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From technician to programme manager: Jenniffer Mabuka-Maroa (right) during a postdoc with her mentor Thumbi Ndung'u.

CAREER PROGRESSION

At the front lines of science

Research technicians have rewarding careers and can use their experience in other roles.

BY CHARLOTTE SCHUBERT

Dunja Ferring-Appel landed a job as a research technician at the European Molecular Biology Laboratory (EMBL) in Heidelberg, Germany, in 2002. She loves the international environment, the constant exchange of ideas, the research puzzles and her work analysing RNA-binding proteins in mice.

In 2011, she was promoted to lab manager, a common next step from a research-technician post. Ferring-Appel's responsibilities expanded to include supervising lab visitors and other tasks, but her main remit is still bench work, such as performing surgery on mice, culturing their cells, operating a fluorescence microscope and analysing gene-expression data. She enjoys the challenge of solving a tough research problem, shifting laboratory tactics until she has a clear result. "Sometimes you have to force yourself to try again and again," she says. "But that is the biggest reward: when you have cracked it."

Research technicians in academia, industry, the non-profit sector and government do much of the daily leg-work of science. Their tasks include analysing soil or rock samples, testing medical devices, helping to design bioreactors and optimizing the shelf life of reagents. Titles vary almost as much as the job descriptions. Examples include 'research technologist', 'research associate', 'research scientist' and 'member of the technical staff'.

Most technicians directly involved in research have a bachelor's or master's degree. For new graduates, such a position is often an entry point into the job market. A technician position can offer a satisfying career as a key member of a laboratory, or can be a stepping stone to a PhD, a medical degree or other job opportunities. There is no single career track, and technicians' job experiences and future career trajectories vary widely.

RISING THROUGH THE RANKS

Ferring-Appel has a strong partnership with the principal investigator (PI) of the lab, and appreciates the scientific challenges and stability of her job. She has watched graduate students and postdocs scramble for funding and uproot themselves to chase the next opportunity. "I am happy to not have this burden," she says. Instead, she has risen steadily through the staff ranks, advancing several pay grades to lab manager.

Both core facilities and individual research labs offer advancement opportunities ▶

for technicians. Xiang Miao is director of a cytometry facility in the Shanghai Institute for Biological Sciences at the Chinese Academy of Sciences. He previously worked as a technician at the facility — running the machinery to analyse cells and helping graduate students to design experiments — before being promoted last year. He now manages three technicians, organizes training workshops and consults for companies.

Jenniffer Mabuka-Maroa also had a technician role before moving up the ranks. In 2000, she landed a technician job at an HIV lab at the University of Nairobi, where she performed immunology assays, made buffers and did other tasks. "It gave me a good foundation and kind of a direction," she says of her first job at the bench. In 2006, she was offered a job as manager of the lab. "I asked myself, do I want to stay here and do this, or do I want to go out and explore new things?" recalls Mabuka-Maroa. She instead applied to a PhD programme at the University of Washington in Seattle, which collaborates with the lab in Nairobi. She earned her doctorate in immunology and virology in 2012, and now directs a genomics initiative as a programme manager at the African Academy of Sciences in Nairobi, a job that requires a postgraduate degree.

Many technicians shift jobs to secure higher salaries, says Kelly Vere. She studies technician roles for her doctoral work at the University of Nottingham, UK, and heads the Technician Commitment initiative, led partly by the UK Science Council, to raise the profile of technical staff. At Nottingham, research-technician salaries start at around £16,500 (about US$21,000), and this can increase with promotions. Near the top end of the scale, a senior technical specialist or lab manager generally earns about £40,000, similar to the pay of a tenure-track lecturer, a position equivalent to an assistant professor in the United States. Vere adds that demographic information on technicians internationally is extremely scarce, in part because the range of titles stymies data collection.

The availability of technician jobs varies by region and institution. Following budget cuts for science in Argentina and Brazil, technician jobs are extremely scarce, says Diego Golombek, a biologist at the National University of Quilmes in Argentina. His lab does without a technician, as do many other labs in the region. By contrast, the Chinese government's massive investment in biomedical sciences means that it is easy to find technician roles, says immunologist Yufang Shi, director of translational medicine at Soochow University in Suzhou, a city in eastern China.

A master's degree can give candidates an edge, but in most scientific fields and countries hands-on research experience is key, regardless of degrees. In the United Kingdom, Vere's rough unpublished data suggest that approximately 20% of UK university research technicians have a post-graduate qualification.

Mareshia Donald, who manages some of the undergraduate internship programmes at the pharmaceutical firm Novartis, recommends that students seek internships in industry or academia, or a post-graduate fellowship. Long-term placements are more likely to lead to a CV-boosting publication, whereas shorter ones can help students to assess their interests, says Donald, who is based in Boston, Massachusetts. And in some countries, such as Kenya, volunteering is often the only way to get experience, adds Mabuka-Maroa.

YIFAN BU

Xiang Miao, who has climbed the ranks at the Shanghai Institute for Biological Sciences.

THINK STRATEGICALLY

Professional networks can help technicians to land their first job, or enable them to move on to the next. Research associate Ping Zhou at Shanghai Jiao Tong University, in China, got her current job in 2017 through a referral from a former colleague. She oversees experiments with mice that inform the direction of clinical trials.

Students should think strategically about their skill set. For example, they could learn immunology assays if they want to work in a city with immunotherapy biotechs. Experience in computational biology, through course work or an internship, can also provide a boost in many fields.

The job landscape can be competitive. But PIs at smaller institutions often get only a handful of applicants, says Manu Platt, a biomedical engineer at the Georgia Institute of Technology and Emory University in Atlanta.

Jobs are often advertised on university websites and sites such as Glassdoor, but Platt suggests that those seeking a technician role approach PIs directly. In particular, newly hired faculty members often have start-up funding and can be a good way to begin the job search. Candidates should ask about career support, he emphasizes, including whether the PI adds technicians' names to publications or encourages them to attend scientific meetings.

Phil Keegan is one scientist whose career received a boost from this type of support. After rejections from several PhD programmes, Keegan started earning about US$30,000 a year as a research technologist in Platt's lab, which was just getting started when Keegan joined in 2009. There, he did routine tasks and led a side project, with Platt's guidance, on sickle-cell disease. He emerged with strong recommendation letters and a research statement that enabled him to secure a graduate fellowship with the US National Science Foundation.

Keegan stayed on in Platt's lab for his PhD and now directs a research group at Draper, a technology-development firm in Cambridge, Massachusetts. Technical staff members in his group test drugs on cells that have been cultured in microfluidic devices. Other employees at the company involved in creating the devices mainly have associates degrees, which are two-year technical degrees available in the United States and in a few other countries. They can lead to a variety of specialized technical jobs.

"Job candidates should ask if PIs add technicians' names to publications."

Platt often advises people who ask him whether they should pursue a PhD or forge a career in science as a research technician, a question he calls "controversial". He notes that a technician will almost always have a direct supervisor who is in charge of overall scientific strategy, and advises people who love science and who might find that level of supervision difficult in the long term to get a PhD. "You will then be on the leadership track," he says.

But he also says that it can be gratifying as a technician to be a central part of a lab, helping to shape its scientific direction and carrying out its day-to-day operations. He adds, "If a PI respects their researchers and values what that person can bring, it can be a great position without the drama, stress and public face of being a PI."

Stability is perhaps highest in government labs, which often have strict regulations around laying off or transferring staff. Igor Ruza is

UDO RINGEISEN/EMBL PHOTOLAB

grateful to have landed his job as a research associate at the New Zealand Institute for Plant & Food Research, a government institute in Nelson funded partially by industry. He earned a master's in biology in 2005 from the University of Basel, Switzerland, but despite his focus on marine science and several internships, he could not find work in ecology. He took a job in a cancer-research lab at the University of Otago in Dunedin, New Zealand, where he gained experience in molecular-biology techniques. These skills helped him to land his current position in 2015, where he genotypes fish for a breeding project. He also spends days at sea, testing net systems, which he helps to design, for their effects on fish.

Research technicians in industry often have more-varied advancement opportunities than do their counterparts in academia or government. Technicians at Roche Innovation Center in Basel, for example, can explore a new pursuit by spending half of their time in business units such as competitive intelligence, supply-chain management, or technology transfer, says Benjamin Hall, a principal scientist at the centre.

Paula Soteropoulos, chief executive of the pharmaceutical company AkCEA Therapeutics in Cambridge, Massachusetts, says biotechnology managers are on the look-out for technicians who will add long-term value to their company, for instance, advancing into jobs in regulatory affairs or other areas. Soteropoulos says she has hired clinical-trials-management specialists whose previous experience included work at the bench as technicians.

Whether a candidate wants to carry on in a tech position or pursue a PhD, it is vital that they keep on top of relevant research developments. "Nothing stays stagnant in industry or academia. You need to constantly keep yourself updated," says Anil Koul, director of the Institute of Microbial Technology in Chandigarh, India, and a former senior director at Johnson & Johnson in Beerse, Belgium. Master's degrees are also the norm in the pharmaceutical industry and salaries are generally higher than in academia, he adds. "A job in pharma is extremely competitive," he says, "even at the entry technical level."

Assessing the scientific-enterprise landscape and deciding which direction to pursue can be tough for an aspiring scientist. Soteropoulos says that "regardless of bachelor's, master's or PhD, my advice to any young person is to take risks on new opportunities", adding that it is important to have the confidence to try new things. Speaking of one's career arc, she adds: "It does not have to be on the straight ladder." ■

Charlotte Schubert *is a freelance writer in Seattle, Washington.*

BACK STORY
Depression tracker

Sociologist Katia Levecque had studied mental health and social inequality in diverse populations before joining the Centre for Research & Development Monitoring (ECOOM) at Ghent University in Flanders, Belgium, in 2012. Her report on graduate-student mental-health concerns (K. Levecque et al. Res. Policy ***46****, 868–879; 2017) went viral, becoming the second-most-discussed article on social media for 2017, according to research-metrics tracker Altmetric.*

What did your study find?
Our survey of 12,000 PhD students from 5 universities in Belgium found that one-third of the 3,659 students who responded had or were at risk of developing a common mental-health disorder, mainly depression or general anxiety. When we compared our data with a survey of highly educated people in Flanders, we saw that PhD students had a risk of mental-health issues that was 1.8–2.8 times higher than for comparable groups.

What responses did you get?
The reactions fell largely into two camps: "This is nothing new, we have known it for years"; or "We are surprised — this is not what we have expected". Some professors admitted that they felt powerless and ill-equipped to do anything. Others acknowledged that they, too, experience the stigmas and taboos that make it a difficult topic to talk about.

The report was retweeted more than 7,000 times. What was that like?
In every presentation I give, when people are 'allowed' to talk or when they feel safe enough, we get to a catharsis moment and they all start sharing their experiences. I continue to get e-mail and phone calls. PhD students send heartbreaking testimonies. Supervisors ask what they can do to spot mental-health concerns, or to better support students. Research organizations have asked for advice on high-level policy programmes to tackle these issues.

How long was this report in the making?
When I joined ECOOM, they were finalizing a survey to be sent to all junior researchers, including PhD students. I asked why they were not covering mental health or well-being. We added those questions at the last minute. I started analysing the data in 2014, but the study wasn't published until last year.

Why the delay?
With results like these, we realized the study could have significant impact. First, our team checked and rechecked the data to confirm that the methodology was sound and the conclusions were robust. We then informed funders and policymakers about our findings and the possible media attention. We waited to make the results public until we were published in a reputable journal, but our study was discussed in the Flemish parliament before publication.

Has this study affected your research plans?
We are organizing a follow-on survey in Flanders for deeper insights into well-being and social support. I'm also working with the United Kingdom, the Netherlands and other countries to do comparative analyses.

Do you have concerns about future surveys?
Yes. Although the boost in recognition of mental-health issues is good, and a lot of departments or universities are setting up surveys, I worry some may get data that are not comparable. For example, if institutions use survey measures that are not valid and reliable, it might not be clear what is being measured. The concern is that we could have a growth of data, but those might not be the best data to base policies on.

What do you think of the attention your study has attracted?
Having this kind of impact is something you can only dream of as a researcher. The barriers that students have encountered when they experience problems and can't talk about them are the same ones we experienced when we tried to publish our findings. But some of those barriers have been broken down by the fact that this paper has been so well received. ■

INTERVIEW BY VIRGINIA GEWIN

This interview has been edited for clarity and length.