

Superpostdocs Reach for the Stars

In the US and now also in Europe, a growing number of special fellowship programs, sometimes called “superpostdocs,” offer newly minted PhDs instant independence and enable them to undertake pioneering research. Job prospects for fellows are rosy, but such early independence is not for everyone.

Lawrence Bragg won the Nobel Prize at age 25, Jim Watson at 34, and David Baltimore at 37. Yet today, few scientists even obtain an independent research position by their mid-30s. So says Barry Dickson, scientific director of the Institute of Molecular Pathology (IMP) in Vienna, Austria. Shortly after becoming director last year, Dickson launched the IMP Fellows Programme to give young researchers with a PhD completed within the last 12 months the support to do independent research. The 4-year program, Dickson explains, was created to halt the trend of the postdoctoral fellowship becoming a period of scientific employment rather than a time of creative and independent research.

Peggy Stolt-Bergner, the first and so far only IMP Fellow, was 29 when she became a fellow last summer, after a brief stint as a postdoc. Now she has lab space for 3 or 4 people, a salary of about €57,000 per year, funding for one master's student or a part time technician to help with research, and about €30,000 per year for research supplies. “You are completely independent,” says Stolt-Bergner, a structural biologist who studies ways to stabilize membrane proteins to make them more amenable for crystallization. “It is both empowering and a bit intimidating to know that success or failure lie only on your shoulders.”

Across the Atlantic at Princeton University in Princeton, NJ, Lewis-Sigler Fellow Maitreya Dunham has a very similar experience. “I am responsible for everything, and at some point that gets a little overwhelming,” she says. The 29-year-old commands an annual salary

of about \$70,000 and can spend \$200,000 a year for her research. She has six benches with two full-time technicians, five undergraduate students, and one professor on sabbatical working in her group. “It's kind of like a professorship in training, I get to pick up project management skills,” says Dunham, who came to Princeton as one of the first Lewis-Sigler Fellows in the summer of 2003. That was right after completing her PhD in genetics with David Botstein at Stanford, where she worked on experimental evolution in yeast, work she continues at Princeton.

The IMP and Lewis-Sigler Fellowships are two recent additions to a growing number of such fellowship programs. Sometimes called “the superpostdoc,” these special fellowships give young researchers an early opportunity to do independent research right after their PhD (Table 1). Most are in the US where their numbers keep growing. Just last year, the Broad Fellows Program in Brain Circuitry at CalTech in California and the Janelia Fellows Program at HHMI's Janelia Farm in Virginia opened their doors to new fellows.

Some see the programs as a way to recruit the most talented young researchers before anyone else can recruit them. They are also a way to give young researchers an opportunity to do risky projects while they are at their most creative. “Given that the ‘sweet spot’ for discovery is typically hit between 30 and 50, it is distressing that so many young scientists are not on their own until halfway through this period,” says Steven McKnight, who chairs the department of biochemistry at the UT Southwestern Medical Center in Dallas, Texas.

Thirty years ago, McKnight was a fellow at one of the first places in the US that offered “superpostdocs”: The department of embryology at the Carnegie Institution in Baltimore, Maryland. As one of the first “staff associates,” McKnight says “I was given the luxury of doing my own, independent research no more than four years after I initially started graduate school.”

Another well-established fellows program is that at the Whitehead Institute in Cambridge, Massachusetts. It was started in 1984 by David Baltimore, the founding director of the institute. Lewis-Sigler Fellow Dunham says she knew that she wanted to be a fellow ever since she worked as an undergraduate at MIT just down the hall from the Whitehead fellows. “They were having such a great time and so much freedom,” she says.

In Europe, programs like that at the IMP still seem to be the exception, but that's starting to change. Until recently, young researchers like Gregory Jefferis in the UK had to be creative to find ways to do independent research early in their careers. Jefferis, a neuroscientist in the Department of Zoology at the University of Cambridge, won a research fellowship from the University of Cambridge's St. John's College. But the fellowship does not provide much to cover research expenses, and so Jefferis applied for an Advanced Training Fellowship from the Wellcome Trust. That fellowship, however, requires at least two years postdoctoral experience. So Jefferis had to convince the Trust that, after his longer American PhD and a year in his thesis advisor's lab, he was experienced enough to get the Training Fellowship. At a time

Table 1. Fellowship Programs in the US and Europe

Program Country	Name/Website
Germany	MPG Otto Hahn Prize
Austria	IMP Fellowship Programme; http://www.imp.ac.at/fellows/index.html
UK	Sir Henry Wellcome Postdoctoral Fellowship; http://www.wellcome.ac.uk/node2151.html
UK	Cambridge St. John's College Research Fellowships; http://www.joh.cam.ac.uk/research_fellowships/
US	Harvard Junior Fellowship; http://www.socfell.fas.harvard.edu/
US	Carnegie Institution Staff Associate Program; http://www.ciweb.edu/pages/staffassoc.html
US	Whitehead Fellows Program; http://www.wi.mit.edu/research/fellows/index.html
US	Bauer Fellows Program at Harvard; http://sysbio.harvard.edu/CSB/research/fellows.html
US	Rowland Junior Fellows Program at Harvard; http://www.rowland.harvard.edu/rjf/index.php
US	Lewis-Sigler Fellows at Princeton; http://www.genomics.princeton.edu/topics/lfellows.html
US	UCSF Fellows Program; http://www.sdbonline.org/pdf/UCSF_Fellows.pdf
US	Sara and Frank McKnight Fellowships in Biomedical Research at UT Southwestern Medical Center; http://www.mcknightlab.com
US	CalTech Broad Fellows Program in Brain Circuitry; http://www.broadfellows.caltech.edu/
US	Janelia Farm Fellows; http://www.hhmi.org/research/fellows/

when research is very expensive, he says, old style fellowship programs like those offered by Cambridge University are no longer suitable because they don't pay much for supplies.

But recently, the Wellcome Trust started to close that gap. For the first time last year, the Trust called for applications for a new scheme called the Sir Henry Wellcome Postdoctoral Fellowship, says Emma Hudson, a science program officer at the Wellcome Trust in London. Similar to the IMP program, applicants can have no more than one year of postdoctoral research experience. The 4-year fellowships comprise £250,000 for basic salary and research expenses.

Similar changes are taking place in Germany. Last year, the Max Planck Society for the first time awarded the Otto Hahn prize for the

four best PhD dissertations that had been completed at a Max Planck Institute (MPI). The awards come with an offer to provide the funds and space to lead a research group at an MPI in Germany. The four winners were selected from more than 500 dissertations that were completed in Max Planck Institutes that year. "They are the guinea pigs," says Herbert Jäckle, Vice President of the Max Planck Gesellschaft. If successful, a similar program may become available for applicants who are not at MPIs, Jäckle adds.

The Otto Hahn prize is a response to the trend that the best doctoral candidates often go to the US and end up being offered group leader positions there. "The Americans say, they are so good, let's give them a group leader position," Jäckle says. "We were stupid not to do the same."

In principle, it already has been possible to apply for so-called junior group leader positions at MPIs without having done a postdoc, Jäckle says. Still, he points out that the Otto Hahn prize fills a gap because it is hard even for excellent candidates to have as good a publication record and to compete successfully with those applicants who have completed postdoctoral research. Despite such recent changes, only a handful of about 60 European group leader funding schemes for young life scientists don't require a postdoc, says Sabine Rehberger-Schneider, who runs the EMBO Life Sciences Mobility Portal, which has a database of funding opportunities (<http://mobility.embo.org>).

But a superpostdoc is not necessarily the best option for everyone, says Rehberger-Schneider. For one thing, it may be much harder to survive and be competitive when working on your own, she notes. Current Whitehead Fellow Andreas Hochwagen agrees. "It's like a jump in the cold water," Hochwagen says. "You are on your own." "They give you enough rope to do anything you want," says Joe DeRisi, who was a UCSF Fellow from 1999–2000 and now is an associate professor and HHMI investigator at UCSF. "But you can also hang yourself with that rope."

Rehberger-Schneider points out that a superpostdoc may not get training in the soft skills necessary to lead a group, which is where the group leader as a role model comes in. Allan Spradling, director of the Carnegie Institution's department of embryology, agrees. "The level of interaction you have as a postdoc [with your mentor] teaches you a tremendous amount about those indefinable stylistic aspects of science," says Spradling, who did a traditional postdoc himself. "Like, what do you do when the next obvious experiment isn't there anymore?"

"My advice to even people who want to be independent is to immediately get a mentor," says Trey Ideker, who was a Whitehead Fellow from 2001–2003 and is now an associate professor at UCSD. "Oth-

erwise, you are kind of left hanging.” That’s exactly what the IMP program advises its fellows to do. They have to nominate one or more faculty members as their official mentors for frequent discussions, and a mentoring committee meets at least once a year to monitor progress.

Doing independent research can be tough, but once fellows have finished a successful fellowship, their job prospects are excellent, as they have already shown that they can lead their own research group. Former fellows include researchers who went on to stellar careers, such as Carnegie alumnus and recent Nobel Laureate Andrew Fire and former Whitehead Fellow Eric Lander, one of the leaders of the Human Genome Sequencing Project and founding director of the Broad Institute in Cambridge, Massachusetts.

As a result, institutes around the country take note when someone becomes a Whitehead Fellow, says David Page, director of the Whitehead Institute, who became the first Whitehead Fellow in 1984. This can lead to invitations for informal visits and potential job offers. Indeed, some places that run fellows programs hire their own fellows as faculty. “It’s like early action for college,” says Ideker. “It’s a way to get the very best and brightest before they even go on the job market.”

Ideker says that just a year into his Whitehead Fellowship he got a job offer to stay at MIT (he declined because he wanted to go back to the West coast, where he had done his PhD). Meanwhile, Nevan Krogan has just been hired as UCSF faculty in January this year after only one year as a UCSF Fellow. “This is a program where the university can check you out,” Krogan says. “At the same time, the fellow can check out the university.” IMP Fellows are evaluated for a group leader position before the end of their third year. “You are basically on a 4-year job interview,” IMP director Dickson says of the program. The situation is similar at the Broad Fellows program at CalTech, which just hired

its first two fellows last year. If the fellows do good work, “we’d shoot ourselves in the foot if we didn’t consider hiring them,” says neuroscientist Christof Koch, who directs the program.

But not all universities or institutes with a fellows program intend to hire their fellows. Carnegie’s Spradling says the “real original reason” for the staff associate program was not to test people and then promote them to a faculty position if they do well. That only happened once in the 30-year history of the program, with Andrew Fire, he says. Rather, Spradling points out, the program exists to give the opportunity “to do something novel at a very creative time and have as much as five years before you have to accomplish that.” The Carnegie program, he says, allows fellows to do research outside of the mainstream that they normally would not get funding for. Carnegie Fellows often take on entirely new approaches to a problem or do pioneering work. For example, current fellow Alex Schreiber says his is the only group that studies the molecular developmental biology of flatfish metamorphosis. “The whole point of this position is you don’t do mainstream work,” Spradling says. Similarly, CalTech’s Broad Fellow Sotiris Masmanidis says the fellowship allowed him to take a leap from nanotechnology into neuroscience. The 26-year-old now uses his experience to build nanosized sensors to measure brain activity. He can spend about \$100,000 a year for equipment and staff and gets an annual salary of about \$70,000.

Because of their good track record and excellent job prospects, the competition to get one of the fellow spots can be tough at programs where anyone can apply. At Janelia Farm, which has hired its first five fellows and intends to expand the number to 20, more than 1300 people have currently started an online application, and about 100 have completed it, says Kevin Moses, associate director for science and training at Janelia. “The idea was that the fellow would be someone who is a very outstand-

ing grad student and has ideas for their own group,” Moses says. But previous publications in top journals are not the most important thing, Moses adds. “We emphasize future potential,” he says. Similarly, to be selected for the Bauer Fellows program at the FAS Center for Systems Biology at Harvard, past performance as well as future research plans are important, says Michael Laub, a former Bauer Fellow and now an assistant professor at MIT.

For other programs like those at UCSF and the Whitehead, candidates have to be nominated. Again, it is not really how many papers one has published that makes a candidate stand out, says current Whitehead Fellow Hochwagen, but the creative potential. “Of course, you need a few papers to show that you can get results,” says Hochwagen, who was nominated by his former mentor, MIT’s Angelika Amon, herself a former Whitehead Fellow. A first author paper in *Cell* that came out of Hochwagen’s PhD certainly helped, he says. Still, “they need to get the feeling that you can start and finish a project,” he adds. During his PhD, Hochwagen initiated a number of projects and brought them to completion by publishing papers. “We are not fixated on the number of publications or where they are published,” says Whitehead Institute director Page. “We are looking for special promise of creative contributions.” In addition, applicants for some fellows programs need to have interests that fit the goals of the program. For example, for the CalTech Broad Fellowships, applicants need to be interested in brain circuitry research. And candidates for the Lewis-Sigler Fellowships at Princeton must have an interest in teaching, Dunham says.

Although more places are starting their own fellows programs, it seems unlikely that they will become a common step on the way to a faculty position, in part because they are expensive, Carnegie’s Spradling says. One HHMI Janelia Fellow costs \$2–3 million for the entire 5-year fellowship, points out Moses. Some programs are

financed by endowments or gifts, and as more former fellows have moved on to successful careers, their number is likely to grow further. McKnight says he has invested money from a company he founded about 15 years ago called Tularik Inc. to fund a fellows program at the department of biochemistry at UT Southwestern Medi-

cal Center in Dallas, Texas. The fellowship pays about \$100,000 a year to support promising postdocs, paying for their salary, the salary of one technician, and experimental supplies. The 3-year program is about 5 years old and has already produced two successful alumni, Jared Rutter, now assistant professor at the University

of Utah, and Benjamin Tu, now assistant professor at the UT Southwestern Medical Center.

“A generation ago young biologists had their first independent job by the age of 30, now it is more like 40,” McKnight says. “This is our teeny blip of [an] attempt to reverse what I see as a terribly bad trend.”

Andreas von Bubnoff

Washington DC

DOI 10.1016/j.cell.2007.03.005