

# THE EVOLVING POSTDOCTORAL EXPERIENCE

Science has gotten bigger in the past decade. There are more scientists doing research and more competition for funding, jobs, and journal space. Projects have become larger in scale, often requiring the collaboration of several groups. Techniques are more powerful, generating massive amounts of data. There are also more career options for researchers to pursue. How have these changes affected the postdoctoral research experience? We asked postdoc supervisors who completed a recent survey for *Science* Careers to share their views. **By Laura Bonetta**

**S**cience Careers conducts surveys on the postdoctoral experience every year, alternating between polling postdoc supervisors and the postdocs themselves. This year's survey, which was completed by over 700 postdoc supervisors, coincided with an economic downturn in many countries. It is perhaps not surprising that, when asked about what career trends they were noticing, many supervisors expressed concern about the job market.

"When I was doing a postdoc, I don't remember anyone ever being out of work or not being able to find a position. Whereas now I do hear about postdocs who are looking for work," says **Yvonne Paterson**, dean for postdoctoral research training and director of the biomedical postdoctoral program at the University of Pennsylvania in Philadelphia. Paterson, who completed a three-year postdoc before joining the faculty at Penn in 1982, says she has noticed an increase in the age of first faculty appointments and promotions. "Most faculty we hire have done more than one postdoc," she says.

The data support Paterson's observations. According to the National Research Council's report "Bridges to Independence," the age of first independent faculty appointments for Ph.D.s has been rising steadily from 34 in 1979 to 38 in 2003 (<http://bit.ly/eYIVQ>).

In addition, the share of recent science and engineering doctorate holders hired into full time faculty positions fell from 74 percent to 44 percent from 1972 to 2003, whereas the share of those reporting to be in a postdoc position rose from 13 to 34 percent. (National Science Board, 2006, Science and Engineering Indicators 2006, [www.nsf.gov/statistics/seind06/](http://www.nsf.gov/statistics/seind06/)).

And the phenomenon does not seem to be US-specific. "Some people have been postdocs for a very long time, especially if they are in a lab that is well funded," says **Edith Sim**, director of graduate and research staff training for the division of medical sciences at the University of Oxford, UK. "Many postdocs get a faculty position after only one postdoc, but I know many others who have done several postdocs. Some of them have been postdocs for as long as 11 years."

## Are Postdocs Getting Longer?

Although it may be a longer haul to an academic position, the length of individual postdoc appointments has actually gotten shorter. When *Science* Careers survey participants were asked the average length of the postdoc experience in their own labs, 67 percent of those polled in 2005 said one to three years and 29 percent said four plus years. In 2007, however, 79 percent said the average postdoc appointment was one to three years and 16 percent four plus years; in 2009, 76 percent said one to three years and 19 percent four plus years. Thus, it seems that the average length of a postdoc stint decreased sharply from 2005 to 2007 and has been fairly constant since then.

One of the factors that may account for shorter postdoc appointments is that many universities and funding bodies in the US and Europe have put in place limits on the length of time a postdoc appointment can last. These limits typically range between three and seven years, sometimes including previous postdoc experiences within that time frame.

**Ola Hermanson** at the Karolinska Institute in Sweden supports limits on postdoc appointments, but points out that in some cases they can be too restrictive. In Sweden, researchers are normally eligible for assistant professor positions only within five years of obtaining a Ph.D. "Nowadays it takes longer to publish in a good journal. Five years is really not enough time to establish yourself," he says. "Especially because after graduate school you usually take some time before starting a postdoc. So by the time you start, the time you have left to do your research could actually be only three years." **continued »**

“I think there is an increased awareness of the contributions postdocs make.”



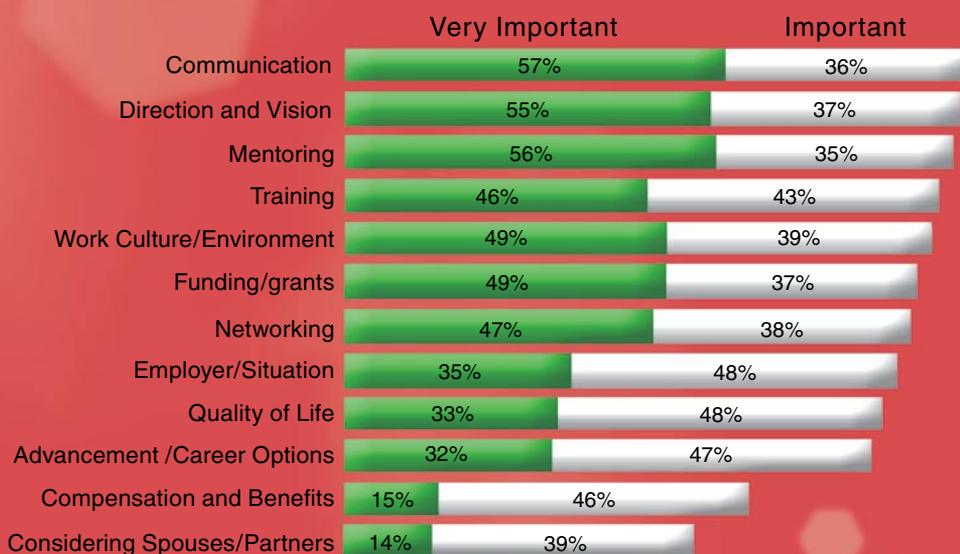
From Top: Nick Birch, Jonathan Dinman, Lynn Zechiedrich

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Postdoc Survey Results

Importance of Attribute Groups in Contributing to a Successful Postdoc Experience



Survey Methodology

This year’s survey aimed to determine what factors contribute to a successful postdoctoral experience from the supervisors’ point of view. Starting February 3, 2009, 717 postdoc supervisors in North America, Europe, and Asia/Pacific Rim responded to an online survey. In addition to being asked to rate the importance of various attributes to the postdoc experience, supervisors were asked to identify their best postdoctoral fellows and note their strengths. They were also asked to comment about the ways in which the postdoctoral experience had changed in recent years in both positive and negative ways. The majority (87 percent) of survey participants were located in North America (59 percent) and Europe (28 percent). The remainder were located in Asia/Pacific Rim (10 percent) or other areas of the world (3 percent). Most (67 percent) worked in academic institutions, followed by government organizations (9 percent), nonprofit research organizations (7 percent), and hospitals (6 percent).

Another potential disadvantage to short postdocs is that researchers become more focused on getting results fast. “Young scientists need to see the bigger picture,” says **Nick Birch**, an entomologist at the Scottish Crop Research Institute in Dundee. “Some research topics may not be in vogue now but will be in 10 years.” But, Birch points out, it may be difficult to see a big picture when postdocs are so short. At his own government research institution, postdocs are typically funded for only one to three years, although appointments can be renewed if additional funding is available.

‘Alternative’ Careers

Another trend that some 2009 survey participants identified is that there are more opportunities for postdocs to pursue outside of academia. “I did my postdoc in the early ’90s at the National Institutes of Health. At that time the only jobs were academia or drug companies,” says **Jonathan Dinman** at the University of Maryland, College Park.

Postdocs today are able to pursue careers in the biotech industry, government, research advocacy, science writing, intellectual property, and so on. Regardless of the career choice, Dinman points out that it is part of the supervisor’s responsibility to offer to support. “I don’t have to clone myself,” he says. “My job as a mentor is to recognize the strength of each person in my lab and guide them toward their strength.”

Although most postdocs begin their training aiming for an academic career, according to informal surveys by the US National Postdoctoral Association (NPA), many end up choosing other options. “Postdocs should consider all career options,” says **Cathee Johnson Phillips**, NPA’s executive director, adding that NPA is no longer referring to careers outside of academic research as ‘alternative’ careers. “If the data we have give us an accurate picture, an academic career may actually be the alternative career,” says Phillips.

In some countries, though, opportunities for postdocs in academic research might be on the rise. “The intensity of funding is increasing annually and can be available from many sources—the National

Foundation, the local government, and local institutions,” says **Jia Wei Zheng** at Shanghai Jiao Tong University in China. “Many Chinese postdocs still go abroad to do research, but nowadays more and more of them come back to China to continue their career.”

More Recognition for Postdocs

Another positive trend that 2009 survey participants identified is that postdocs today are more likely to have higher salaries than 10 years ago and to have benefits. According to data from the US National Science Foundation, of the postdocs who received their Ph.D.s between 2001 and 2006, 91 percent received health benefits and 50 percent received retirement benefits from their current or most recent postdoc employer. (National Science Foundation, division of science resources statistics, Postdocs Participation in Science Engineering and Health Doctorate Recipients, 2008, [www.nsf.gov/statistics/infbrief/nsf08307](http://www.nsf.gov/statistics/infbrief/nsf08307))

“I think there is an increased awareness of the contributions postdocs make. And people are more aware of the need to provide benefits. In general, the postdoc community is more in the forefront,” says Phillips. “But that does not mean that we don’t still have a long way to go.”

One of the main factors that has served to increase such awareness is the establishment of postdoc offices and associations at many universities. At the University of Alberta in Edmonton, Canada, the postdoc office has made “the situation between postdoc and supervisor really clear,” says biochemistry professor **Joel Weiner**. “Expectations used to be loosely defined. Now we have a formal letter that lays out the project the postdoc will work on, the rules about the maximum length of the appointment, and enforced salary levels.”

Under new regulations, postdoc positions at the University of Alberta cannot last longer than five years. “I think it has been a really good change,” says Weiner. “But some people don’t like it. You can no longer have a postdoc in your lab for six or seven years at \$20,000 a year.” **continued »**

## Postdoc Survey Results

PI Rankings 2009	Postdoc. Rankings 2008	Attribute
1	7	Communication
2	1	Direction and Vision
3	4	Mentoring
4	9	Training
5	N/A	Work Culture/Environment
6	2	Networking
7	5	Employer/Situation
8	N/A	Quality of Life
9	6	Advancement/Career Options
10	8	Compensation and Benefits
11	10	Considering Spouses/Partners

**Comparison of attribute rankings from principal investigators (PIs) and postdocs.** The table compares certain attributes of a successful postdoc, as rated by PIs in this year's survey, and postdocs in the 2008 survey. Of note are the clearly divergent views on Communication, Networking, and Training.

Lawrence Livermore National Laboratory in California, a government laboratory funded primarily by the US Department of Energy, hires about 50 percent of its postdocs as permanent staff members. **Ian D. Hutcheon**, deputy director of the Glenn T. Seaborg Institute at Lawrence Livermore, has noticed that in recent years there are more opportunities for women to be postdocs and then move on to obtain permanent positions. "We have a pretty generous maternity leave policy; there is much greater awareness of the needs for all postdocs to spend time with their families," says Hutcheon.

This awareness was lacking when **Lynn Zechiedrich** did her postdoc at the University of California, Berkeley in the early 1990s. "I did not know whether I even had any benefits until I became pregnant," she says. "I just did not think about it. I was focused on my work." When her son was just seven weeks old Zechiedrich was asked to return to work. "It never occurred to me I could ask for more time," she says. "Today postdocs are not so clueless. They will speak out."

The change, Zechiedrich and others believe, has to do with postdocs being savvier and more aware, as well as a general change in culture. "There are more women in science, more families, and more acceptance of family," says Zechiedrich, who is at the Baylor College of Medicine in Houston, Texas. "There is also more appreciation of the work being done by trainees and willingness to treat them well."

### Where Have the Outstanding Postdocs Gone?

One change from this year's survey compared to the one conducted in 2007 is that only 39 percent of supervisors said they are currently supervising a postdoc that they consider to be outstanding—down from 45 percent in 2007.

In some of the "newer" research fields, outstanding postdocs are still hard to come by. "In our particular field, bioinformatics, it is rare to find postdocs with really strong skills both in the life sciences and in a technical area. For example, a mathematician who is able to formulate and pursue a biologically relevant research question or someone with lab experience who is able to develop new models or algorithms," says **David Kreil** of Boku University in Vienna. He points out that most current Ph.D. programs do not provide this kind of "dual-training."

Most postdoc supervisors who were interviewed for this article, however, did not think that the quality of postdocs had changed. "I have not seen a decrease in the availability of qualified people but we all like to hire the best and the brightest. It's a very competitive market. We all try to hire people who are really good but there are only so many of them," says Hutcheon.

So what should a supervisor look for? The most common attribute 2009 survey participants looked for when recruiting a new postdoc was a strong research experience; it was cited by 82 percent of those polled. Other common factors included interest in working in new fields (53 percent), having a graduate adviser with a good reputation (48 percent), and coming from a good research institution (34 percent).

One thing that has not changed in this year's survey compared to the 2007 one is what supervisors believe makes a successful postdoc experience. When survey participants were asked to rank the importance of several factors, the majority agreed that conducting high quality research (79 percent), learning to work independently (66 percent), and publishing work (65 percent) were most important to a successful postdoc experience. These responses were virtually unchanged from two years prior.

Similarly when participants were asked to rate the importance of 12 groups of attributes in contributing to a successful postdoc experience, the three that came up on top—communication (91 percent), direction and vision (92 percent), and mentoring (91 percent)—were also the same as those ranked highest in 2007 but differed in certain aspects from 2008 postdoc rankings (see table, left).

Scientific careers have undergone many changes in recent years. Some changes have to do with the funding situation, others with the type of research that is being conducted, others yet, with the rules and regulations put in place at institutions. But one thing that will probably never change is why people do science. "If you don't love doing science, you should never pick this career," says Hermanson. "We live for the moment of discovery. Three hundred sixty days could be pretty boring. But it's definitely worth it for those 5 days of excitement."

### Featured Participants

**Baylor College of Medicine**  
www.bcm.edu

**Boku University**  
www.boku.ac.at/home.html?L=1

**Glenn T. Seaborg Institute**  
seaborg.lanl.gov

**Karolinska Institute**  
ki.se/?l=en

**National Postdoctoral Association (NPA)**  
www.nationalpostdoc.org

**National Research Council**  
www.nationalacademies.org/nrc

**Scottish Crop Research Institute**  
www.scri.ac.uk

**Shanghai Jiao Tong University**  
www.sjtu.edu.cn/english/index

**University of Alberta**  
www.ualberta.ca

**University of Maryland, College Park**  
www.umd.edu

**University of Oxford**  
www.ox.ac.uk

**University of Pennsylvania**  
www.upenn.edu

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