

Not everything is coming from the foundations: Women scientists themselves are banding together to give each other grass-roots support. At the Massachusetts Institute of Technology, an informal collaboration among female faculty, dating back to 1972, has helped many of the 50 or so women who have won tenure at MIT (out of a faculty of 936). The MIT women's network is now preparing a proposal aimed at setting up a special mentoring program for junior faculty women.

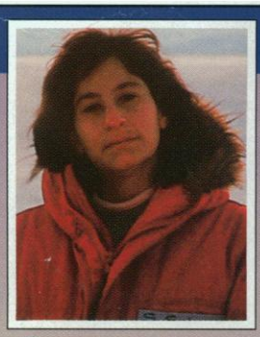
U. OF MASSACHUSETTS

Renaissance woman. Anna Nagurney.

These programs will succeed, say experts on the subject, only if individual institutions help them. "There is absolutely no substitute for commitment on the part of the university administration to equal opportunity," says MIT associate provost Sheila Widnall. "You have to have that at every stage in the process… in the search process, in hiring, promotion, mentoring, and in seed money for setting up labs." How well the universities heed this message will be crucial for the next generation of female scientists. **A.G.**

With reporting by Constance Holden.

Speaking Out



Susan Solomon

Solomon is an atmospheric chemist at the National Oceanic and Atmospheric Administration in Boulder, Colorado. In 1986, she was the first to propose a mechanism for how chlorofluorocarbons (CFCs) could cause a hole in the ozone layer—a theory she confirmed a year later with experiments in Antarctica. Her discovery led to international bans on the use of CFCs and numerous awards, including the Department of Commerce's gold medal for "impeccable science in the cause of humankind." In Antarctica, where Solomon led a team of 18 men, she got two distinctly different impressions of how men view women in science.

"We were flown down to the Antarctic on Navy aircraft, and our pilot came swaggering in in his flight suit. He looked at us and said, 'Who's in charge here?' And I said, 'I am.' He was taken aback for a second, but then he said, 'Good for you.' And more often than not, I've found men to be like that pilot—they actually enjoy the difference of working with women, or they just frankly like women."

"In Antarctica, we were the first new people that the over-winter team had seen in about 6 months. I was assigned a dorm room, which didn't have curtains, so I tacked up some cardboard and began to get undressed when I heard this squeak in the snow right outside my window. And sure enough, there was a Peeping Tom—welcoming me to Antarctica. So there I was in my bra and long underwear thinking, 'I bet this didn't happen to anybody else in my group.' **V.M.**

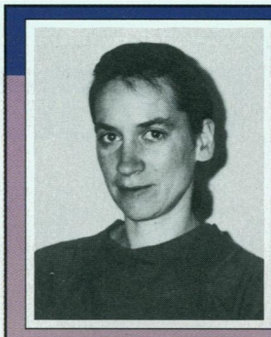
WILLIAM KEYSER

Speaking Out

Anna K. Behrensmeyer

When Behrensmeyer, now a research curator of paleobiology at the Smithsonian, entered Harvard's graduate program in geology in 1967, one of her professors gave her the benefit of his opinion that "women only come to Harvard to catch a Harvard man." She was discouraged from doing field work for her thesis; analyzing samples in the laboratory, one professor said, was more appropriate for a woman. Behrensmeyer's thesis advisor disagreed, however, and he helped her pursue her research in Kenya's Lake Turkana Basin as a member of Richard Leakey's expeditions. There she rediscovered the field of taphonomy: the investigation of how natural forces affect abandoned materials, such as archeological sites or skeletons. Today, she is largely credited with leading a renaissance of taphonomic studies and has been called "the mother of taphonomy."

"Early on, I wrote many papers with another woman, Susan Kidwell, and so there were certainly snide remarks about how taphonomy was only being done by women. But I never let that bother me. In fact, throughout my career—aside from some people at Harvard—I haven't really been aware of negative feelings about women. Partly, that's because of luck, but it's also because I was armed with the right attitude. When I was a child, my mother and aunts instilled in me a sense of my own worth and because of that there was very little that could have shaken my confidence. **V.M.**"



Speaking Out

Leigh Handy Royden

As a Harvard undergraduate, Royden's talent for rowing temporarily sidetracked her scientific career. But torn ligaments ended her hopes for an Olympic medal, and, with time on her hands, she accepted an earlier invitation to do research in geophysics and oceanography at the Woods Hole Oceanographic Institution. Later, after joining a geology camp run by MIT in California's Mojave Desert, Royden dropped oceanography to pursue geophysics full time. In the Mojave she met her husband, Clark Burchfiel, who was running the camp. Royden is now an associate professor at MIT, where Burchfiel is a full professor—a relationship that has led some colleagues to asssume she got there because of him.

"In 1990, I was awarded the Donath Medal for scientists under 35 by the Geological Society. Yet despite this, I'm sure a few people continue to say that I've gotten where I am because I'm married to Clark. And I've often wondered why it's never discussed the other way around—'Well, Clark's done so well because he's married to Leigh.'"

"One of the things that helped me in science was my athletic career. It teaches you to compete physically and also psychologically—in the face of outside pressures, you have to perform. When giving talks and debating, you also need this kind of calm self-confidence, but while many men get this training, very few women do. We suffer by being unused to competition. **V.M.**"

Science would very much like to know your response to the special section on

Women in Science

Name:_____

Title:_____

Institution:_____

Telephone # (optional):_____

Field of scientific specialization: _____

Years in the field:_____

On a scale of 1 to 5, with 1 being the most valuable and 5 being least valuable, which elements of "Women in Science" did you find most valuable? (Please circle one for each)

Profile of a Field: Neuroscience	1	2	3	4	5	Did Not Read
Profile of a Field: Chemistry	1	2	3	4	5	Did Not Read
Profile of a Field: Mathematics	1	2	3	4	5	Did Not Read
Key Issue: Mentoring	1	2	3	4	5	Did Not Read
Key Issue: Tenure	1	2	3	4	5	Did Not Read
Key Issue: The Two-Career Science Marriage	1	2	3	4	5	Did Not Read
Speaking Out	1	2	3	4	5	Did Not Read

Do you think "Women in Science" should be an annual feature of *Science*? (Y) (N)

What subjects should be covered in future "Women in Science" sections? _____

How important have issues related to gender been in your scientific career? _____

What formal or informal organizations for women have been helpful to you? _____

What experiences have you had that are relevant to women in science? (attach other sheets if necessary) _____

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(All responses will be kept confidential, with the possible exception of being included—without names—in surveys presented to the Board of the AAAS or to advertisers.)