LEFT OUT OF THE LAB

Germany is tackling the lack of women in its scientific institutions.

DPA/ALAMY

Heike Kielstein teaches students the structure of the heart at the Martin Luther University of Halle-Wittenberg.

BY DENISE HRUBY

Half-way through her interview, molecular cell biologist Anne Wuttke retired to a vacant room. Her five-month-old son Tobias was hungry, so the early-career scientist turned her back to the glass wall to breastfeed him. Her interviewers — scientists from the Max Planck Institute of Molecular Cell Biology and Genetics in Dresden, Germany, where she was applying for a postdoctoral researcher position — had to wait. "It was my second child, so I was more relaxed about taking control of the situation and doing it in front of them," she says.

It hadn't been easy to travel from her PhD laboratory at Uppsala University in Sweden to Dresden with a five-month-old baby, but Wuttke says it was the right thing to do. "In a way, it was a test for my future employer. I was saying: 'I can handle the challenge of balancing work and motherhood, but how about you?'"

Wuttke, now 34 and a mother of three, was offered a postdoctoral fellowship at the institute in July 2014. Her lab is close to a day-care centre for her two- and five-year-old children, and an infant school for her eight-year-old. Her family's home is a few minutes' cycle ride away.

Four years later, job candidates and employees are able to use a family room for breastfeeding and childcare at the institute, thanks to Wuttke. In 2018, she received a For Women in Science award, one of three given to outstanding German woman scientists with children each year by L'Oreál Germany, the German commission for the United Nations Educational, Scientific and Cultural Organization and the Christiane Nüsslein-Volhard Foundation. The €20,000 (US$23,000) prize money, half of which is earmarked for projects that will help mothers with young children in the workplace, helped to pay for an expansion of the family room. Set up in 2006, the prize is the result of the country's drive to achieve gender equality in science, and was inspired by annual international awards for women in science of the same name.

STUCK IN THE PAST

Despite being among the world's most developed countries — Germany has the European Union (EU)'s largest economy and the world's fourth-largest by gross domestic product — the nation performs poorly when it comes to giving women equal opportunity in sciences (see 'Lagging behind').

In non-academic research facilities, 35.4% of scientific staff were women in 2015 — the second-lowest figure in the EU (only France had a lower ratio of women, at 35%). The German Research Foundation (DFG), which spent €3.2 billion on grant funding in 2017, has also pointed to low representation. The share of women in individual applications for third-party funding to the DFG was 16% in natural sciences; for engineering, it was 10% (see 'Gender and funding').

In Germany, one reason for the under-representation of women in scientific leadership positions is that the gender roles remain deeply traditional, says Jutta Dalhoff, a

historian who has focused on gender discrimination her entire career, and has been leading the Center of Excellence Women and Science at the GESIS Leibniz Institute for the Social Sciences in Cologne, Germany, since 2006. "The idea of women as mothers who stay at home to take care of children is deeply ingrained in German society," she says.

In many ways, she says, the picture of today's German woman is still defined by the clear gender roles of past generations, including those of the National Socialists, who demanded women focus on family, children and the household. But Dalhoff stresses gender bias among decision makers is still pivotal to how German women are treated.

When East Germany fell under Communist rule, during which equal opportunity for men and women was emphasized, women started to enter careers that were traditionally the reserve of men. Although few made it into leadership positions, one of the era's most prominent women is Angela Merkel, Germany's chancellor, who grew up in East Germany and earned a PhD in quantum chemistry (see 'Leading the way').

Germany's federal constitution guarantees women equal rights and gives the state a responsibility to foster equality and remove hurdles related to gender. And yet a spokesperson for the Federal Ministry for Education and Research (BMBF) told *Nature* that: "Scientific examinations found structural barriers in this field which have had a negative effect on the careers of women in sciences." According to many female scientists, these hurdles can range from a lack of childcare facilities to straight up sexism and discrimination by superiors who favour men.

FIXING THE PROBLEM

To fix this, the government and private organizations have launched a wide range of initiatives to foster women's talent and try to put them on an equal footing with men, targeting all age ranges from schoolgirls up to female university professors. For example, '*Komm, mach MINT*' is a nationwide network of women in science, technology, engineering and mathematics (STEM) that works to raise awareness of scientific careers and encourage schoolgirls to choose a STEM field. Prizes and stipends such as the Women Techmakers Scholars Program from technology giant Google encourage women to become role models in computer sciences. Female students are eligible for grants such as the Henry Ford grant for women who study engineering. And during the nationwide 'Girls' Day', STEM companies, research facilities and universities give schoolgirls a chance to learn about STEM careers. Since 2016, publicly traded companies in Germany have been required to meet a quota of 30% women in their board of directors.

Anatomist Heike Kielstein, who researches obesity and natural killer cells (a type of immune cell) at the University Hospital in Halle (Saale), says that she's seen first-hand how little flexibility there is when it comes to, for example, letting young mothers mark papers from home. Kielstein herself has two teenage sons and two teenage stepsons. "If I feel a scientist is being discriminated against because she's a woman, I will speak up," she says.

"THE GENDER ROLES REMAIN DEEPLY TRADITIONAL."

One solution to tackling structural inequality is to implement the cascade model, also known as the leaky pipeline, under which the ratio of women to men should remain the same as both move up the career ladder. But that is far from being achieved: in 2017, 50.8% of university students but only 24.1% of full-time professors were women.

POSITIVE DISCRIMINATION

The *Professorinnenprogramm* is an initiative that was started by the BMBF to support female professors across all higher-education disciplines, from sciences to the arts. Initiated in 2008, it has provided more than €300 million in funding to universities that pledge to work on improving gender equality. To be eligible, a university has to submit a proposal detailing planned gender-equality initiatives, which range from better childcare facilities to mentoring programmes. If the proposal is accepted, the federal and provincial government will fund the salary of one or more professorships. The condition: women have to be hired for the funded professorship and the freed-up budget has to be used to put the gender-equality initiatives into action.

This programme, the BMBF says, has helped to increase the percentage of female professors across all fields from just 15.2% in 2006 to 23.4% in 2016. Between 2008 and 2018, more than 500 professorships were awarded to women. It's a generous incentive for universities to be proactive about gender equality, a spokesperson from BMBF says. "Furthermore, the project contributes to a change in scientists' and university culture and gender-neutral interactions with one another, free of discrimination."

The third phase of the programme will run from 2018 to 2022 with a budget of €200 million and a maximum of €165,000 in funding per female professorship per year.

Dalhoff, whose group evaluated the last ▸

A €5.4 MILLION INITIATIVE AIMS TO INCREASE THE PROPORTION OF WOMEN IN SENIOR POSITIONS FROM 19% TO 24% BY 2020.

Q&A
LEADING THE WAY

PETER ENDIG/DPA/LSN

In 2011, Beate Schücking became the first female head of Leipzig University in its 600-year history. A total of 967 men preceded her. Born in 1956, Schücking earned her medical degree at the age of 24 and her first professorship at 33, and is a specialist in maternal and child health research and psychosocial medicine. She was re-elected in 2017.

What was the scientific landscape like for women when you started out?

In the 1970s, not as many women were beginning a scientific career in Germany as today. The ratio of female medicine students to men back then was below 30%. The general idea, also dominant in my family, was women can study, but once married, they should exclusively focus on their family.

What have been the biggest changes since then?

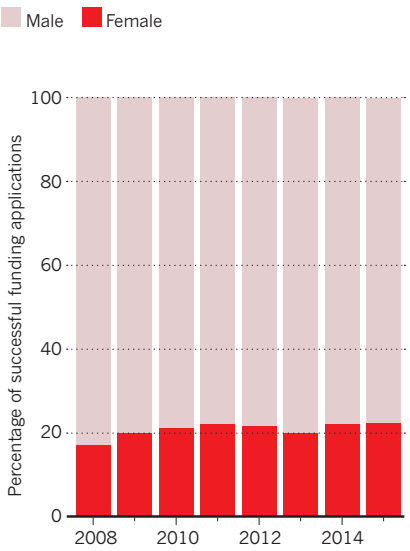
Having a family and a scientific career is seen as compatible. Still, conditions for female scientists are harder than for their male colleagues. Long-lasting, outdated role models don't change that fast. Often, women still have to choose between children and their career, and run the risk of having neither. But now, you also see male scientists who are single parents.

Why does Germany still have one of the lowest ratios of female professors?

We have enough programmes to support women in their careers. It's now time to improve society's appreciation of women in leadership positions.
We have very few women managing Germany's publicly traded companies, and high-ranking, female politicians are likely to trigger more controversy and criticism compared with men. It takes time to change the role models that have dominated Germany for so long. It's a step by step process to change people's mindsets. **D.H.**

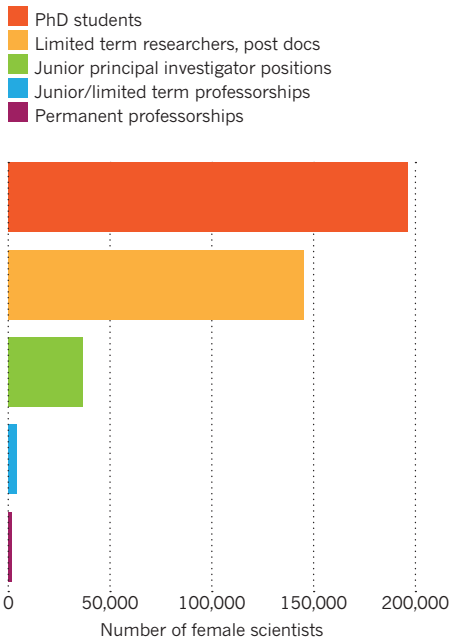
GENDER AND FUNDING

Far fewer women than men apply to the German Research Foundation (DFG) for funding, which is reflected in the low number of overall successful applications. Little has changed in the last decade.



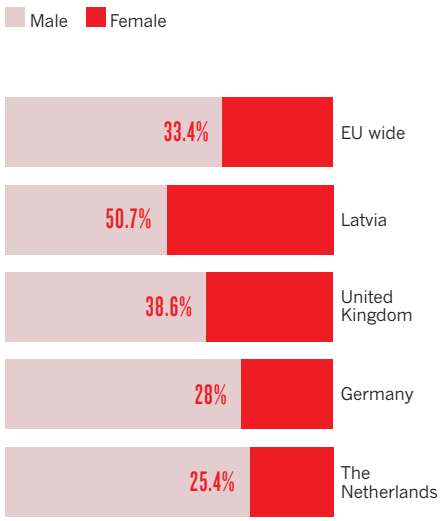
ROAD TO EQUITY

More tenured positions could help woman scientists — who often face a disadvantage if they take maternity leave.



LAGGING BEHIND

A European Union (EU)-wide comparison comparison shows that Germany has relatively few female scientists. Latvia has the largest proportion of women scientists in the EU. The Netherlands has the smallest.



Professorinnenprogramm, points to the disproportionately small size of the initiative in comparison with other support programmes. "It had relatively little impact," she says, pointing out that a few hundred professorships out of tens of thousands isn't a lot. "But it cost a lot of money, so you're not supposed to say this out loud. And without it, we'd be even further back."

The key to eliminating structural inequality, she says, lies in the implementation of binding target quotas, based on the cascade model, in all publicly funded scientific institutions and programmes — with repercussions for those who don't meet their goals.

SEXISM IN SCIENCE

Increasingly, discussion of sexual discrimination, and assault, in the science community has provoked strong reactions. The 2015 firing of British biologist and Nobel-Prize winner Tim Hunt, who had said that female scientists distracted the work of male colleagues and were prone to crying, led to a heated debate in Germany. The influential weekly magazine *Der Spiegel* launched an online survey asking readers whether he should have been removed from his position. About 23,600 people — more than 90% — said no.

The scientists interviewed for this feature also gave examples of discrimination: the male professor who couldn't understand why a colleague preferred seeing her son's first flute concert to attending the annual Christmas party; the water-cooler speculations over whether a PhD student's pregnancy had been an accident because it would hinder her work; the advice given by a female superior to never tell anyone about plans to have a family.

WHY TENURE MATTERS

The scheme that has the potential to have the most impact could be one that isn't tailored towards women at all, say many interviewees (see 'Road to equity'). In 2017, the German government funded the first tenure-track positions, in which scientists are given several-year contracts by a university and, after a positive evaluation at the end of the contract, will be promoted to a professorship.

"NO ONE SHOULD WORK FOR MORE THAN A TOTAL OF 12 YEARS ON LIMITED EMPLOYMENT CONTRACTS — SCIENTISTS HAVE TO GET A FULL TENURE BEFORE THEN."

This system is common in the United States, but historically the path towards a permanent contract in Germany tends to include multiple short-term contracts at different universities in different cities or even countries. In 2017, BMBF research found that 93% of PhD students, assistants, postdoctoral researchers and non-professorial scientific staff were on limited contracts, around half of which lasted for less than a year.

"It's an inhumane system — for females and for males," says Stefanie Gräfe, a theoretical chemist at the University of Jena whose research focuses on ultra-short laser pulses and their effects on atoms and molecules. Short-term contracts have created an incredibly competitive, high-pressure environment, she adds. German labour law stipulates that no one should work for more than a total of 12 years on limited employment contracts, meaning that scientists have to get a full tenure before then — or leave university research. Any career break, such as maternity leave, is seen as a huge setback.

The Max Planck Society is creating tenure-track positions that will lead to a permanent contract, with up to 10 positions that will be open to female scientists only. Such a tenure-track system will increase the compatibility of career and family substantially, says Wuttke. With the updated tenure-track system, Wuttke says she could lead a research group for about five years, and then, after a positive evaluation, her position would be turned into a professorship. "It's a bit early to tell how that will work out, but if it doesn't, I'll have to look around for other options. Options in the private sector," she says.

Under the current system, she would probably have to move her entire family two to three more times before they can settle permanently — if she's lucky enough to get a professorship at all.

"I really want to stay in science. But it has to be compatible with my family," she says. "If science loses me as a scientist, then that's a pity. But for my family to lose me as a mother, that's not an option." ■

Denise Hruby is a writer and editor in Austria.