POISON PIPES What drives an activist engineer? **p.439**

TRANSFERABLE SKILLS What are scientists good at? **go.nature.com/2cabnfp**

NATUREJOBS For the latest career listings and advice **www.naturejobs.com**

MONTY RAKUSEN/SPL

Industrial experience can open doors to whole new career options.

INDUSTRY

Open for business

Postdoc positions in industry can teach people skills that they would not learn in academia.

BY CHRIS WOOLSTON

For better or worse, a postdoctoral position (or two or three) has become a near-mandatory stop en route to a permanent research career. As scientists search for postdoc opportunities, many have had to rethink the template for what constitutes a suitable position. The usual posts at universities or government-run research institutes still attract plenty of applicants, but many researchers are opting to continue their training at a different kind of institution — one with a chief executive instead of a dean.

A postdoc at a for-profit company can open doors to all sorts of science careers. But just like at universities and institutes, industry postdocs can bog people down in go-nowhere positions — in fact, the industrial realm holds special pitfalls for those who don't carefully check the job requirements and limitations. Before applying for an industrial postdoc, researchers should make sure they will emerge with the skills, publication history and network that they'll need to take their next career step.

Even for those with a deep interest in pharmaceutics and biotechnology, an industrial postdoc can be far off the radar. That was the case for Nuria Sancho Oltra. After finishing a PhD in organic and biomolecular chemistry at the University of Groningen in the Netherlands, she took a postdoc position that included two years working on drug development at the University of Pennsylvania in Philadelphia and more than a year at the Swiss Federal Institute of Technology in Lausanne. She hadn't thought of doing a postdoc in industry, but quickly realized that the academic route wasn't for her. "I wasn't curing a disease or doing anything that would improve health care in the short term," she says. "I was publishing papers and that was it."

As she wrapped up the postdoc, she decided she wanted to become a full-time scientist at a drug firm. "I started applying for jobs, but I realized it would not be easy because I lacked industry experience." So, instead ▶

POSTDOC APPLICATIONS

How to get your CV noticed

Only stand-out applicants have a real shot at a postdoc position at a top research company. So how to stand out? Sarah Hymowitz, who sifts through hundreds of applications for every postdoc opening in the department of chemistry and structural biology at Genentech in South San Francisco, California, has some suggestions. She doesn't have much time to scan the CVs — and some warrant little more than a glance — so she looks for specific things.

- **Defined purpose.** Hymowitz looks for people who have a specific scientific reason for seeking a position at the company. "A lot of second-tier applicants simply want to work at Genentech," she says.
- **Ability to finish.** "I'm looking for people who have a history of finishing projects," she says. She is therefore less than impressed by a list of 'submitted' papers on a CV. "An actual paper in *Nature Structural Biology* is better than a hypothetical paper in *Nature*," she says.
- **Team spirit.** Hymowitz looks for scientists who embrace teamwork, a crucial part of industrial work. "I like seeing middle-author papers," she says. "It shows you can collaborate."
- **Science, not business.** Don't waste precious CV space detailing your business knowledge of biotech or pharma. When hiring postdocs, Hymowitz is first and foremost looking for scientists, not business partners. "I don't care what they know about industry," she says.
- **Clear markers.** Hymowitz doesn't have time to read every CV from top to bottom, so the key info needs to jump off the page. She recommends a couple of bullet points that highlight scientific skills and accomplishments, complete with keywords.
- **Testimonials.** A word of support from someone familiar with your work can go a long way. "If your PI sends me an e-mail or gives me a call, I'll take a closer look at the application," Hymowitz says. C.W.

▶ of sending out more futile applications for permanent work, she started a two-year postdoc at the Swiss pharmaceutical company Roche. Four months in, she's already picked up a lot of industry knowledge about the ideas, experiments and tinkering needed to turn an interesting compound into an actual drug. "I have a more-global vision of what it takes to develop products," she says. "You interact with so many people. You feel like you're part of the team."

INITIAL STEPS

Looking back, she's happy with her path: she says she wouldn't have been able to get the practical, health-care-focused post she has now without the training from her academic position. Still, she encourages other scientists with an interest in pharma or biotech to streamline the process and consider an industrial postdoc as their first option. "If you are finishing up a PhD, you are perfectly capable of doing a postdoc in industry," she says. "It's not much different from research in academia."

And the truth is, most companies are reluctant to hire permanent staff who don't have any industrial experience, says Barbara Preston, a former pharmacologist and the co-founder of PharmaScouts, a science recruitment firm in La Jolla, California. "Companies tell me that it takes a year for people to psychologically make the transition from academia to industry," she says. Researchers who have an industrial postdoc on their CV are much more attractive to company hiring committees.

Developmental biologist Daniel Lafkas effectively dismissed the idea of an industrial postdoc as he finished up his PhD at the National and Kapositrian University of Athens. "I thought that if I wanted to do basic research, my only option was academia," he says. "I wasn't aware of the level of science conducted at biotech companies." His plans — and his preconceptions that industry wouldn't be the right arena for fundamental research — changed after he spoke to cancer researcher Chris Siebel while at a conference. Siebel, a leading figure in oncology at Genentech in South San Francisco, California, shared his commitment to basic research, so Lafkas quickly reevaluated his concept of an acceptable postdoc position. "His standing in the field was a very important factor for me even considering a postdoc in industry," Lafkas says.

Like many scientists contemplating a stint in industry, Lafkas worried that the corporate culture of secrecy would cut him off from the research community. "You need connections," he says. "If you can't go outside of the company to talk about your work, that can be a deficit." Publications were another key issue, he says. "I knew I had to go into a lab that would allow me to publish well."

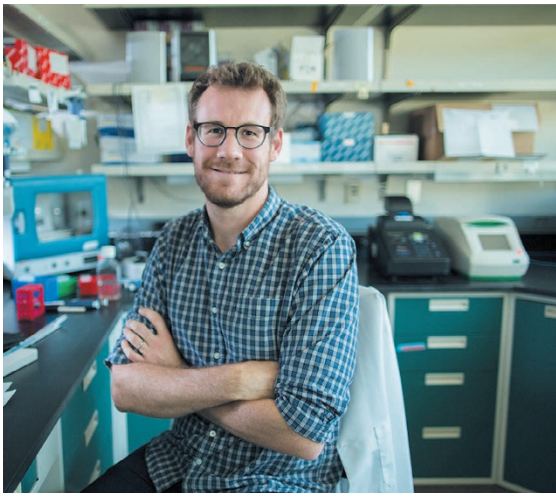
Those concerns are valid, Preston says, who adds that many postdocs in industry are held back by the company culture. "Postdocs want to be able to publish," she says. "But in industry, a lot of times you can't." Some companies are reluctant to publicize their research, and some simply don't have the funds to support the sort of side projects that can lead to papers, she says.

Genentech expects its postdocs to publish, however, and after getting that assurance, Lafkas took a postdoc position in Siebel's lab in 2013. The move paid off. In 2015, Lafkas was the lead author of a *Nature* paper showing that Notch signalling pathways can determine the development of adult lung cells (D. Lafkas *et al. Nature* **528,** 127–131; 2015). With a paper in a prestigious journal under his belt, he felt he had many options when his postdoc ended in 2016. "Going back to academia was still a possibility," he says. But he ended up accepting a full-time position in Genentech's department of immunology discovery, where he'll join the search for new drug targets. "I wanted to find a lab that would get me out of bed in the morning," he says. "As long as I'm doing work that I find exciting, I don't see a need for a change."

RESEARCH FIRST

New graduates considering their postdoc options may worry if they do their training in industry, they'll never be able to get back into academia. Although it's true that most researchers who take industrial postdocs end up staying in industry, that's far from the only possible outcome, says Leslie Pond, head of the postdoc programme at the Novartis Institutes for BioMedical Research in Cambridge, Massachusetts. "The way our programme is structured, it's possible to build a path toward an academic career," she says. "The emphasis is on basic research, and they have the opportunity to establish a strong publishing record." Novartis also understands that postdocs need to be able to discuss their projects with other scientists, she adds. "Because it's a temporary position, they need to be able to be specific about the work they've done in their future job interviews."

Pond says that about 5% of Novartis postdocs go straight to full-time positions in



GENENTECH

Daniel Lafkas was initially sceptical that industrial postdocs could incorporate basic research.

academia. Another 8% go on to do a second postdoc, many in academia. Recent alumni of the Novartis postdoctoral programme include Sereina Riniker, a chemist now at the Swiss Federal Institute of Technology in Zurich, and Andreas Bender, a principal investigator working on molecular informatics at the University of Cambridge, UK.

Preston says that scientists who complete a sound industrial postdoc should be well prepared for a career in academia. The main strike against them, she says, is that they won't gain much experience in writing grant applications, which is important for academic survival. Joe Arron, director of immunology at Genentech, agrees that people who do industrial postdocs usually have that important gap in their skill set. "They're coming out of their postdoc without a foot in the money bucket," he says. "Typical academic postdocs are going to be more involved in the grant process." It's always possible to learn how to write grant applications through seminars, workshops or online courses, however, and Genentech offers its employees special grant-writing programmes.

It's understandable that industrial postdocs tend not to return to academia, Preston says. Certain personalities are simply better suited for industry, and those who thrive there are likely to want to stay. "In industry, you have to be team-oriented and cooperative," she says. "People in academia are more independent."

"In industry, you have to be team-oriented and cooperative."

Cooperative or not, it takes a competitive edge to get in the door at a top research company. Arron says that he gets hundreds of applications whenever there's a postdoc opening in his lab. "We're looking for really great scientists with a lot of potential," he says (see 'How to get your CV noticed'). "Beyond that, it's open-ended."

In his experience, many of the top scientists didn't have a clear preference for academia or industry when considering their postdoc options. Instead, they were looking for the right mentor with the right project, no matter where it might be. "If you're a talented scientist, you want to go to an elite institution in your area," he says. "We're competing with top academic and medical centres for postdocs."

In the end, Arron says, industrial postdoctoral positions can be just as valuable and productive as academic postdocs, and vice versa. "Good science," he says, "is good science." ■

Chris Woolston *is a freelance writer in Billings, Montana.*

TURNING POINT
Activist engineer

Last year, civil engineer Marc Edwards spent at least US$150,000 of his own money to prove that tap water in Flint, Michigan, was contaminated with lead. Over the past decade, Edwards has been documenting and exposing lead contamination in the Washington DC water supply and fighting to hold government officials accountable. Edwards explains how this work equipped him for the Flint case, which garnered international attention and shone a spotlight on similar concerns nationwide.

A mother's plea for help got you involved in the Flint crisis. Is it similar to the DC case?
In Flint, up to 12,000 children have been exposed to high lead levels. The DC-area case was much worse than Flint, in terms of harm done and number of children affected. Unfortunately, there was betrayal by government officials in both cases.

How did the DC case prepare you for Flint?
As a civil and environmental engineer at Virginia Polytechnic Institute and State University in Blacksburg, I researched corrosion in homes. In 2003, I started sampling water in DC homes and found outrageously high levels of lead. Ultimately, we discovered that the public had been misled by local and federal agencies. I've had to disprove falsified government reports, which my earlier work had not prepared me for. But without that experience, I would not have been able to help people in Flint.

How did the events in Flint unfold?
Flint was the exact opposite of DC in every respect. Once we confirmed the contamination and government oversight, we had sample kits going to Flint in less than a week. We knew we had to cooperate with anyone who wanted the truth about the lead, and fight anyone who tried to obfuscate matters. There is a line between science and activism, and it's one you cross only as a last resort. It's either that or, in this case, letting kids be hurt and a city destroyed. We used Freedom of Information Act (FOIA) requests — which invoke a federal law to access information from the government — to get the data about who knew what was happening with the contamination and when.

Your findings contradicted official reports. Were you concerned about credibility?
Only the paranoid could possibly survive something like this. If you make one mistake, you will never, ever recover. It makes you very careful not to say anything you are not prepared to back up 100%.

How have your efforts affected your workload?
I worked on the DC case for 30 hours a week as a volunteer, for 10 years. But I worked 70 hours a week to make money and produce papers, the things that count towards academic-career success. There's no way you'd put on your CV that you made FOIA requests and attempted to get falsified reports retracted.

How did you fund the Flint work?
I knew the day would come when another community would need help, so I donated my fees from consulting and other work into a fund in the department. It was put into a discretionary account. We did, eventually, get $33,000 from the US National Science Foundation, which gave us credibility.

Are you getting calls from people in other cities about more contamination concerns?
I get 20–30 communications every single day. I work 65 hours a week on Flint, so I don't have time to check these things out. But in the back of your mind, you say, what if they are valid?

Why do you maintain a website with Flint research updates?
I didn't want to be dependent on the few investigative reporters left to explain the science behind it. Every single major breakthrough came out on our blog first.

Do you have lasting concerns?
There was a time when engineers and scientists were the leaders of their generation. But we have created our own world, set apart from society, where we tell each other we're important. If we cannot get this fixed, we are destined to enter a new dark age. ■

INTERVIEW BY VIRGINIA GEWIN

This interview has been edited for length and clarity.