

Technical paths into a world of research

The role of a biological science technician, although rewarding and exciting, can sometimes be overlooked. Having spent the past 16 years working in busy research laboratories, technical operations manager Lisa Jameson shares her rather unconventional route into academia

The first time I set foot in a laboratory was during an interview for my first job in science. At the time I was working in retail management, studying biology with the Open University in my spare time but with no practical experience or useful qualifications to show for it. I wasn't the usual biological technician applicant but I was full of enthusiasm, a desire to learn and, as it turned out, I had a steady hand. I was invited back for a second interview and, much to my surprise and delight, I was offered the job. It was a life-changing day for me and set me on an exciting career path.

There is an established route into academia that goes like this: complete an undergraduate degree, perhaps do a Master's degree (to test the water and figure out your specialism), and/or find a suitable PhD and work your socks off until you achieve the coveted doctorate. From there it is a clear, although challenging, route to the top: work as a **post-doctoral researcher**,

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apply for a **fellowship**, perhaps secure a post as a lecturer and before you know it, you're an academic, teaching and leading your own research team. That **professorship** is finally in sight!

Alternative route

Following this path into academia is a high-risk strategy and the competition for positions, coupled with a precarious funding situation, creates a bottleneck of talent on the ladder. The technical side of research can sometimes be dismissed as less prestigious but as any researcher will tell you, the technicians are frequently the glue that hold an entire project together. Technicians can become highly skilled, specialised researchers in their own right. It may be a support role but it also



A senior technician giving a training talk to new staff





A researcher demonstrating equipment to a group of biology technicians. Cross-departmental networking between colleagues is often encouraged and allows for extra skills and experiences to be incorporated into a technician's skill set

involves a great many practical, experimental techniques, a large degree of organisation, and supervisory responsibilities for other members of the laboratory.

What does the word 'technician' conjure up when you hear it? For me, I think of someone in a lab coat, perhaps purifying a sample containing DNA or running an assay. For others it might be a person operating a piece of high-tech equipment or working with animals. The beauty of the technical route is the sheer diversity of roles within it and the transferrable skills to be gained along the way. In my experience, a competent and knowledgeable technician is less likely to be pigeon-holed into a particular discipline than a more 'academic' scientist.

Starting out as a technician

My first technical job was a steep learning curve. When I joined the electrophysiology laboratory team at Sheffield University, my two main tasks were to run the DNA sequencing machine for my group and to build a library of plasmids. A plasmid is a circular piece of DNA, that in our laboratory contained our mutated genes of interest.

Coming in as I did with no experience, I learnt these skills in a very particular way. The practical side came first — pipetting, measuring, purifying DNA, and loading samples into a multiwell plate. The theoretical knowledge came later as I took courses and read voraciously to understand the theory and the history behind what I was doing. *Gene Cloning* by T. A. Brown became my constant companion as I learnt new techniques and better ways of doing things.

My first technical post included some classroom learning, some research seminars and journal clubs (which are opportunities to discuss current scientific research that is likely to be of interest to the group). It included the production of some new plasmids. I spent a significant

amount of time preparing and loading samples into our sequencing machine and then, after running the program, interpreting the results. The other, almost universal, job of a technician is housekeeping duties in the laboratory. This includes ordering equipment or chemicals for the group, making up communal stock solutions, preparing equipment for use — any number of tasks associated with the smooth running of a laboratory.

The way I did things, practical first, theory later, is undoubtedly not ideal. Practical techniques are best learned when underpinned by a sound knowledge and although this route worked for me, I found it tough. However, you can enter the technical profession at a number of different levels and the potential to progress through those levels to a senior position is huge. A degree in biological sciences is not essential. It may help you to start at a slightly higher pay grade than those without a degree, and it will demonstrate a passion and enthusiasm for science, but far more importantly, when looking for technicians, the most important qualities are a methodical and organised approach to work and the desire to learn.

Apprenticeships are currently becoming more common and this is a fantastic way to get a foothold on the technical ladder. Alternatively, for some labs, an A-level or equivalent qualification in biology and a willingness to work your way up, perhaps coupled with a few weeks of work experience,

Box | Resources for would-be technicians

- The 'Technicians Make it Happen' organisation aims to highlight the talent and commitment of technicians across all disciplines, giving them the recognition they deserve: <http://technicians.org.uk>
- The Institute of Science and Technology provides resources, training and networking for technicians: <https://istonline.org.uk>
- The Science Council provides professional registration for scientists and technicians: <https://sciencecouncil.org>

Terms explained

Fellowship An academic position, sometimes with supervision from another researcher but carrying out independent research. Fellowships are highly competitive posts and are usually reliant on securing enough research funding to make the research viable.

Post-doctoral researcher A person who has completed their PhD and is now working as a researcher. These are often short-to medium-term posts, which will allow for an increase in expertise, often leading to further academic positions.

Professor The most senior academic position. Professors are leaders in their particular research and/or scholarship field.

would be enough to secure yourself a great job. Many research groups are happy to take on work experience students who show a real desire to learn. If you do decide to take a degree in a biological science, then the practical and theoretical knowledge gained will be an added incentive for any employer.

Increasing skills and experience

During my time in Sheffield, I became the senior technician in the lab, training other technicians and students in all the techniques in which I had become proficient. After 4 years, I moved to a different laboratory, at a different university, to increase my skill set. In this post there were new skills to be learned. The new job was in a protein lab and my job was to produce large quantities of specific proteins for the researchers to use in their experiments. Whereas previously my samples had been in the region of microlitres, I was now growing large bacterial cultures, 4 litres at a time (which smell delightful, by the way). To do this I used bacterial cells that had our mutated gene of interest inserted into them. The bacteria would make protein that I would later retrieve by using both chemicals and soundwaves to break open the cells. I then used several different techniques to purify our interesting protein out of the rest of the cellular debris.

I also took on my own projects, supervised new PhD students joining our laboratory and produced data for academic papers. During the process of writing a research paper, the group's experimental results were written up to give a comprehensive description of the research being carried out. This was then submitted for review before being published in an academic journal. Seeing my hard work and hard-won data published in this way was massively rewarding.

Furthering your technical career

So where could all this invaluable practical expertise take you? At the top end of the technicians' career path there are senior research technicians and experimental officers. At this level, you would expect a technician to be very knowledgeable and highly specialised, quite possibly managing their own team of staff, troubleshooting research for academics and running their own research. There may



Technicians are often required to pass on their skills and knowledge by training other members of their groups



Continued professional development is an important part of any academic career. At this event, technicians attended seminars, met researchers from different subject areas and signed up for tours of other departments

well be a large teaching element to the technical workload too, training other technicians and postgraduate students in laboratory techniques. And, of course, while doing all of that, maintaining the smooth running of a busy research laboratory. Technicians are nothing if not expert choreographers.

Wherever your ambitions lie, there is a chance you can get there through a technical career. Your own inclination could be public outreach, engaging others in the understanding of science, or it could be management, health and safety or teaching. The knowledge picked up during a technical stint can provide brilliant experience to take into a PhD, if that's the road for you. Many institutions will allow a student to continue working as a technician while studying part time for a PhD.

Management and safety

Many people, myself included, move in the direction of lab management or laboratory safety. Such jobs are still in that biological research environment but with a role more geared towards strategy and planning than pipetting. After well over a decade of working at a laboratory bench, during which I loved (almost) every second, I made the move into technical management. In this new role, I manage both people and laboratory spaces.

I now spend my time in other people's laboratories, whether in an advisory role or to inspect the safety in a laboratory. I currently line manage a team of around 25 technicians who between them have over 400 years of practical lab experience. Their own skills and interests are as diverse as they are. I work with plant scientists, molecular biologists, flow cytometry experts, animal technicians and protein biologists, and that's within a single building. As a team, my technicians and I support the research activities of over 50 academics, including research into breast cancer, osteoarthritis, circadian biology and many more, as well as a number of core facilities carrying out data analysis and research support. My job can be hugely varied — one day I might be researching brand new pieces of laboratory equipment, the next day I might be clearing up a chemical spill in a full decontamination suit (although hopefully not too often!). There is, as they say, never a dull moment.

These days, I spend a significant amount of time recruiting staff for other research laboratories. So what do I look for in a prospective technician? In short, enthusiasm, a love of hands-on science and a willingness to broaden their knowledge. Take those qualities into a technical job and you'll go far.

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