GERMANY

The Backbreaking Work of Scientist-Homemakers

Germany's attitude toward women and careers, says cell biologist Mary Osborn of the Max Planck Institute for Biophysical Chemistry in Göttingen, can be summed up in the three words of an old German slogan: Kinder, Küche, Kirche (children, kitchen, church). The idea that a woman has a right to a life outside of the home and family is still a radical proposition in Europe's economic powerhouse, and German society turns a disapproving eye on women who try to make such a life for themselves. "We are told all along that if you put children into day care, they will suffer," says developmental biologist Claudia Stürmer of the University of Konstanz. "You get it on TV. You get it everywhere."

This disdain for day care, combined with stores that are open only during the working day (making it all but impossible for working women to shop) and schools that have only morning hours, makes Germany a particularly hostile environment for families in which both parents work. Add to this an entrenched network of established male scientists who tend to hire other men, and it's small wonder that Germany's record for getting women into senior research positions is one of the world's worst. The figure from the former West Germany for female senior faculty in the five main science disciplines—biology, physics, chemistry, math, and the geosciences—is a mere 2% (see table next page); that's even lower than the United States, hardly an egalitarian success story, where women make up about 5% of associate and full professors in the natural sciences, according to a survey by the institutional research program at Oklahoma State University. And while the situation for women scientists was better in the former East Germany, that has all changed since unification (see story, p. 1477).

In the elite Max Planck Society (MPS), an independent, but largely government-funded agency that runs

Researchers are being pushed out of the lab and into the kitchen

Fighting for Day Care at the Lab

The Max Planck Institute for Developmental Biology in Tübingen has long had a prominent place on the scientific map of Germany—largely thanks to the work of the country's best-known woman scientist, Christiane Nüsslein-Volhard, who created a multitude of *Drosophila* mutants that have revolutionized developmental genetics. But today, there's a second reason why the institute is on the map: It boasts one of the few successful examples of lab-based child care in all of western Germany.

MANFRED GROHE

Success story. Geneticist Maria Leptin *(right)* and neurobiologist Sigrun Korsching campaigned for a day-care center at their lab—and won.

The story behind this second claim to fame dates back to 1991, when developmental geneticist Maria Leptin's plan to combine science and motherhood went awry. In September of that year, she gave birth to her first child. For the first few months, she took the baby in to work with her and let him sleep in her office. But by the end of the year, her baby was becoming more demanding, so Leptin hired a sitter—but the woman pulled out of the arrangement at the last minute. Leptin, fuming, teamed up with neurobiologist Sigrun Korsching—another mother desperate to stay at the bench—to launch a day-care facility at the institute.

The idea wasn't new: A group of graduate students and postdocs had tried to set one up the previous year, but gave up after the Max Planck Society (MPS) said it couldn't legally use its income from the government to pay for child care. Leptin and Korsching, however, weren't as easily brushed off. They secured the backing of Nüsslein-Volhard (who donated money from one of her scientific prizes) and other senior scientists at the institute. And after an intense lobbying effort, the two women got the MPS to provide an $8,600 interest-free loan from its private income; they also won a $17,250-a-year grant from the Tübingen city council.

This funding in place, the day-care center opened in spring 1992, offering places for up to 12 children. But with costs—mostly salaries for professional childminders—running at nearly $60,000 a year, that left no money to employ any administrative staff. So Leptin and Korsching had to take on most of the administrative burden themselves—a job that early on took many hours each week. "You have to be prepared to put that work in and take the risk of it failing," says Leptin. And she did, in spite of a geographically complicated life: Her husband, immunologist Jonathan Howard, works at the U.K. Agricultural and Food Research Council's Babraham Institute, near Cambridge, which means Leptin, Howard, and their two children are commuters between Germany and Britain.

The risk has paid off. The day-care center is now an established feature of life at the Tübingen institute. And things are getting a little easier: The MPS has set aside some $25,000 for Tübingen's child-care operations over the next 3 years, which means that the day-care center's immediate future is secure. Indeed, the MPS has also decided to allocate about $230,000 over that same period to subsidize lab-based child care at its other institutes. MPS officials argue that there has been no sudden change of heart: It just took time to win formal approval to spend some of the society's scarce private resources on child care. But Leptin's and Korsching's success added to the momentum.

–P.A.

more than 50 research institutes throughout Germany, the statistics present an even more dismal picture: Among more than 200 researchers holding the position of Max Planck director—a grade roughly equivalent to a university professor, but carrying with it generous funding to run a research group—there are only two women. And seeing these skimpy prospects for advancement, junior researchers are leaving their fields in droves (see graph below). One of few women at the top, Lasker prize-winning developmental geneticist Christiane Nüsslein-Volhard of the Max Planck Institute for Developmental Biology in Tübingen, puts it mildly when she says the country as a whole needs to provide "much more encouragement to women to really dare to be a scientist."

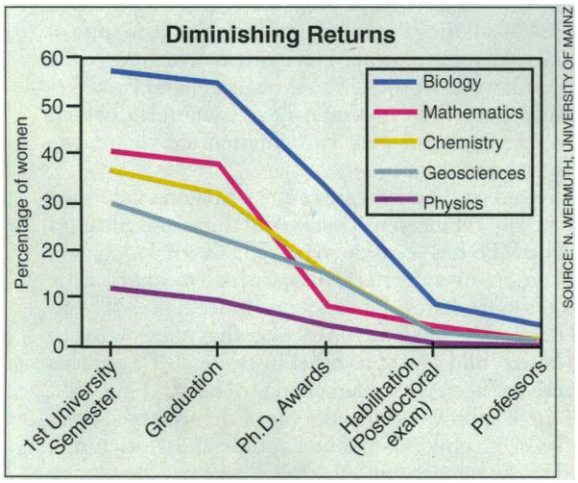
MANFRED GROHE

Discouraging words. Her country is a hard place for women scientists, says geneticist Christiane Nüsslein-Volhard.

Added to the social pressures and practical difficulties, say German women, is a degree of discrimination by senior male scientists

The double bind. Of more than 20 female researchers interviewed for this article, most agreed that the chief problem for women in science in Germany is the societal pressure on mothers to devote their time to caring for their children. This intense pressure is compounded because the male-dominated academic establishment is reluctant to make allowances for women with young children, making it difficult for them to keep up with the 12-hour days and weekend work that are the norm in many German labs. This puts women in a double bind, damned by society if they don't devote the majority of their time to their families, and penalized if they do—because their resumes aren't as extensive as those of male colleagues.

The consequences can be very disturbing: Elisabeth Pollerberg, a neurobiologist at the Tübingen developmental biology institute, says she knows of roughly a dozen young women scientists who had abortions because they thought that having a baby would end their careers. "They really couldn't see how they could make it work," she says.



SOURCE: N. WERMUTH, UNIVERSITY OF MAINZ

Dropping out. The percentage of German women scientists drops as career stages advance.

The educational system adds to these problems. German students complete their education at a comparatively leisurely pace—taking a year longer than most Europeans to finish high school and typically completing their Ph.D.s only after the age of 30. So if women have children in their thirties, and take time off to raise them, they have precious little time left to establish an independent scientific reputation. As a result, many of Germany's most prominent women scientists, such as Nüsslein-Volhard, have not had children.

This problem is seriously exacerbated by the German distrust of day care, which has led to a dire shortage of child-care facilities. Elsewhere in Europe, such facilities are expensive, but at least they are available, says Nüsslein-Volhard: "Here, you can't even get it if you can pay." The few women who have managed to combine a successful scientific career with motherhood say they relied heavily on support from family members. University of Bonn high-energy physicist Gisela Anton, for instance, took only a few months off when her children were young. But she says this was possible only because her parents lent her a hand. "It would help if universities had [day care]," says Anton. Yet only a very few research centers have such facilities, and only where individual women scientists have invested huge amounts of time and energy to set them up (see story, p. 1475).

Added to the social pressures and practical difficulties, say German women scientists, is a degree of discrimination against women by senior male scientists. This bias can be subtle, and hence difficult to resist. As an example, 1992 budget cuts at the Deutsche Forschungsgemeinshaft (DFG), Germany's main research council, forced Konstanz's Stürmer to shed one of her lab staff. Male colleagues' labs, she says, escaped downsizing: "To me, it was pretty clear that there is something like an old boy network," which operated to preserve the men's labs. That belief is echoed by physical chemist Sigrid Pyerimhoff of the University of Bonn, the only woman among the DFG's six vice presidents. "There are a few influential hardliners who can prevent a woman from getting up in the world," she says.

In the MPS, the system of appointing new directors is inherently susceptible to bias, say women who have seen it in action at close quarters. MPS directors are appointed not through open application, but under a system in which the other directors at the institute with a vacancy suggest suitable candidates to the MPS. Unsurprisingly, male MPS directors almost always suggest other men, says Göttingen's Osborn, who nonetheless takes the charitable view that this bias is largely unconscious: "I wouldn't really say it's open prejudice. It's just a situation of not thinking about the issue."

Stopping the female exodus. Under these conditions, many young scientists are deciding the struggle to combine family and a research career isn't worth the effort. Take Katje Paschke, a neurobiologist who 3 years ago left a postdoc position at the University of Konstanz to become a full-time mother. "It's very sad," she says. "You learn such a lot...but it all goes to waste." She's now thinking about retraining in environmental biology, where it may be possible to get a nonacademic job that won't demand such long hours.

The hemorrhage of women scientists from many disciplines is particularly severe during their doctoral

programs and after the Ph.D., and senior researchers like Nüsslein-Volhard and DFG vice president Pyerimhoff say that any effort to stem the flow must start with a concerted mentoring effort to encourage women in these programs, as well as doctoral recipients, to keep going. So far, there's no plan in place to promote such mentoring. But there are some signs that the scientific establishment is slowly accepting the fact that something must be done.

The MPS, for instance, has, after years of denial, acknowledged that a problem exists within its ranks. Last year, the MPS scientific council agreed to alter the agency's procedure for selecting directors. In the future, before sending a short list of candidates to the MPS, each institute with a vacant post will have to contact up to three dozen non-MPS scientists and ask them to suggest candidates—female candidates in particular. Moreover, MPS president Hans Zacher says there are moves under way to appoint three more women directors.

Meanwhile, the DFG has begun to recognize that special arrangements must be made for female scientists who are raising children. Since 1991, the research council has run a program for researchers working toward the habilitation (a post-Ph.D. qualification usually required of applicants for tenured university posts) that awards part-time fellowships for applicants with young children. Most important, the fellowships include a childcare allowance of up to DM500 (about $290) a month.

These features are encouraging more women to apply: Under the DFG's previous habilitation program, which included no special arrangements for working parents, only about 20% of applicants were female. But women accounted for about 30% of the more than 500 awards made under the new program in 1991 and 1992.

Easing the way back in. In the most wide-ranging development, the German federal government in 1991 launched the HSPII program, a wide-ranging effort to tune up the German higher education system, including an earmark of more than DM700 million (about $400 million) over the next decade to promote the participation of women. Aside from awarding fellowships with child-care allowances, the program includes specific grants for women scientists interrupting their careers—including "contact stipends" to pay for journals and conference fees, and "re-entry stipends" to lure women back into the lab. The program is being implemented by a range of federal agencies and the governments of the individual German states, or Länder, and overall it's a very important initiative, say German women scientists. Many caution, however, that careful monitoring is needed to check that the program is meeting its goal of increasing the ratio of women at each tier of the system so that it matches the current proportion at the next level down.

One other positive development is the appointment of women science ministers in several states. Under Germany's federal constitution, science ministers in individual Länder have considerable influence, because they are responsible for overseeing university-based research and have the final say in faculty appointments. In one such state, North Rhine-Westphalia, the Social Democrat politician Anke Brunn has served as science minister since 1985. In 1991, Brunn launched the Lise Meitner program, which awards 15 to 20 fellowships each year to young women scientists working toward the habilitation. Her goal is to create a crop of qualified female candidates to fill future vacant professorships.

Progress has not been uniform, however. In some Länder during the 1980s, science ministers sought to redress the academic gender imbalance by appointing female candidates from short lists put forward by faculty committees, even though men on the lists had clearly been ranked higher. That prompted a backlash from

Post-Unification Blues

Until 1990, for German women in science the grass was greener on the east side of the fence. In the eastern part of the then-divided country, more than 40% of academic staff were female—far higher than the proportion in the west. For all its faults, East Germany's communist government regarded women as an important part of the labor force and, unlike its western counterpart, instituted a comprehensive state-run child-care system that allowed motherhood and a career to go easily hand in hand.

Since unification, however, life has become much tougher for women scientists in the east. Over the past 3 years, the entire eastern German academic system has been restructured—a process that has eliminated hundreds of jobs, and required many scientists to compete against all comers to retain their posts. There's little hard evidence that women have been fired in greater proportion to men, says sociologist Marianne Kriszio, the women's representative (charged with encouraging gender parity in the faculty) at East Berlin's Humboldt University. But, she continues, this cut-throat competition has seen large numbers of easterners—male and female—replaced by younger scientists moving in from the west. Most of the newcomers are male, resulting in a sharp cut in the number of women researchers in the east.

Take the Max Delbruck Center for Molecular Medicine (MDC) in Berlin: Set up on the site of three former biomedical institutes of the East German Academy of Sciences, the MDC employs less than one-third as many scientists as did its troika of predecessors. Whereas seven out of 35 department heads in one of the old institutes were female, says MDC tumor biologist Iduna Fichtner, only two of the new 35 MDC research groups are headed by women.

GERMAN CANCER RESEARCH CENTER

United they fall. Reunification has taken a toll on east German women, says biologist Iduna Fichtner.

Even for those eastern German women scientists who still have their jobs, life today is more difficult than it used to be, especially for those with children. Prior to unification, a working day that ran from 7:00 A.M. to 4:00 P.M. and a minimum of paperwork left evenings free for the family. But western-style hours run from 9:00 A.M. to 5:30 P.M. and often later. Combined with copious form-filling and frequent meetings, it places a heavy burden on female lab chiefs.

Another disturbing trend is the gradual erosion of the former East Germany's excellent child-care facilities. Before unification, "I had no real organizational problems to have a professional career and to take care of my family," says the MDC's Fichtner. She's not personally affected by the change in child-care arrangements, because her children are grown, but younger colleagues, she says, are struggling to juggle the twin demands of career and family. Child care is still generally available and affordable, but its cost is rising all the time. The future also looks bleak, because, since unification, the birth rate in the east has dropped by more than 50%, as women worry about their ability to compete in an increasingly tough labor market. A few years from now, that's likely to mean many day-care centers will close.

–P.A.

many faculty committees, which refused to suggest any women candidates. Naturally, women quickly became frustrated, and "we stopped applying," recalls immunologist Margot Zöller of the German Cancer Research Center in Heidelberg.

The existence of this kind of backlash means the climate for women scientists in Germany is not about to improve overnight. "Things are changing, but very, very slowly," says statistician Nanny Wermuth of the University of Mainz. Indeed, many women scientists believe German labs will become a genuinely friendly environment for female researchers only when the current older generation of ultra-conservative professors, who subscribe to the "Kinder, Küche, Kirche" philosophy, are replaced by men who know professional women, and their needs, close-up. Says virologist Karin Mölling, who last year left Germany for the University of Zurich after 25 years in the MPS: "I wish every man a successful daughter."

–Peter Aldhous

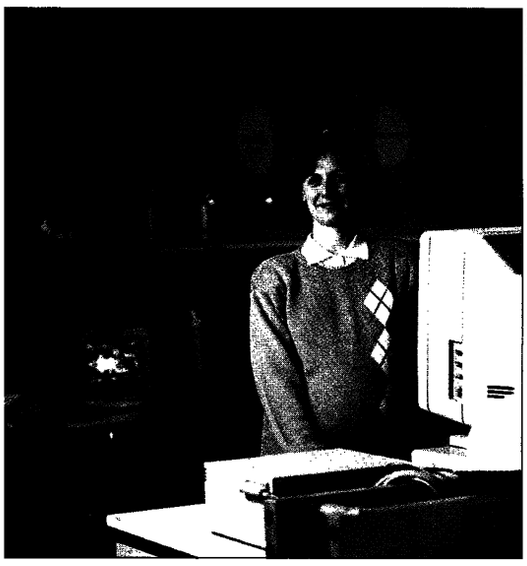
ITALY

Warm Climate for Women on the Mediterranean

Italian women in physics say they find little discrimination in their field

When English particle physicist Cherrill Spencer moved to the Italian National Lab at Frascati, on the outskirts of Rome, in 1972, to work on an electron-positron storage ring experiment, she says she had two unexpected experiences—one negative, one positive. The first was constant, unwanted attention on the streets of Rome. "I have light brown hair but there I was considered a blonde," she says. "I don't consider myself particularly attractive, but I couldn't walk three feet without men pestering me and asking me for my phone number." The second experience was more appealing: For the first time in her career, Spencer found herself working with other women physicists. And, to make it easier for female researchers with children, the lab had a free on-site child-care center. "It's a great anomaly," she says of the position of female scientists in Italy.

That was 22 years ago, but the anomaly still exists. Although Italy may not be known as a bastion of feminist ideals, growing numbers of women are finding a place in the traditionally male-dominated world of physics. Statistics collected by Jim Megaw of Canada's York University and published in a report by the U.S. National Research Council show that of a sample of 572 physics professors in Italy, 23% are women, compared with 3% in the United States. The same study revealed that Italian women hold 29% of physics bachelor's degrees and 21% of doctorates—compared with 15% and 9%, respectively, in the United States.



SAM OGDEN

No way out. Nuclear physicist Francesca Bombarda says Italian girls benefit from being required to take math and science courses.

Interviews with more than a dozen female physical scientists who have worked in Italy reveal women there feel that, in spite of the street harassment, they are treated as equals in the arena of physics. Indeed, many who have worked in both places say the climate for women in physics is better in Italy than it is in the United States. "As a physicist you don't experience discrimination from direct colleagues," says nuclear physicist Francesca Bombarda, who is pursuing a career in fusion research at one of the major Italian national labs run by ENEA (the Agency for New Technologies, Energy, and the Environment). And—ironically, in view of the climate on the streets—she adds that within the scientific community "problems like sexual harassment are almost unheard of."

High-energy physicist Alessandra Ciocio, now at the Lawrence Berkeley Laboratory, says that after working in both countries, she finds that Americans pay more lip service to equality for women than Italians do, yet American women physicists have to fight harder to get the credit they deserve. "It's true that men [in Italy] will never let you pay for a meal and they will always open the door for you," she says. "But this kind of behavior doesn't affect your life [as a scientist] there." "In the United States I have to shout to get anyone to listen to me, and then I get accused of sounding hysterical," she says. "I'm much less offended by men opening the door for me than I am by having to struggle to get noticed."

How is it that Italian society can seem sexist on the surface yet be welcoming to women in the generally male domain of physics? Tradition is one factor cited by several of the women interviewed by *Science*—and this is borne out by a key historical work on the subject, *Woman in Science*, by a Notre Dame chemistry professor (and Catholic priest), H.J. Mozans, published in 1913. Italy, says Mozans, boasts a history of female intellectual achievers dating back to the middle ages. Women were allowed to attend the first Italian universities from their inception during the Renaissance.

From those universities emerged a handful of acclaimed female academics, including a prodigy and mother of 12 children named Laura Bassi, who in the mid-1700s was awarded a chair of physics at the University of Bologna, as well as a place in the prestigious Academy of Science at Bologna. While women in other European countries had to retreat to convents to pursue advanced studies, says Mozans, "the women of Italy were taking an active part in the great intellectual movement inaugurated by the revival of learning...in art, literature, and science."

Many of today's Italian women physicists say they think this tradition has helped to provide a welcoming environment for their careers. "In Italy, there are role models," says Ida Peruzzi, a particle physicist trained in the 1950s in Italy. At the time she was trained, she says, women were a smaller minority, but, "there was a tradition [of women in physics] so I knew that it was something I could try for." Peruzzi went on to work on accelerator projects in the United States and Italy, and she says she was viewed as much less of an oddity by her