

environment and relationships," she says. "Then ask yourself if moving to another lab will give you more opportunities and more viable projects that result in papers or publications."

As they weigh up their options, postdocs should consider talking discreetly to other principal investigators about joining their labs. It's also a good idea to learn as much as possible about the principal investigator and lab environment from current and past lab members. "You want to make sure you don't go from one bad situation to another," says Sanford. She advises that postdocs find out exactly what would be expected of them. They should discuss the skills and training they have, and what they need to develop in the next year. "It is also important to understand what the lab direction is, what the principal investigator wants to do, and what the grants situation is," she says, "so that there are no surprises."

When approaching new labs, a postdoc should avoid disparaging the principal investigator of the lab he or she is leaving. "You can say there were challenges, but focus on the lessons learned and skills gained," says Anderson-Thompkins. "It is okay to say that you wanted to pursue other opportunities, but you don't have to say how bad the lab or the principal investigator was."



"The worst thing is leaving things to fester."

Jo Handelsman

Discussions should also focus on finishing existing projects or handing them over to other members of the lab. "Give them plenty of lead time and wrap up what is going on," says Anderson-Thompkins. "That will help you leave on the best possible terms." It could also mean that the postdoc is still able to garner a supportive letter of recommendation from the principal investigator in the future. And even if a glowing recommendation is out of the question, chances are that the 'old' principal investigator will be a collaborator or grant reviewer or a close friend to someone on a hiring committee. "You want to walk out the door with a good reputation," says Anderson-Thompkins. "Don't do anything that will hurt your career." ■

Laura Bonetta is a freelance writer based in Garrett Park, Maryland.

TURNING POINT

Jonathan Rothberg

Last December, Jonathan Rothberg, founder and chief executive of Ion Torrent, a biotechnology company based in Guilford, Connecticut, released the Personal Genome Machine. The US\$50,000 desktop DNA sequencer will, he says, greatly improve access to genome sequencing.



What decision was pivotal in your early career?

I was interested in chemistry and engineering in high school, and did a chemical engineering undergraduate degree at Carnegie Mellon University in Pittsburgh, Pennsylvania. But my interests in biology and cognitive psychology were growing, and I had to decide which to follow for a PhD. I knew I wanted a set of tools that would make me marketable. The explosion in biology from genome sequencing set me up to combine my interests in computers, biology and engineering, and have an impact in a rapidly emerging field. So I got a PhD in biology from Yale University in New Haven, Connecticut.

What is your advice to young scientists?

Master a number of fields. There will always be someone better than you at physics, maths or chemistry, but if you focus on mastering a few things you love, nobody will be better at that intersection.

Who had the biggest influence on your career?

Steve Jobs [co-founder of Apple]. I loved the way he was changing the world in 1984. I saw him give a presentation in which he said the most profound thing I had heard — that the reason he had become influential was that he 'just did it'. I know it sounds like a Nike commercial, but it hit home that most people simply think about things, and don't do them.

Are you a scientist, inventor or entrepreneur?

I would say scientist and inventor. I am not an academic so I don't publish very often, but my publications have been on the covers of *Nature* and *Science*. I'm an entrepreneur only because assembling smart people and funding is essential to bringing inventions to market. But scientific needs inspire my inventions. For example, my newborn son had a health scare in 1999. The doctors had no way to tell whether he had an inherited disease, and I realized that an invention able to sequence an individual genome quickly would be useful. That idea sparked my second company, 454 Life Sciences. But my inventions also give me access to interesting, ground-breaking science. I cold-called Svante Pääbo, a geneticist at the Max Planck Institute for Evolutionary Anthropology in

Leipzig, Germany, and told him that I had a machine to help sequence the Neanderthal genome — which led to a collaboration.

Is the Personal Genome Machine a turning point just for your career or for science in general?

I hope it is pivotal for science in general. We made a semiconductor device that sees chemistry in real time. A chip measures electrical charges during DNA replication, which lets it decode the sequence. It's a connection between chemistry and the digital world. This means that the sequencing machine will one day be as ubiquitous and cheap as the mobile phone.

What skills do you think will be most in demand in the coming decade?

Quantitative skills — the ability to do calculations and estimations. Biology is great, but you need analytical skills. It no longer helps simply to describe something. We need more people at the intersections of fields. For example, bioinformaticians don't have to have a PhD in molecular biology, but they need enough of an understanding to develop an intuition about how systems work.

How should would-be inventors go about bringing a technology to market?

They should do the hardest experiment, the one that poses the biggest obstacle to success, first — otherwise they could find themselves ten years later having made little progress. Many people lose themselves by not asking tough enough questions about their own inventions. If you can't clear the biggest hurdle, you are wasting everyone's time. ■

INTERVIEW BY VIRGINIA GEWIN