

THE POSTDOC EXPERIENCE: NOT ALWAYS WHAT YOU EXPECT

“A great mentor, an encouraging lab environment, and exciting science...”

“A learning opportunity for you to grow as a scientist...”

“A period of work that allows you to finish with quality publications, having made lots of contacts in the field, formed collaborations, and started forming an independent body of research...”

These statements describe what a successful postdoctoral experience should provide, according to respondents to a recent survey by *Science Careers*. But how can you ensure you get what you want out of your postdoc? And what happens if things don't turn out as planned?

By **Laura Bonetta**

“What was really important to me in choosing a postdoc was that I was really interested in the research going on in the lab and I knew I could do really good science there,” says **Renald Schaub**, a research associate at the School of Chemistry of the University of St. Andrews in Scotland. But Schaub chose the laboratory of someone who not only had strong scientific credentials but was also supportive of the people working for him. “I went to Denmark for two days to interview, and right away I could tell he was a really good guy,” he says of his former postdoctoral adviser Flemming Besenbacher, head of the Interdisciplinary Nanoscience Center (iNANO) at the University of Århus in Denmark.

Besenbacher's support turned out to be particularly critical when Schaub started looking for a job. “A year and a half before I decided I would end my postdoc I started to send out job applications in Europe and in the States. I had no positive responses even though I already had two *Science* papers by then,” says Schaub. That's when Schaub decided to ask Besenbacher for help. His adviser wrote reference letters and suggested colleagues Schaub could contact at various institutions. “He knew someone in the department where I eventually got my position,” says Schaub.

A Successful Postdoctoral Experience

Schaub was one of close to 4,000 current or former postdocs polled in this year's survey (see “Survey Methodology”). Almost all survey participants agreed that the research topic (88 percent), good publication prospects (78 percent), and principal investigator (PI, 78 percent) had the greatest influence in their choosing of a postdoctoral position. The institution/company came in at a lowly 57 percent.

When asked about the importance of various factors in contributing to a successful postdoctoral experience, most survey respondents considered certain attributes of the PI as key (see graph on p1228). Top of the list (63 percent of respondents rated this as very important) was the scientific standing—defined as publishing in leading journals, having strong contacts, and being a recognized leader. Many respondents thought it was also very important for the supervisor to have direction and vision for their research (57 percent); to provide opportunities to attend scientific meetings and meet other researchers (56 percent), and to provide or assist in obtaining the financial resources needed to conduct their research (56 percent).

Doing a postdoc in a lab where she was not free to set up collaborations or attend scientific meetings to talk about her work eventually steered former postdoc **Anna Webb** away from research. “You need to make connections and gain a certain level of independence during your postdoc if you are going to have a career in academic research,” she says. Webb gave up the bench for a position at BiomedCentral, a UK-based publisher of open-access scientific journals—a job that allows her to interact closely with scientists and learn about their work on a daily basis. “I don't regret doing a postdoc. I learned a lot and I always enjoyed the science,” she says. “I ended up in a job I really enjoy, which I wouldn't have a chance of doing without my scientific experience”

What About Communication?

Last year's *Science Careers* survey polled not postdocs but their supervisors. **continued »**



Anna Davis



Laura Colgin

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Andrea Ditadi

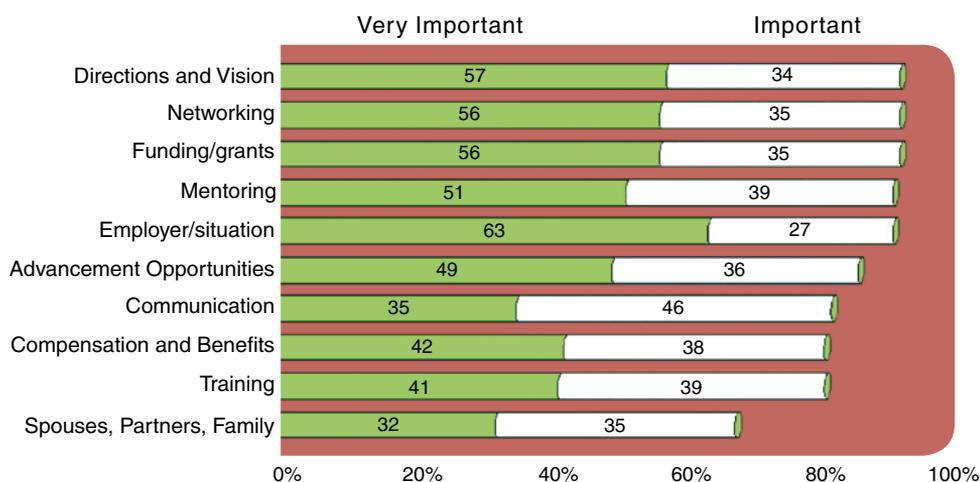
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Postdoc Survey Results

How Postdocs Rate Factors Contributing to a Successful Postdoc



Survey Methodology

The survey was launched on March 19, 2008, with an e-mail invitation to approximately 60,000 Ph.D.s located in North America and Europe who were current or former postdocs. Of the 3,850 qualified surveys collected, 75 percent came from individuals in the United States or Canada, 20 percent from continental Europe, and 5 percent from the UK. About twice as many current postdocs participated as former postdocs. Most (79 percent) postdoctoral positions were held in academic institutions. Life or medical sciences were the most common (72 percent) disciplines for postdoctoral studies among respondents. Most respondents were 31 to 40 years of age (62 percent current and 57 percent former postdocs).

They ranked communication and mentoring as very important in contributing to a successful postdoctoral experience (dx.doi.org/10.1126/science.opms.r0700037). Interestingly, these factors were not ranked highly by the postdocs surveyed this year—with mentoring coming in at No. 5 (51 percent of respondents ranked this as very important) and communication at No. 9 (35 percent) in a list of 10 factors.

But it is hard to argue against the value of good and open communication between a postdoc and his or her adviser. Now in the fourth year of a postdoctoral position at the University of Colorado in Boulder, **Sandi Clement** says communication was difficult when she first started out in the lab of Jens Lykke-Andersen. “When I first started I was intimidated and did not communicate as much as I do now,” she says. One tool she thinks would have been helpful is the individual development plan offered by the Federation of American Societies for Experimental Biology. “It makes you ask questions like: This is where I want to be in 5 years so what do I need to accomplish? Or, this is what you wanted to accomplish this year, why didn’t you?” explains Clement.

Clement says Lykke-Andersen turned out to be a “great mentor” and contributed to “an awesome experience.” But she may be in the minority. Only 62 percent of survey participants had someone they would describe as a mentor during their postdoctoral years, and for only half of them that person was the PI of the lab. “A postdoc is a mentored apprenticeship into the job market. The person you are working with should be helping you along. But if the person who hired you turns out not to be a mentor, you need to seek out other people,” says **Alyson Reed**, former executive director for the National Postdoctoral Association (NPA).

David Angelini, a postdoctoral fellow pursuing research into the developmental and genetic aspects of evolution (or “evo-devo”) at the University of Connecticut, agrees. “I think it is important to have a mentor during your postdoctoral years. It does not necessarily have to be your PI. In graduate school I was in a large lab, so there were lots of postdocs and others who could give me advice,” he says. “As a postdoc I relied more on my supervisor.”

And for people looking for a postdoctoral position Angelini, who in September 2008 will be starting a faculty position at American University in Washington, D.C., has this advice: “Find an environment where you can talk to someone about how your career is going and the execution of science.”

The Good and the Bad

According to verbatim responses from this year’s survey respondents, some of the best things about the postdoc experience are having the independence and freedom to choose research projects and schedules, learning new techniques, and interacting with other colleagues. The worst things about it, for some, were poor relationships with their supervisors and low salary and job security, as well as the lack of independence for postdocs with controlling advisers.

Laura Colgin was one of the lucky ones. During her Ph.D. she had been studying how rhythms are involved in the function of the brain using tissue slices. For her postdoc she wanted to continue with the same line of research but with recordings in living animals—a technique she had never done. At a scientific meeting, Colgin approached Edvard and May-Britt Moser from the Norwegian University of Science and Technology. Although the Mosers’ research did not focus on rhythms, she proposed starting that work in their lab if they were willing to train her in doing live recordings. “They were open to it and that is how the position worked out,” says Colgin. “If someone is willing to put in a time investment to teach you something new they will probably be a good adviser. Many postdocs get their positions because the lab wants their existing skills instead of providing them with additional scientific training.”

Salary Woes

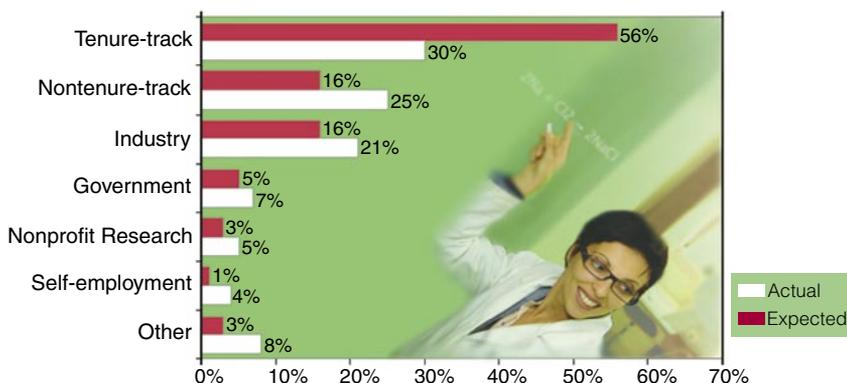
Some of the biggest hardships for many postdocs are low salaries and lack of retirement benefits. According to this year’s *Science* Careers survey only 15 percent of respondents received benefits—53 percent received no benefits and worried about a negative impact on their long-term retirement situation, whereas the remaining 32 percent did not receive benefits but were neutral about the impact.

Had she had some retirement funding, **Michele Marquette** might have extended by a year or two her postdoctoral studies on the effects of microgravity on muscle at the NASA Johnson Space Center. “I went to graduate school after working for several years so I was older than most Ph.D. students. I had no retirement benefits as a student and that continued in my postdoc,” she says. “It will take a long time for me to catch up.”

And if the thought of not putting any money away for retirement does not aggravate some postdocs, having to live on a meager salary does. The median (50th percentile) postdoctoral salary reported by survey respondents located in the United States was **continued »**

Postdoc Survey Results

Type of Position Expected vs. Actually Obtained



A larger percentage (56%) of former postdocs desired tenure-track academic positions than actually obtained such positions (30%). Similarly, only 16% of former postdocs initially expected to seek nontenure-track research scientist positions, compared with the 25% who ended up in such positions. The “other” types of positions that were cited included nonbench careers such as consulting, technology transfer, and administration.

Featured Participants

- American Association for the Advancement of Science
www.aaas.org
- American University
www.american.edu
- BiomedCentral
www.biomedcentral.com
- Harvard University
www.harvard.edu
- HF Scientific, Inc.
www.hfscientific.com
- Interdisciplinary Nanoscience Center, University of Århus
www.inano.dk
- Lithion, Inc.
www.lithion.com
- NASA Johnson Space Center
www.jsc.nasa.gov
- Norwegian University of Science and Technology
www.ntnu.no/english
- University of Colorado at Boulder
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- University of Connecticut
www.uconn.edu
- University of Padua
www.unipd.it/en
- University of Texas Medical Branch, Galveston
www.utmb.edu
- University of Washington
www.washington.edu
- University of Wisconsin
www.wisc.edu

\$40,000, which was an increase of just over 5 percent compared to the 2006 survey. The median salary of foreign postdocs was £27,500 in the UK and €25,200 in continental Europe.

Andrea Ditadi at the University of Padua, Italy, had to live on no salary for several months into his postdoc. “I was not paid for three months. That was a critical situation. You cannot go three months without money,” he says. “I was lucky because I live close to my parents.”

After working in France for three years Ditadi decided to do a postdoc in Italy “to try to stay and do something for my country,” he says. But a year into his postdoc, he is frustrated by not being able to obtain the resources he needs to carry out his research. He has decided to look for postdoctoral positions abroad.

Expectations Versus Reality

Although only 2 percent of survey participants had done a postdoc in industry, many of those who did say this is a good option for anyone thinking about a career in industry and wanting to get a head start (see June 16 career feature at dx.doi.org/10.1126/science.opms.r080055). Industry can also expose a postdoc to different aspects of doing science, according to Christopher Campion, director of the chemistry department at HF Scientific in Fort Myers, Florida. While working on his Ph.D. in physical organic chemistry at the University of Rhode Island, Campion had the opportunity to do an internship at Lithion, Inc., in Pawcatuck, Connecticut, which then turned into a postdoctoral fellowship. “My experience was different from the typical postdocs that only focus on one entity. I was working on multiple projects. I helped set up a lab, bought instruments, learned about applying for grants,” says Campion. “One of the many good things about my postdoctoral adviser is that there were no taboo subjects. I came out a more diversified and well-rounded scientist.”

The majority of survey respondents (79 percent) held postdoctoral positions in academic institutions—and they expected to get a job in academia. Over half (56 percent) of former postdocs wanted a tenure-track academic position after completing their postdocs, but only 30 percent got one (see graph above). Only 16 percent of former postdocs expected to seek nontenure-track research scientist positions, but 25 percent ended up in such posts. And a

significant number of former postdocs (12 percent of respondents) who were expecting to obtain tenure-track positions ended up working in government or the nonprofit research sector, being self-employed, or working with other types of positions. These data should be a wake-up call to grad students and postdocs: having a backup plan is essential in today’s job market.

Anna Davis knows that life can take unusual twists and turns. While doing a postdoc at the University of Washington in Seattle she started her family and wanted to explore different options for working part time. She and several colleagues wrote a grant with her postdoctoral adviser and got funding from the National Science Foundation for six years to produce educational software called NerveWorks, which is now commercially available (www.ecobeaker.com/products-college/NerveWorks).

After her Ph.D. in molecular and environmental toxicology at the University of Wisconsin Lisa Van Pay started a postdoc at Harvard University needing to “publish a lot and quickly.” But she also started doing other things during her postdoctoral years, including working with the public at science and technology museums. When the needed publications did not come through, she applied for a prestigious public policy fellowship at the American Association for the Advancement of Science. In September she will be starting a one-year fellowship in Washington, D.C., with the possibility of a renewal. “I am really pleased at how things turned out, but I could not have predicted it,” says Van Pay.

Former and current postdocs advise graduate students planning their postdocs to do their research on the prospective lab and PI. A literature search is a good start, but it also helps to query colleagues, current and former lab members, and of course the PI. Many survey participants also suggest having a well-laid-out timeline of accomplishments for the postdoctoral years. And while someone might start out wanting a career in academia, it pays to be open to other paths. “You have to continually assess your goals,” says Van Pay. “Often people don’t pay attention, and it could be several years before they realize that things are not going according to plan.”

Laura Bonetta is a scientist turned freelance writer based in the Washington, D.C., area.

DOI: 10.1126/science.opms.r0800058