A grand exit

Five researchers reveal the challenges of retiring to make way for the next generation.

BY MEGAN SCUDELLARI

Hans-Hilger Ropers vividly recalls the moment when he realized that he was running out of time to fulfil his scientific ambitions. It was at a lecture series in 2002, and the first three talks, delivered by distinguished colleagues from Max Planck Institutes (MPIs) across Germany, each began with a variation of, "Ladies and gentlemen, what I'm going to talk about today has kept me busy for 20 years."

Ropers did not have 20 years. He had become director of the MPI Department of Human Molecular Genetics in Berlin when he was 51. He was fast approaching 60, and under German law he would be required to retire in 5 years. Ropers knew that he would not have enough time to complete his work on the genetic underpinnings of early-onset cognitive disorders. He also knew that when he retired, the institute would dissolve his 70-member department, so his employees would be out of jobs.

Ropers is hardly the only person to worry about retirement, which has become a charged issue in the sciences. The proportion of US National Institutes of Health (NIH) grants awarded to people over the age of 65 more than doubled between 1998 and 2014, going from 4.8% of the grant budget to 12%. Out of concern that this greying scientific workforce is limiting the availability of grants and jobs for young scientists, the NIH this year proposed a solution: an 'emeritus' award to encourage senior scientists to wind down their research and hand projects over to junior faculty members. It was met with overwhelming disapproval.

ILLUSTRATION BY THE PROJECT TWINS

Scientists argued that the proposal placed too much focus on age, and risked awarding grants for factors other than the merits of the research. "While I like the idea of transferring knowledge and resources, if you can't do so efficiently inside a typical 40-year career span, then why should you be given longer?" says Paul Brookes, 42, a biologist at the University of Rochester Medical Center in New York. "Nobody can argue that emeritus professors were somehow caught unaware that they'd have to retire some day."

To explore the rules, culture and expectations of retirement, *Nature* contacted academics in the middle of making their exit. The issues faced by older scientists can vary dramatically by country, and there is no right way to retire, says Tania Saba, associate dean of graduate studies at the University of Montreal in Canada, who has studied retirement trends since 1993. "Some want to keep working; others would retire the next morning if they could."

Fighting the clock

After Ropers had swallowed his panic, he crafted a plan. He rushed to obtain a 3-year extension so he could work until he was 68 (a provision now available to most academics in Germany), and later a second, unusual extension to work to 71. But even so, uncertainty about his future affected his department. "All your co-workers realize that this guy is turning 65 in a couple years, so they start to look for alternatives."

Over his final 6 years, Ropers watched his department shrink from 70 people to 25, then to 10. If he had known from age 60 that he would be able to work for 11 more years, Ropers would have sought appropriate grants, and would have been able to retain faculty members and plan his retirement better. "It would have made a world of difference," he says.

Mandatory retirement for public employees used to be the norm across Europe, and despite some changes, it maintains a foothold in countries including Germany, Sweden and Spain. Legal challenges calling the practice discriminatory have mostly been unsuccessful. In 2007, the top European court ruled that European Union (EU) countries can force workers to retire as a way to free up job places and reduce unemployment for younger workers. But there is no empirical evidence that such an approach works. In fact, studies suggest that higher employment for older people is often correlated with higher employment and higher wages for younger workers.

Some people facing mandatory retirement choose to leave the country. That was the reason immunologist Klaus Rajewsky, 78, left the University of Cologne in Germany in 2001 to set up a lab in the United States. "It's not so easy, particularly for experimental scientists to start a new lab at that stage," he says. "So most people retire, or try to get

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some prolongation where they are."

Ropers' department officially closed in November 2014. His last EU grant will expire shortly, and the remaining lab space is now being refurbished for the director of a new department. "After that, I will still have a chair and a room," says Ropers. "That will be it, though." He still plans to publish what he calls the biggest paper of his career, with four years' worth of data on the genetics of mental disabilities. He has also accepted a part-time, paid job as a clinical geneticist at the Institute of Human Genetics at the University of Mainz. Although still concerned about the Max Planck Society's decision to close its only department for human genetics, he says that it is time to move on to other things, including an around-the-world trip with his wife. "The sun is shining," Ropers says. "Life could be worse."

Changing course

Japanese stem-cell biologist Norio Nakatsuji turned 65 this year, and just like in Germany, that means mandatory retirement. As his final grant runs out over the next 2 years, his 2 labs at Kyoto University will close and most of his 16 laboratory members must seek employment elsewhere.

Although he is leaving academia, Nakatsuji has big plans in business. As former director of the Institute for Frontier Medical Sciences at Kyoto University, he has spent a career deriving and distributing stem cells. During that time, he co-founded a biotechnology company, ReproCELL in Yokohama, which made a splashy initial public offering in Japan in 2013. Using US$2 million of his earnings, Nakatsuji founded two stem-cell-related companies: a consulting firm that bridges academia and industry, and a biotech company that is developing drug-testing devices based on heart muscle derived from stem cells. "They were unexpected funds, so I can put my money towards being an entrepreneur," says Nakatsuji. "That would be impossible for an ordinary professor."

His move into business is unusual in Japan. It is much more common for a retired academic to take a position at a private university. But this did not appeal to Nakatsuji. Such jobs, he says, "should be made open to young people".

Japanese government policies have increased the number of PhD graduates by an estimated 6.2% per year since the 1990s. But the number of academic positions available to those graduates has remained stagnant. The pipeline narrows as soon as they graduate: in 2014 the Japan Society for the Promotion of Science, the country's largest scientific funding agency, granted only 362 out of 3,222 applications for postdoctoral fellowships across all fields. Most PhD graduates who do not get fellowships take on short-term jobs at universities or public research institutions.

Making space for young scientists should be a priority in Japan, but it is a great challenge, says Osamu Terasaki, a physicist who worked in academia there for 36 years before taking on a professorship at Stockholm University, a position he retired from in 2010, at age 67. "In Japan, senior investigators keep so much power, and for a long time," says Terasaki. "Young people should take over. It would make the situation more healthy."

Keeping busy

The top task on Uta Frith's post-retirement to-do list is to publish a graphic novel.

Frith, a developmental psychologist, retired from University College London in 2006, at the mandated age of 65. Although she could have fought to get another grant and keep working, she opted instead to leave the lab. "I was so happy that I wouldn't have to apply for any grants ever again." Frith gave up hands-on research but has taken advantage of the time to write up some of her previous work: she has published 33 papers since 2007. Now 73, she calls her retirement the "best years of my life". They are also some of the busiest. She has founded two networks for women in science and technology, called Science&Shopping and UCL Women; she collaborated with the BBC on a television documentary about autism and is working on another about obsessive–compulsive disorder; she chairs the diversity programme of the Royal Society; and she tweets regularly, to more than 15,000 followers. Frith also travels with her husband, psychologist Chris Frith, to Aarhus University in Denmark for a month once a year, to advise students and teach. "I only do things I really feel passionate about. That's the beautiful luxury of retirement," she says.

Frith's current passion is her graphic novel. She and her husband won the French National Centre for Scientific Research's 2014 Jean Nicod Prize for cognitive science and philosophy, and promptly spent the €25,000 (US$28,000) award on paying an editor and artists to help them develop the novel, which is about social cognition: the study of how the human brain processes and uses information about other people. The Friths hope that their book — which they will release in instalments starting as early as this year — will help them to share their research with the public.

"We could never do this if we had to pursue paid work," says Frith. "Retirement is a time you can really have complete liberation from responsibilities and duties, and devote time to things you might otherwise never have done."

Although mandatory retirement was phased out in the United Kingdom in 2011, its effects can still be felt, says Peter Lawrence, 73, a developmental biologist at the University of Cambridge and an outspoken opponent of age discrimination. "Many regard people above retirement age as odd to still be working. You feel as if you're not entitled to work."

A 2010 study from the UK Department for Work and Pensions found that, despite the lack of evidence, employers still believe that productivity declines with old age[1]. Many still hew to the traditional retirement age; the average age of retirement in the United Kingdom today is 64.7 for men and 63.1 for women, although it has been increasing.

Following passions

In the United States, working past traditional retirement age seems to be becoming the rule rather than the exception.

> *"As long as somebody is contributing, why force them to retire?"*

Mandatory retirement was phased out of US law starting in the late 1970s, and was ultimately abolished in 1986, although academic institutions had until 1994 to comply. This has resulted in ample opportunity to observe what happens in the absence of a forceful shove out of the door: people work for longer (see 'Retired yet?').

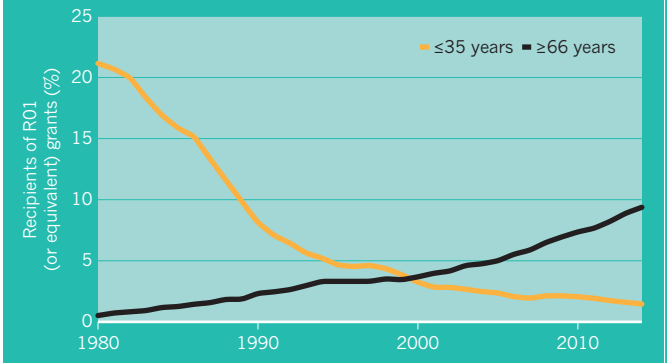
According to the National Science Foundation, the proportion of working scientists and engineers in the United States over the age of 50 has increased from 1 in 5 in 1993 to 1 in 3 in 2010 (ref. 2). "As long as somebody is contributing substantially — teaching, administratively, research-wise — why force them to retire?" asks John Dowling, a neuroscientist at Harvard University in Cambridge, Massachusetts, who will formally retire this June, at the age of 79. Although financial security may play a part, some certainly stay on for the love of science: 54% of employed people aged 65 or over say that they are working because they want to, not because they have to, according to the Pew Research Center[3].

But what if they no longer want to? Physicist Mark Adams voluntarily retired from the University of Illinois at Chicago at the age of 59, to take advantage of state pension rules. He feared that changes to the poorly funded system, which had been attacked by politicians, would leave him worse off. If it had not been for that, he would probably have

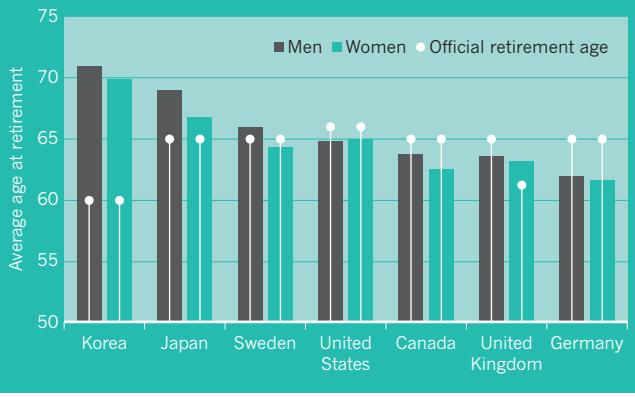
SOURCE: NIH; OECD

Retired yet?

The US National Institutes of Health has witnessed a decline in the proportion of R01 grants going to younger researchers, and a rise in those going to researchers aged 66 or over.



Most countries have an official retirement age of 60–65, and some enforce mandatory retirement for public workers. But the average age at which workers effectively leave the workforce varies dramatically.



worked for another four years, he says.

Adams also knew that his work would not languish when he retired. "I have thousands of colleagues," he says, including international collaborators working on results from the now-decommissioned Tevatron proton–antiproton collider at Fermilab in Batavia, Illinois, and the Large Hadron Collider (LHC) at CERN, Europe's particle-physics lab near Geneva, Switzerland. The field, he says "has almost a corporate structure to keep experiments going".

Two years after his official retirement, Adams still uses his office at the university, where he is completing the analysis of data from one of the particle detectors at the LHC. But he no longer receives a pay cheque, and he recently transferred his last student to a colleague. He plans to ease out entirely soon, to devote himself full-time to QuarkNet, an educational programme that he joined 14 years ago to bring high-energy physics experiments to schools in the Chicago area. "I feel like that's a real volunteer thing I can do with my skill set, something that makes a difference. That's where I want to put my time."

Letting go

Hélène Delisle also wanted to accomplish things outside academia. She had studied international nutrition at the University of Montreal for 29 years. But in January 2014, when she turned 70, she informed her department director that she would be retiring towards the end of the year.

Like the United States, Canada no longer enforces retirement: mandatory retirement was abolished province by province between 1973 and 2009. So Delisle was free to work for as long as she desired, and eventually that desire waned. Her husband had fully retired from medical practice by 2013, and it became apparent that they would have a better lifestyle together if they were both retired, pursuing new endeavours together rather than trying to plan around her career.

Delisle remained fully active right up to her official retirement in September, mainly finishing reports for a six-year nutrition project in West Africa. Since then, she has been transferring the leadership of a World Health Organization Collaborating Centre that she headed to a colleague, has served on several scientific committees, and has joined the editorial board of a nutrition journal. She visits her office at the university weekly to see students who are wrapping up their graduate work, and those regular visits have made the transition smoother. "In a way, retirement is a separation, a severance, because you used to go to work every day and have plenty of activity and hectic business travel," she says. "You've got to let that go, and that can be difficult."

Most of all, Delisle is finally making space for other pursuits, foremost among them social activism, and spending more time with her husband and her piano. Delisle has played in a chamber-music trio for years, and looks forward to devoting more time to concerts.

Although there are few universal lessons to be drawn about how to wind down one's career, most researchers abhor the mandatory system. Delisle and Adams say that it was important to make their own decisions about retirement on the basis of their desire and productivity, and not have the decisions made for them because of their age. "The ideal would be that no one checks how old you are but just looks at what you're doing and what you are able to do," says Ropers. "But that idea hasn't pervaded into public routine."

In fact, pushing senior researchers out may be doing more harm than good. "There is no evidence that shows that early retirement can reduce unemployment, particularly youth employment," says Saba. Most studies show the opposite: an analysis from the nonprofit US National Bureau of Economic Research in Cambridge, Massachusetts, for example, found that paying senior individuals to retire actually increases the unemployment rate for younger workers, because older people remain productive and spur the creation of new jobs[4]. Research suggests that there is not a fixed number of jobs in the economy, so the idea of one-to-one replacement is false. For example, women did not replace men in the workforce in the late twentieth century; on the contrary, two-earner families increased disposable income and prompted job creation. But how this dynamic might differ in academia, which is dominated by tenure and the pressures of limited funding, has not been fully analysed.

Still, most senior scientists interviewed for this article emphasized concern for those in the next generation and felt they should be making room for them. "It's important to give young people the opportunity to do research," says Dowling.

But no matter how or why you go about it, do not think of retirement as an end, says Frith. "Stopping doesn't mean stopping. It means do what you've always wanted to do." ■

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