CAREERS

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INDUSTRY SKILLS

Boosting business

Programmes prepare biomedical trainees for the management side of science.

BY KENDALL POWELL

Dana Watt represents a new generation of cell biologists. Even when she started her PhD in autumn 2010, she knew she was not heading for an academic career. Graduate students today, she says, are quite aware that they will not all become tenured professors. "We either have to ready ourselves for the long postdoctoral haul, or we can explore options outside of academia." So she jumped when her university posted an announcement about an off-campus short course on biotechnology business management during her fourth year of doctoral studies. She soaked up the new language and approach to scientific discovery.

A broad array of jobs outside academia requires business know-how — and there are many more of these jobs than there are conventional bench-research positions in biotechnology and pharmaceutical firms. A case in point: only a dozen of the 340 jobs posted by the biotechnology company Genzyme in South San Francisco, California, in 2011 were strictly research-and-development positions, according to an outside analysis. The other postings were mainly for positions in regulatory affairs, marketing, quality assurance or management — all of which require business skills beyond what most doctoral students acquire in their degrees. The abundance is tantalizing, but it is difficult and stressful to discern or develop a career path to these jobs.

"The PhD comes off as very one-size-fits-all," says Watt, now in the fifth year of her PhD at Washington University in St. Louis, Missouri, and planning to pursue a career in biotechnology consulting. "We need to rethink the way we train PhDs. I had to look to extracurricular sources for training because 'not academic' is not a real career path."

To help students in cell biology and other biomedical disciplines to navigate these non-academic career paths, various short courses and boot-camp-style workshops offer auxiliary business training. They showcase the vast range of opportunities in the biotechnology and pharmaceutical arenas. And — in sharp contrast to master's programmes in business administration (MBAs), which typically require two years of costly study — these courses are short and usually inexpensive. For those who want more intense training, at least one US campus has started to offer business curricula tailored to people with life-sciences doctorates. These programmes give people with PhDs — who already have valuable analytical skills — the vocabulary and tools to bridge to the business world.

Early-career researchers will find that many of these offerings are aimed at their demographic. They can learn about them through their institution's graduate division or postdoctoral office, or at conferences, where scientific societies often host workshops. The best programmes include lectures by and networking opportunities with industry leaders, and direct connections to companies, including internship offerings.

SHORT COURSES

Judging by its popularity, a course coordinated by the American Society for Cell Biology (ASCB) in Bethesda, Maryland, seems to have found the right format to give business training to biomedical scientists. Responding to what it saw as a business skills gap, last June the ASCB offered a 12-day course for graduate students and postdocs called Managing Science in the Biotech Industry. More than 500 people applied for the 40 all-expenses-paid spots at the Keck ▶

Graduate Institute in Claremont, California.

With strong financial support from the lab-supply company EMD Millipore, headquartered in Billerica, Massachusetts, the course featured Keck faculty members and industry leaders speaking on topics such as finance, intellectual property and project management.

The course's biotech business case studies fascinated participant Carlos Solórzano, a neuroscience postdoc at the University of California, San Francisco. "What kind of thought process does the CEO go through?" he says.

The course participants conducted a market analysis, choosing real biomarkers that could be developed into a cancer-diagnostic test. Using scientific, clinical and financial analyses, participants built a case for why a hypothetical company should invest in such a test.

Watt also attended, and was enthused after hearing a consultant speak about trouble-shooting specific problems for companies. "The novelty and fast-paced aspects really fit my personality," she says. "Most importantly, I'm excited about a particular career path and how to get there." Solórzano came away from the course with a new appreciation of how to foster connections between a company and the outside world. The ASCB will offer the course again on 12–24 July 2015; applications are open from 4 December until 27 February.

For biomedical scientists who decide to commit to a business career, Keck also offers deeper training options. Founded in 1997, it is one of the few institutions worldwide that offer formal degree programmes in bioscience-industry skills. In the past five years it has begun to offer programmes that are tailored specifically to doctoral and postdoctoral students, such as a four-course certificate in bioscience management.

It also has a full-time professional master's programme for people with PhDs or medical doctorates (MDs). The US$25,700 course takes nine months, with the option to do an internship afterwards. "We see this real valley — a skills gap — between basic research skills and skills needed for industry," says Steven Casper, dean of Keck's School of Applied Life Sciences. "To translate the scientific power of these scientists into useful skills in industry doesn't take a lot: four or five courses, working on a business project and doing an industry internship."

Keck's success — the full-time programme has a placement rate in salaried jobs of around 90% — lies mostly with its connections to biotech and pharmaceutical industry giants such as Pfizer, Genentech and Regeneron. Students spend the entire nine months working in teams on the business side of real company projects such as identifying a new application for a therapeutic compound.

Although the time and price tag might not appeal to PhD holders, Casper says that graduates start in positions with a median salary of $80,000–90,000 and quickly advance. "They are super useful to these companies because they can talk to any scientist or MD there, and then talk to the accountant."

Even though the Keck master's programme requires less time and financial investment than a conventional MBA, it is still a hefty outlay. Instead, Many biomedical trainees might just need exposure to the industry and the career options. Workshops let them sample the offerings.

HONING SKILLS

SciPhD, a career-development firm in Rockville, Maryland, offers a variety of one- and two-day programmes to universities, scientific societies and conferences across the United States and in Russia, Malaysia and Saudi Arabia. The cost per participant varies between $60 and $100, and some organizations refund the fees if students complete the course. SciPhD also offers a 40-hour, 2-month course through the New York Academy of Sciences for $600–800 per participant.

"The training that scientists get as PhD students and postdocs is so disciplined, insightful, innovative and strategic — they are truly leaders" in a business sense already, says Randy Ribaudo, co-founder of SciPhD. "They just don't know it."

His own career evolved from a lab-head position at the US National Cancer Institute in Bethesda, Maryland, to a modelling-software company to a project manager at the health-care diagnostics firm Celera, where he picked up strategic-development and management expertise.

SciPhD's workshops introduce scientists to skills that correlate with success in entry-level industry positions: productivity, risk management and even empathy, for example. "Companies are not going to hire you because of technical expertise — rather, they want somebody innovative with good management skills who can play well in the sandbox," says Ribaudo.

The workshops also help scientists to reframe their research experience on short, focused CVs, and in mock interviews. Juggling two or three sets of experiments and publishing papers, for example, could translate to "managed multiple projects simultaneously to meet milestones and time objectives".

Ribaudo hopes that participants also leave with a sense of how many types of industry position they would qualify for with just a bit of added experience — jobs such as product manager, quality-control officer or analyst for a venture-capital firm.

Workshops are great for exposure to careers and for mini-injections of training. But nothing compares to the value of on-the-job experience, which students can gain from internships

HELPING HANDS

Scratching the start-up itch

A well-worn path into the business world for researchers is to start companies in order to develop their own discoveries. When Lars Forsberg, a junior faculty member at Uppsala University in Sweden, found that loss of the Y chromosome in older men's blood cells was associated with an increased risk of cancer, he realized that he might have the basis for a business. He is relying heavily on two programmes in Sweden designed to help academic scientists to make the leap to industry: the Uppsala Innovation Centre (UIC) and Mentor4Research.

Forsberg's start-up cancer-diagnostics company, CRAY Innovation, sprang from a conversation that he had at the UIC, a business incubator closely associated with the university. The UIC patent adviser explained that if he did not patent the technology, no company would invest in it to develop it into a diagnostics kit. In Sweden, researchers — not universities — own the intellectual-property rights to their work.

"If I want this discovery to become something for the good of mankind, there's no other option than to do the business," says Forsberg. It helped that the UIC office was located in the building next to his lab.

The UIC provides the extra business training that academic researchers need to commercialize their research. Forsberg participated in the centre's free three-month Business Lab course with lectures on business development, sales, financing and communication. At the end of the programme, participants write a business plan and pitch it to an investor panel.

Forsberg encourages other young researchers to seek out business incubators. He says that he has gained "the feeling of confidence when someone believes in you". And, just as importantly, these incubators often offer legal and financial aid to start-up companies.

Forsberg also participated in the Mentor4Research programme run by the Royal Swedish Academy of Engineering Sciences, which connects postgraduate researcher–entrepreneurs to experienced industry mentors.

"There is definitely a very big need for these kinds of programmes," says Anders Nordström, senior adviser for business development at the UIC and a regional manager of Mentor4Research. "Researchers don't have any idea about how to run the company or meet milestones or explain ideas to investors." K.P.

HUMAN WORKFLOWS

Students learn techniques for prioritizing ideas at a Business of Science course run by SciPhD.

and volunteer opportunities. Watt, for example, participates in a student consulting group that partners with biotech start-ups to offer scientific advice at reduced consulting fees. Others gain experience by volunteering in their university's technology-transfer offices, which help to commercialize research discoveries.

One of the boldest and riskiest ways to gain real-world experience is to start a company based on a scientific discovery. This approach, experts say, is best after some formal business training and with hands-on mentoring from successful entrepreneurs (see 'Helping hands').

ON THE JOB

To ensure that its graduate students find a clear path to business careers and have opportunities to gain on-the-job experience, Johns Hopkins University School of Medicine in Baltimore, Maryland, established the Biomedical Careers Initiative (BCI). Peter Espenshade, a cell biologist, explains that the initiative grew out of a lack of career-development resources for trainees at a time when the job market was being squeezed.

Many graduate programmes have begun to showcase non-academic career options, but the BCI has taken steps beyond that. Its website curates and promotes non-science courses on campus, including those that help to build skills and knowledge in business.

The BCI also facilitates a three-month industry internship programme in which late-stage graduate students take a leave of absence from their research to work at companies or organizations. Students can do internships at companies with which the BCI has connections, or find their own opportunities. Two crucial components help to ensure buy-in from faculty advisers. One is that the BCI pays the student's graduate stipend during the internship; the other is a memorandum that all parties sign that documents the student's interest, the start and end dates of the placement and an agreement between the student and adviser that certain research priorities must be completed first. This arrangement minimizes disruption to laboratory work.

In the BCI's first year, students completed internships at places such as MedImmune, Eli Lilly and the American Society for Biochemistry and Molecular Biology. Espenshade, who has trained a dozen PhD students in his own lab, says that he will count the BCI a success if it keeps even one student from "going reflexively into a postdoc as the next step". Ideally, graduate students would investigate non-academic career options from the beginning of their PhD programme, he says.

Gregory Cherryholmes did just that. Like Watt, he entered graduate school with an eye towards a biotech business career, and he completed the Keck certificate programme and did some freelance marketing consulting along the way. As a postdoc studying cancer immunotherapy at University of Washington in Seattle, he wants to help researchers in his field to ferry their cancer vaccines to the market.

"We see this real valley — a skills gap — between basic research skills and skills needed for industry."

He draws an analogy between most biomedical trainees' lack of business skills and a business concept called the 'valley of death' — the difficult stretch between having a good scientific idea and convincing investors to commercialize it.

"PhDs have all these skills — super bright with great critical thinking — but they don't have the business know-how to know where they want to go," he says. "These micro-opportunities can help bridge that valley." ■

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GRADUATE STUDIES

US education appeals

First-time enrolments of international students in US graduate schools rose for five consecutive years from 2009 to 2014, finds a report from the Council of Graduate Schools in Washington DC. The biggest year-on-year increases were in the physical and Earth sciences, up 20% to 16,235 first-time enrollees in 2014. The largest increase per nation was in the number of students from Brazil, which almost doubled its number of first-time US graduate-school enrolments to 1,134; India was up 27% to 21,889. However, first-time enrolments from Canada and China each fell by 1%, after previous annual increases of 3% and 5%, respectively. Jeff Allum, author of the report, says that the dip in enrolments from China might be a result of the nation's students taking advantage of their home country's investment in graduate schools. Meanwhile, a report from the Institute of International Education in New York found that overall international enrolments in US graduate schools rose by 6% to about 330,000 from 2013 to 2014. Nearly 80% of students from India were enrolled in science, technology, engineering and maths studies, as were 42% from China and one-fifth from the United Kingdom.

RESEARCH FUNDING

Wellcome change

The Wellcome Trust, the United Kingdom's largest biomedical-research charity, is rebalancing its funding priorities to focus on early-career scientists, collaborations and high-risk, high-reward projects. The London-based trust, which spends more than £700 million (US$1.1 billion) a year on biomedical research and outreach, plans to boost funds for postdoctoral fellowships and to introduce small 'seed' grants to support research on innovative ideas for which few preliminary data are available. Separate programmes for new and senior investigators will merge, with candidates' career stages considered in grant-application evaluations — a move designed to favour early-career researchers. The shift comes after lengthy consultations with grant applicants, according to Jeremy Farrar, who took the reins at the foundation in April 2013. In a statement, he said that the new framework would help to channel more resources to the most promising questions. "We want to make sure that as we increase our funding, the right opportunities are available," he said. For an interview with Farrar, see *Nature* http://doi.org/xdk (2014).