CAREERS

CONNECTIONS Dispel your doubts and convene your own colloquium **p.431**

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KARLA JESSEN

Retired palaeontologist Michael Wuttke takes lignite samples with a drill stick, near Darmstadt, Germany.

TRANSITIONS

Stick retirement!

Scientists who step back from full-time work can find plenty of ways to remain active in their research field.

BY AMBER DANCE

Louis Chen was technically meant to retire in 2005. The mathematician at the National University of Singapore was turning 65, the university's official retirement age. But he was only five years into his tenure as director of the university's new Institute for Mathematical Sciences, and the university wanted him to stay on. So he remained for seven more years, stepping down in 2012. Over the next 18 months, he travelled and had knee surgery, before returning in summer 2014 to teach graduate courses for a year.

Then, in 2015, Chen's provost took him to lunch. "He told me that maybe it was time for me to leave," says Chen, who was happy to retire. But he still hasn't really left: he's at his university office three or four times a week. "I cannot abandon my research," says Chen. "It's a passion." In July 2015, he was appointed emeritus professor, a title that comes with perks: he's eligible to apply for grants, and continues his research on probability and statistics. He maintains his e-mail address and library access and, he's delighted to say, "free parking for life".

GO YOUR OWN WAY

There are as many ways to retire as there are scientists; there's no right or wrong path. Many researchers wish to continue their academic lives in one way or another. The emeritus title can allow scientists to keep laboratory or office space or apply for grants; associated privileges vary widely. However, research funds probably won't flow as generously as they used to, and emeriti typically downsize their research space and teams. Some retired scientists turn to other projects, such as writing books or doing charity work. The key to a fulfilling retirement, say those who are pleased to have stepped down from full-time work, is to line up positions and projects, and to prepare for the emotional toll that the transition can take.

Worldwide, the ranks of those aged 60 or older are expected to rise. The United Nations, for example, predicts that by 2050, 21% of the world's population will be at least 60 years old, up from 10% in 2000. Among scientists, in particular, the average age is climbing. In the United States, scientists' average age rose from 45 to 48.6 between 1993 and 2010, and it is expected to climb further. The trend is similar in Europe.

National rules on retirement vary widely. In Sweden, for example, it is mandatory at age 67; in South Africa, at 65. The United States and Canada have no mandatory requirement age. Although data on active retirees and emeriti are scarce, a 2014 survey of retired medical professors from 20 countries found that many continued to teach, and that more than 40% had published at least one paper or book in the previous year (N. G. De Santo *et al. QJM* **107**, 405–407; 2014).

Researchers who are nearing retirement should start preparing for it as early as possible, advises Amy Strage, assistant vice-president for faculty development at San Jose State University in California. There could be many options to research and decisions to weigh. For example, at some universities where retirement is a choice, faculty members can take advantage of phased retirement plans. That means they can wind down their research while working part-time, so long as they commit to a date ▶

for full retirement within a few years. Those required to step down from their positions at a certain age might be able to arrange unpaid positions, or jobs in countries with a higher retirement age.

Some retired faculty members gain emeritus status, although the meaning of that title varies widely between institutions and nations. At some universities, it's granted pro forma to retiring full professors. At others, it's an honour bestowed only on pre-eminent researchers. "It is retirement with distinction," says Kimberly Read, assistant director for the Florida Center for Inclusive Communities at the University of South Florida (USF) in Tampa. Read researched retirement and emeritus issues, focusing on the oral history of an emeritus professor, for her 2016 PhD thesis at USF.

Emeritus is the final rung on the academic trajectory from assistant professor to associate to full. Obtaining this ultimate promotion is often much like gaining those earlier ones, with a committee evaluating a person's research or service contributions to the university, and administrators approving a decision to award the honour.

For some, the emeritus title is a final feather in their academic cap as they head through the door. Others take it as a commitment to further engagement with the university. "You want to continue to help the department," explains Dean Martin, an emeritus professor of chemistry at USF and Read's research subject. Every morning, he comes to his office, where he does research and publishes papers, mentors students, edits the departmental newsletter and raises funds for the department.

EDITH SIM

Pharmacologist Edith Sim enjoys her retirement.

Achieving emeritus status gives retiring professors a lasting connection with their university. They might or might not be given their own office, but they will typically have access to resources such as the gym, library and e-mail. They might also be given admittance to emeritus associations, which provide camaraderie (see 'Lasting bonds'). They will not, however, receive a salary.

Access to grant money varies from one country to another, but maintaining emeritus status and a university affiliation is often enough to make a retired researcher eligible, at least to apply. "Since I retired I'm busier than ever, writing papers, travelling to meetings and giving talks," says George Ellis, 79, an emeritus mathematician at the University of Cape Town in South Africa. "The main issue is funding."

For several years, he held on to a small grant of 100,000 rand (about US$7,500) from the South African National Research Foundation. The amount allowed him to attend overseas conferences and invite researchers from other nations to visit and collaborate. But cuts at the foundation have caused the grants to dry up. Now, he plans to attend conferences only if the hosts pay for his trip.

Fortunately for Ellis, his research requires little funding and few resources. "They can't keep one from thinking and reading and writing," he points out. With his emeritus status, he's able to keep an office in his department, and he continues to work with colleagues and students.

Some researchers manage to keep a lab going. Martin has continued to win grants well into his retirement. But he is an outlier in terms of the amount of work he does in his retirement and, at times, this has generated confusion. His grant funds are deposited in a research bank account — but more than once, the university assumed he was inactive and transferred those funds into central accounts. (His dean and department chair restored the money.)

Many retired scientists, however, can't maintain the lab space and funding that they did as active researchers. They might not want to continue competing for grants, and the space might be needed for new faculty members. That doesn't mean that retired researchers can't make academic contributions, says Strage. They might shift from bench science to less-space-intensive activities such as giving speeches, guest teaching or reviewing manuscripts, she explains.

Others find new lab space. Michael Wuttke, a vertebrate palaeontologist, engineered his own post-retirement research position. In 2015, aged 65, he left his job at the General Directorate for Cultural Heritage Rhineland-Palatinate in Mainz, Germany. But he had started seriously considering his next steps a few years earlier. He set up a position as 'designated volunteer' at the Senckenberg Research Institute and Natural History Museum in Frankfurt, and since 2015 he has been working with specimens from fossil sites such as the Messel Pit, a disused quarry near Frankfurt, where he did his PhD research. Wuttke has access to the same resources and scientific equipment that employees have. He expects to publish soon on a previously unknown species of frog, whose fossilized remains were discovered at the site.

TEAM SPIRIT

Scientists can also remain active in research by continuing to correspond with the team they once led. Stem-cell physician Outi Hovatta retired from the Karolinska Institute in Stockholm, at the age of 70. Although Sweden's retirement age is 67, she was able to stay on for three more years as a senior faculty member — provided she funded her own salary from grants. At 70, she was happy to return to her family home in Helsinki.

She passed the research group on to a colleague, but stays active as a professor emerita. Now 72, Hovatta continues to correspond with her Karolinska colleagues. Including her name on grants helps them to obtain funding, and she comments on draft publications.

Edith Sim, 67, a retired pharmacologist and emerita professor of the University of Oxford, UK, and Kingston University London, has also kept up her research without a lab. She's writing papers based on unpublished data that she had collected earlier, and on fresh data from collaborators. She recently published a book, co-authored with a former student, on how certain enzymes affect a person's response to drugs.

Sim is also involved in charitable work. This includes running a Saturday morning programme to give teenagers a taste of what science is like before they commit to studying it further. For example, the teens in her pilot

LASTING BONDS

Keeping in touch

Full-time researchers interact daily with colleagues and students, but retirees risk losing that sense of community. Organizations can help to restore it. Here are a few examples.

- The European Association of Professors Emeriti welcomes retired professors from all European universities, as well as corresponding members from abroad. From 68 founding members in 2016, the organization has grown to nearly 200.
- The US-based Association of Retirement Organizations in Higher Education lists about 100 such communities, often associated with a particular university or other academic organization.
- The Emeritus College of Arizona State University (ASU), in Tempe, welcomes emeriti of ASU and associate members from elsewhere. Member activities include memoir classes and helping students to prepare for an international science competition. **A.D.**

programme at Kingston played with wind tunnels and microscopes and interviewed astronauts. Sim is also a trustee with the Daphne Jackson Trust, a UK charity that helps scientists who have had a career break to return to research.

Of course, scientists don't always find retirement easy. Nancy Schlossberg thought it would be "a piece of cake". In 1997, at the age of 68, and after 24 years as a counselling psychologist at the University of Maryland in College Park, she became an emerita and headed for Sarasota, Florida. There, she hoped she'd find ways to write or get speaking invitations. But it wasn't that simple. "I get to Sarasota, and there I am without a purpose," she recalls. "I was shocked."

Schlossberg had to create her own opportunities. Because her professional expertise was in life transitions, she decided to study retirement. That work led to the first of three books that she has penned on the topic since 'retiring': *Retire Smart, Retire Happy* (American Psychological Association, 2003).

Through her post-retirement research, Schlossberg has worked out why it didn't feel good to be suddenly purposeless in sunny Florida. Those who have retired, she learned, must shape a new identity. "That transition process, even if it's something you wanted, can be very unsettling," says Schlossberg. "But the most important thing tied to your identity is your sense of purpose. That's what gives you the reason to get up in the morning." Of course, that sense of purpose or identity needn't be related to previous professional activities — but Schlossberg's interviews with retired researchers indicate that they need something to define their lives.

"Since I retired I'm busier than ever, writing papers, travelling to meetings and giving talks."

"You do feel, a little bit, that you might be kind of sidelined," says Chen, who has noticed that he receives fewer invitations to present at or to organize talks and conferences. But he's not terribly bothered. "I think you have to accept this," he says.

And in any case, Chen notes, he now has time to lunch with old friends whenever they call, and to rekindle old hobbies: singing, and playing the recorder and cello.

Sim also struggled a little at first. As a full-time scientist, she'd found solace in her garden. Once she retired, gardening no longer offered the same sense of escape. It took time to rediscover the joy of tending the plants. Today, she says, retirement feels good. "Now that I've got used to it," says Sim, "it's a very nice way to live." ■

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GETTY

COLUMN

More than a meeting

Convene a colloquium, says **Francesco Sciortino**.

Organizing a scientific conference can be a daunting prospect. You know that it could offer exceptional career benefits by boosting your network and helping you to develop those famous soft skills: communication, teamwork and time management. But you might think the process involves unacceptable levels of stress, complications to your unpredictable schedule and even more delays to that unfinished project.

Still, you should consider the option. You'll refine skills that are not necessarily innate and that you'll need in any job. Why not hone them in the setting of an enthusiastic student group?

I became involved in student activism during my high-school days in Italy, before I moved to the United Kingdom in 2010 to study physics. As an undergraduate at Imperial College London, I joined student associations to meet like-minded people and to get a taste of a variety of research fields. I set up tours to my department's laboratories and found the gratitude of other students to be extremely rewarding. Through the Imperial College Physics Society, I also co-organized a number of trips, some of which later inspired me to pursue a PhD in plasma physics — none more so than our visits to the Culham Centre for Fusion Energy near Oxford in 2013, 2014 and 2015.

A different chapter began in August 2014, when I and six others joined together to found the Italian Association of Physics Students (AISF). Since then, our group has grown to more than 1,000 members in Italy and has become one of the most active in the International Association of Physics Students (IAPS). We have organized public lectures, lab tours and outreach events, offering simple demonstrations to school groups of all ages and engaging in the International Year of Light celebrations in 2015, which aimed to highlight the importance of light and optical technologies. Since then, the AISF has also set up annual visits to Italy's Gran Sasso National Laboratory in Abruzzo, the European Gravitational Observatory near Pisa and other leading research facilities. The Italian Conference of Physics Students has become our key annual gathering, bringing together more than 100 students from institutions nationwide in a different city each year.

In 2015, one year after we founded the AISF, we submitted a bid to host the 32nd International Conference of Physics Students (ICPS). It sounded a little over-ambitious at first, but we demonstrated that our association could raise the necessary funding and institutional

support. It could hardly have gone better. In August 2017, the ICPS took place in the Italian city of Turin with 450 participants from 44 countries, and included almost 200 talks and posters from university students of all levels. I was part of an outstanding team that helped to exhibit the best of Italian academic research, the wonders of our national cuisine and local artistic treasures. Our programme included trips to the Turin Astrophysical Observatory, Sacra di San Michele Abbey and traditional wine cellars.

Organizing student events shapes how you collaborate with people. I discovered what kind of team player I am. I learnt that balanced group dynamics, rather than individual herculean efforts, best foster motivation, enthusiasm and effectiveness. I've always wanted my impact to exceed my direct reach, and so connecting with others who could carry my efforts forward was essential. Seeing other people independently repeat events that I initiated has been extremely rewarding.

I started out with pragmatism, but little understanding of the art of compromise. That's now been forced into me by countless online meetings, most recently as part of a committee to reform the regulations of the IAPS. The international setting of these efforts also gave me chances to travel, practise languages and gain exposure to fund-raising. I've developed important friendships and boosted the competitiveness of my PhD applications, which in turn brought me to the United States.

Joining student associations, organizing events all over Europe and becoming part of a community of enthusiastic young scientists has helped me to go beyond lecture halls, research labs and supervisor meetings. The skills that I gained have given me the freedom to enjoy much more of my own scientific career. ■

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