

REAL LIFE V

The Euro-Postdoc: National Barriers Are Crumbling

American postdocs may have a plethora of legitimate complaints, but they have always enjoyed one advantage over their counterparts in Europe: a job market that spans a unicultural continent. After finishing a Ph.D. at Stanford University, you're likely as not to end up doing your first postdoc three time zones away on the East Coast. But it's an adventurous young European researcher who ignores the barriers of language and culture and switches to a lab at the other end of the continent. And pulling off a successful postdoc in a foreign European lab has taken luck as well as pluck: "In general, there's a shortage of fellowships in Europe," explains molecular geneticist Pierre Chambon, whose Strasbourg University Institute of Biological Chemistry ranks among Europe's top postdoc destinations. But in the name of European unity, that's now beginning to change.

What's happened is that the European Community (EC) has discovered the postdoc. In 1985, the Brussels-based European Commission awarded only about 50 fellowships for postdocs hoping to leave their home country for a lab elsewhere in the EC. In 1991, 500 such grants were awarded, and in the fall this figure should more than double with the launch of a grandly titled program called "Human Capital and Mobility."

Together with the increasing availability of travel grants from national government agencies and private foundations, the EC's interest in supporting extranational postdoctoral work means that what was once a trickle of young scientists crossing borders is now at least a small stream. No, the EC hasn't gotten around to keeping any detailed statistics on the migration of postdocs, so nobody can say just how many young researchers cross borders without the EC's help. But in the absence of hard data, *Science* has turned to random interviews to discover both what has driven some of the current crop to stray from home, and what advice they may have for others thinking of making similar journeys. Not surprisingly, there are pluses and minuses in these adventures.

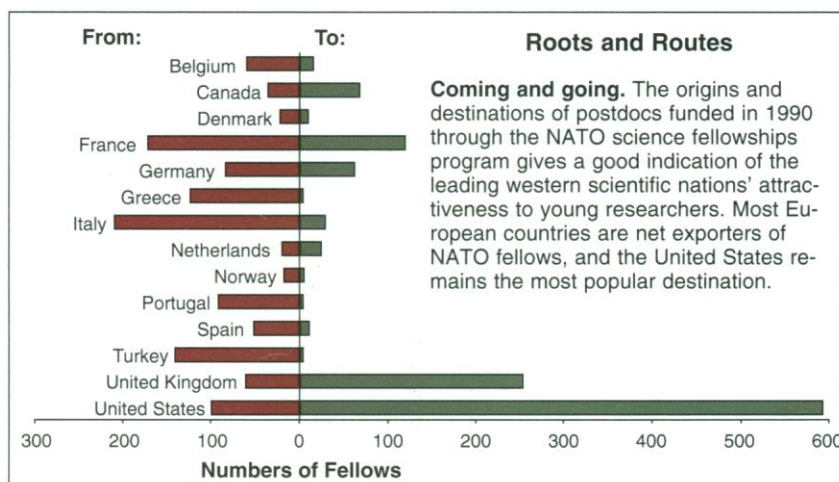
Ask most migrant postdocs why they moved to another European country, and the first answer is simple: The lab they joined was offering the most attractive project. But there are plenty of secondary motives. "I wanted to learn French," says Helen Bodmer, a British immunologist who's spent the last 3 years at Chambon's institute in Strasbourg. For Francisco Santos Aries—a Portuguese analytical electron microscopist who took his undergraduate degree and doctorate in France before joining Cambridge University's Cavendish Laboratory—the exposure to another country's distinctive lab culture is a major attraction. "You look at research in another way," he says. In Britain, Santos Aries says he's had "very easy contact with everybody," from Ph.D. student to lab director—which came as a breath of fresh air after the rigid hierarchy of most French labs.

But just because there are obvious benefits in working abroad doesn't mean that landing a position in a

foreign lab is easy: to the contrary, the postdocs *Science* spoke to say it can be quite tricky. First comes the problem of picking the right granting agency. A bewildering array of organizations will fund migrant postdocs in principle, but it pays to do some homework before applying. Matthias Merckenschlager, a German immunologist who's also at the Strasbourg biochemistry institute, says that he found it "relatively easy to get a fellowship," but he's being modest about his persistence. When Merckenschlager first decided to move to France, after already doing his Ph.D. away from home (at the Imperial Cancer Research Fund in London), he applied for fellowships both from a private foundation funded by the drug company Boehringer Ingelheim and the German government's official academic exchange program. When these were unsuccessful—Merckenschlager assumes that German organizations didn't want to fund a researcher going from Britain to France—he had to rely for 6 months on a temporary salary from Strasbourg University. Relief eventually came with the offer of fellowships from both the European Molecular Biology Organization and the Japanese-inspired international Human Frontier Science Program—which runs a traveling postdoc scheme in molecular biology and neuroscience as well as providing large grants for international research teams. Both agencies had previously funded work in the Strasbourg University institute that Merckenschlager had joined—hence one key piece of advice from the young German: "Apply to an agency that's already funded your [chosen] lab."

Of course, stay-at-home postdocs can experience similar difficulties, but the migrant has another problem: Traveling fellowships often aren't long enough to last 2 years—often the minimum time required to complete a research project. Indeed, many of the postdocs with whom *Science* chatted warned that anyone going for such grants ought to examine the small print: Several traveling fellowship schemes seem to promise a second year of funding, but the reality can be closer to what befell Jordi Bernues, a Spanish nucleic acid biochemist. When he left Barcelona for the European Molecular Biology Laboratory (EMBL) in Heidelberg, Bernues thought his EC fellowship would last for 2 years. But renewal after a year wasn't the formality that he'd expected, and Bernues was given only another 6 months funding. "I had to look for another fellowship," he says, "and that was a real problem." Granting agencies wouldn't provide a fellowship for Bernues to con-

As funders of the new migrants multiply, it pays to do some homework.



tinue his work in Heidelberg. "So I finally ended up getting the money from the EMBL budget," he says.

Getting sustained financial backing is one of the most easily measurable hurdles for postdocs thinking of leaving their home bases. But a far more subtle potential downside of traveling is the possibility that after a few years spent abroad you may have lost contacts vital for getting a job when you return home. Most migrant postdocs tend to think about the pluses of their foreign work experience: that their contact with a foreign lab will lead to career-boosting collaborations later on, for

example. But Michele Spada, an Italian researcher at the Max Planck Institute for Plasma Physics near Munich, worries about his future. "I'd like to go back to Italy," he says, but after 4 years away, working first on a Ph.D. thesis, and now as a postdoc, he is sure that he'll have to compete as an outsider against other young Italian physicists who have networked with the professors who sit on Italy's central academic appointment committees.

Losing contact with the home job market is also a problem for postdocs who've come to Europe from the

Euro-Postdoc: Get Thee to a Euro-Lab!

Thirty years ago, the only center that really deserved the title of "European laboratory" was CERN, the particle physicists' showpiece in Geneva. But today, everyone's in on the act. Astronomers flock to the European Southern Observatory's (ESO) telescopes in Chile, and with the rise of the European Molecular Biology Laboratory (EMBL) in Heidelberg, even small science has caught the Eurolab bug. And starting in 1994, the European Synchrotron Radiation Facility in Grenoble will be a magnet for materials scientists and structural biologists. These centers aren't just a focus for European pride. Increasingly, CERN and its emulators play a central role in the careers of Europe's brightest young researchers. And for many established professors, the few weeks a year spent at CERN or ESO may be the only release from the twin hassles of teaching and administration—time to get down to some serious research.

CERN

If you're an up-and-coming postdoc who wants to plug into the science job market, there are few better places to be. Sit for long enough in CERN's cafeteria and "you see just about everybody in the business coming through," says Vernon Hughes, a Yale University physicist who's one of CERN's many regular U.S. visitors. Indeed, the unique opportunity for networking may be CERN's greatest attraction, says Egil Lillestol, a Norwegian who joined the Geneva center's staff 3 years ago—the culmination of an association with CERN that began 30 years ago as a student.

Salaries are generous, too: Lillestol, for instance, doubled his take-home pay when he moved from the University of Bergen. For those who'd like to make membership of CERN's scientific staff a firm career goal, however, Lillestol's message is blunt: Forget it. More than 4000 researchers visit CERN each year, but fewer than 50 research physicists are on the center's permanent payroll. "We are headhunting clever European physicists for the one or two permanent positions that become available each year," says Lillestol.

But for those embarking on their careers, a few years spent at CERN is an impressive addition to anyone's resume. If you look at recent hirings by the top U.S. high-energy physics labs, "many of those people have been to CERN," says Bob Kowalewski, an American who's one of CERN's 100-strong complement of postdocs.

ESO

The steady flow of scientists through ESO provides fertile ground to sow the seeds of future collaborations. At La Silla observatory in Chile, "there's always someone doing work that's of interest to you," says Harvey Butcher, director of the Netherlands Foundation for Research in Astronomy. As a busy science administrator who hasn't given up his own research, Butcher also appreciates La Silla's other main virtue. On a remote mountain in the Chilean

desert, there are few distractions to get in the way of the science, he says. "Many of us who are regular users have that almost as a major motivation."

As at CERN, ESO's in-house science division—which numbers fewer than 10 people, divided between La Silla and ESO's headquarters in Garching, near Munich—is dwarfed by the 300-plus researchers who visit La Silla each year. And the observatory's astronomers must all take on a heavy administrative load to ensure that the wheels turn smoothly for La Silla's visitors. As a result, ESO astronomer Jacques Breysacher reckons he spends "not more than 30%" of his time on his own research into stellar evolution.

ESO's postdocs and Ph.D. students don't have the same responsibilities, and again, there are few better places to start a career. "ESO has more money, in comparison with national institutes, to send people to attend international conferences," says Breysacher. The only problem: ESO hosts fewer young researchers than the other Eurolabs—and the six postdoc fellowships that are offered each year typically attract almost 100 applications.

EMBL

If you're looking for a Eurolab that's made the nurturing of young scientific talent its central theme, look no further than EMBL. Two-thirds of the Heidelberg center's 330 researchers are postgrads and postdocs, and even the 60 group leaders who form EMBL's backbone reflect the emphasis on youth: Some are as young as 28, and none stays for more than 9 years. With research funding hardwired into his contract, joining EMBL as a group leader "was the ideal opportunity to build up an independent group and establish some kind of research profile," says Angus Lamond, a British RNA biochemist who came to Heidelberg 5 years ago, from Phillip Sharp's lab at MIT.

Like Lamond, some three-fourths of EMBL's group leaders are Europeans recruited from U.S. labs, and most return to their own countries. To allow this high turnover of young European scientists, current EMBL director Lennart Philipson has doubled the lab's size since taking over in 1982, at the same time cutting the number of permanent staff from 48 to 29. But EMBL isn't there to provide long-term jobs, says Philipson: It's all about "bringing home the good things about U.S. science."

It's not just the scientific opportunities at EMBL that make it an attractive staging post for young European biologists returning from the United States. For some, EMBL's social environment can be as big a draw. After spending 5 years at Columbia University as a Ph.D. student, finding another lab willing to embrace newcomers of any nationality was a high priority for Athanasios Papavassiliou, a Greek postdoc now entering his second year at EMBL. Heidelberg can't equal New York's cosmopolitan appeal, but within EMBL's walls there's "the same feeling of not being a foreigner," he says.

—P.A.

United States. To keep yourself visible, "you have to attend lots of meetings," says molecular biologist Sam Gunderson, who came to EMBL after finishing his Ph.D. at the University of Wisconsin.

The pitfalls notwithstanding, few migrant postdocs seriously regret the experience. "If I could go abroad again, I certainly would," says Santos Aries. And that's a message that needs to be broadcast loud and clear to Europe's young researchers, according to François

Kourilsky, director general of the French Centre National de la Recherche Scientifique, who says: "The Europe of science will be built through postdoctoral exchanges." But Europe will need to do even more than it is already to make its postdoc opportunities as attractive as those offered on the other side of the Atlantic. As the figure on p. 1743 shows, when a young European leaves for a foreign lab, it's likely to be on a transatlantic flight.

—Peter Aldhous

Future Goal: The Euro-Scientist

Europe may be moving inexorably toward political and economic union, but when it comes to what most worries thoughtful Europeans with regard to the scientific profession in their individual countries, there's little or no unity of concern.

Yes, nearly everyone frets about the graying of the scientific workforce, most particularly in academic circles. Says Daniel Andersen, chairman of Denmark's Medical Research Council: "We have very great worries about our career structure. Most of the permanent positions are filled with people in their fifties and sixties." But a quick survey of research administrators in Europe's leading scientific nations reveals that this may be about the only point of commonality.

In Britain, the major headache is youth: an explosive growth in the numbers of postdocs and temporary research assistants. Over the 1980s, the number of British university scientists on short-term contracts doubled, while the number of permanent positions remained more or less constant. "We're now building up a group of mid-career people with nowhere obvious to go," says sociologist Howard Newby, chairman of the UK Economic and Social Research Council. In the long term, the availability of permanent university jobs should increase, as more lecturers will be needed to teach a student population that's set to grow by a third over the next decade. But this trend has "come too late for the present generation of thirtysomethings," says Newby.

To French lab chiefs, in contrast, Britain's glut of postdocs looks like an embarrassment of riches. In 1983, the French government decided that researchers in public-sector labs—including those at the universities—should get tenure immediately after completing their doctorates. The idea was to give young researchers some long-term job security. But the move has also created problems: Some scientists who supported it at the time now complain that it's practically impossible to hire a young French researcher to work for just a couple of years on a new project, as every French researcher in his or her late twenties expects an offer of a job to be one for life. "I think we did something that was too extreme," says Françoise Russo-Marie of the Cochin Institute of Molecular Genetics in Paris. And there's little hope of a change any time soon. Philippe Lazar, director general of INSERM, the government's medical research agency, says a U.S.-style postdoc system isn't consistent with the French philosophy: "People want to have some stability in their careers."

Over the Alps in Italy, there's a similar dearth of postdocs, but that's not the only problem. The career issue that's stirred up most controversy in the past few years is Italy's byzantine system of appointing university professors. When an academic retires, an Italian university can't just fill the position by appointing a promising young researcher. The reason: Italian professors and associate professors must be appointed through national competitions where several hundred researchers often chase as few as 30 jobs. In most disciplines, these competitions usually happen only once every 5 years, so "in general, we wait for 3 or 4 years for a full

professor," says Fernando Aiuti, a clinical immunologist at the University of Rome. Worse, he says, there are no strict criteria to ensure that the best candidates get the jobs. So favoritism can step in, and former pupils of the researchers who sit on the judging committees often benefit.

In Germany, too, aspiring academics face a formidable hurdle before they can become professors. To enter the top ranks of German academia, a candidate usually has to complete a degree called the "habilitation." Five or so years after completing a Ph.D., a German researcher seeking to become a professor must prepare another thesis on his or her postdoctoral work, which must then be approved by a senior faculty committee at the university. What does this extra hurdle achieve? Its defenders claim that it's necessary as a filter to maintain quality in Germany's universities. But others are skeptical. Horst Kern, a University of Marburg cell biologist who was a member of the German government's advisory Science Council until last January, contends that "the habilitation has not added to the quality of teaching." Kern would like to see a system that simply assesses a researcher's publications, rather than demanding a time-consuming thesis. But in a country that's always reluctant to break with tradition, he says, "that's heresy."

And then there's Germany's second problem—one that is a source of even more widespread concern: Scientists on average don't complete their doctorates until they're around 32 years old, about 5 years later than their counterparts in Britain. This isn't unique to Germany: In Denmark—as in the other Nordic nations—says Lauritz Holm-Nielsen, rector of the Danish Research Academy, doctorates were traditionally a "mid-career reward to the best researchers," rather than an essential part of a young scientist's training.

Denmark, at least, has decided to change that: Realizing that young Danish scientists stood to miss out in a job market that's becoming ever more international, the Danish parliament in 1986 formed the Research Academy, which has launched a new program of grants to encourage more Danes to carry on straight from their undergraduate studies to a Ph.D. The incentive seems to have worked: Denmark now has six times as many students enrolled in Ph.D. programs than it did 5 years ago.

So far, it's small countries like Denmark that are paying the closest attention to international trends when thinking about how to improve the career structure for their researchers. But some scientists predict that the march toward European unity will eventually compel the continent's major scientific powers to start thinking the same way. For example, Marburg's Kern says: "I think that Germany will be forced into reforms through European unification." And when a country like Germany can't think about career structure for its large scientific workforce without looking at what's happening elsewhere in Europe, then it may not be so long before there is such a thing as the standard European research career.

—P.A.

With additional reporting from Patricia Kahn.