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The University of Bonn in Germany is one of the many institutions across Europe that are attracting early-career researchers from around the world.

RELOCATION

The European dream

Early-career scientists are increasingly drawn to the region's opportunities and diversity.

BY QUIRIN SCHIERMEIER

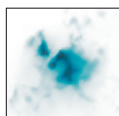
Fathiah Zakham's career so far has spanned much of the globe: the Yemeni scientist (who was born in Saudi Arabia) earned her PhD in Morocco and did postdoctoral research in Switzerland and Finland. In Yemen, she worked as a microbiologist at Hodeidah University until 2015, when it was bombed by an international military coalition fighting Yemeni rebels.

Now, in Finland, she has found a safe and more liberal research environment than in Yemen. "I was never free there to do the

research I wanted to do," says Zakham, who has been conducting research on tuberculosis and viral fevers at the University of Helsinki since 2018. "Male colleagues refused to involve me in any activity or projects. My supervisor here grants me every freedom I could ask for." The long-stay European visa she obtained, together with a grant from the Institute of International Education in New York City,

enabled her to go to Switzerland in 2017 for a postdoc at the University of Lausanne, before her move to Finland a year later. She adds that she did not consider the United States because of potential visa obstacles.

The United States remains the most popular country for junior scientists, particularly those from Asia, in which to seek experience. But the pull of the United States has somewhat waned, owing partly to travel restrictions for students and scholars from several Muslim-majority countries, including Yemen. Applications for specialist visas, which most foreign scientists need to work in the United States, have ►



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► fallen by 19% since 2016. Conversely, the flow of talent to Europe is on the rise.

Moving to a new country enables early-career researchers to gain fresh cultural and scientific perspectives. For many non-European Union scientists, a successful research project in Europe is also a springboard to a career in their home country.

"I can affirm that I have my job thanks to my stay in Europe," says Regina de Sordi, a pharmacologist at the Federal University of Santa Catarina in Florianópolis, Brazil. She spent two years as a postdoc at Queen Mary University of London, UK, from 2013 to 2015. The opportunity to collaborate with international researchers in Europe furthered her career in Brazil, she says.

CUTTING EDGE

One of the attractions of Europe is the chance to gain experience in a multicultural research environment using advanced scientific techniques and state-of-the-art instruments. "During my stay in Germany, I was trained on how to work with a wide range of cell lines from fibroblasts to induced pluripotent stem cells," says Nowsheen Goonoo, a biochemist from Mauritius who spent a year at the University of Siegen in 2016–17 as a postdoc.

Goonoo, now a postdoc at the University of Mauritius, says that she found her stint in Germany — funded by the Alexander von Humboldt Foundation — to be an enriching experience on a professional and personal level. "It was relatively easy to adapt to the German lifestyle and food," she says. She received hands-on training in atomic-force microscopy, fluorescence microscopy and X-ray diffraction, and built networks that resulted in several joint publications. In 2017, she returned to her former group, where she now oversees the cell-culture lab. "Experience I acquired in Germany is highly beneficial for the progress of our research on biomaterials and polymer characterization," she says.

De Sordi, whose native Brazil attracts relatively few international students, says that it was hard to imagine how international science can be before arriving in the United Kingdom. In London, she joined a group that included young scientists from China, Ireland, France and Japan.

She says that it was difficult at first to acclimatize but that she grew more comfortable as time went on. "People are more reserved here, so I was feeling quite alone in the beginning," notes de Sordi, who adds that she also found English hard to understand, initially. "I was quite surprised that my years of English classes were not as helpful as I imagined. But after six months I was used to the differences in culture and I was absolutely in love with everything. I learned something new every day in a very inspiring environment. After this international experience I was really another person — much more confident, personally and as a scientist."

Europe, of course, has downsides, including language barriers, administrative burden, a high cost of living in many EU cities and a perplexing diversity of national and European funding systems. Some find cultural differences difficult to navigate, for instance citing the unspoken, unwritten protocols that surround traffic, bicycles and queues. Social and professional relationships can also be challenging; some wonder whether it's OK to ask colleagues for help. And southern and eastern European countries generally draw fewer international researchers than do northern European countries, such as the Netherlands, Germany or the United Kingdom.

However, the EU's well-developed research infrastructure and varied funding sources puts it on a par with North America and Asia's strongest science-focused countries. In 2018, scientists in the EU produced about 25% of the global share of peer-reviewed science and engineering papers — more than either China (21%) or the United States (17%). And most scientists who relocate to Europe from regions that have fewer resources find that conditions for science — including funding, training opportunities and access to research facilities and lab reagents — are much better than in their native area.

"Many people want to go to the United States because they think it's the best place to do science," says Yulia Ermakova, a Russian postdoc at the European Molecular Biology Laboratory (EMBL) in Heidelberg, Germany. "But for me, EMBL is what scientific paradise might look like. I really couldn't ask for more." In Russia, she says, she had to wait several months for the delivery of reagents, such as deoxynucleotide triphosphates, which would often arrive overheated, damaged or beyond their expiry date. At EMBL, reagents arrive within a few days of ordering and at much lower cost than in Russia.

EMBL is Europe's flagship biology lab. This intergovernmental organization involves more than 80 independent research groups at six sites in Heidelberg and Hamburg in Germany, Barcelona in Spain, Grenoble in France, Rome, and Hinxton in the United Kingdom. Scientists there can rely on some of the most advanced microscopy facilities in the world and receive tailored training in analysis techniques for their projects. EMBL also organizes regular training courses and summer schools, such as in bioinformatics, image analysis or CRISPR–Cas engineering, which visiting scientists from around the world can attend.

But Europe's research capacities are distributed unequally. Strong science hubs in western and northern Europe contrast with less-developed science landscapes in the south

and southeast. Countries such as Bulgaria and Romania, both of which joined the EU in 2007 and which invest little in science, scarcely benefit from the bloc's allure for foreign scientists. Others, including Finland, Sweden, Germany and Switzerland, which are among the world's top science spenders, attract thousands of foreign researchers each year. So does the United Kingdom, which hosts some of Europe's highest-ranked research universities. In the 2017–18 academic year, around 25,000 scholars and scientists in the country — more than 12% of the total UK academic research staff — were from non-EU countries. No one knows how severely British science will be affected by the United Kingdom leaving the EU (and indeed, whether or when that will take place), but some leading UK scientists predict catastrophe.

UNFAMILIAR ENVIRONMENT

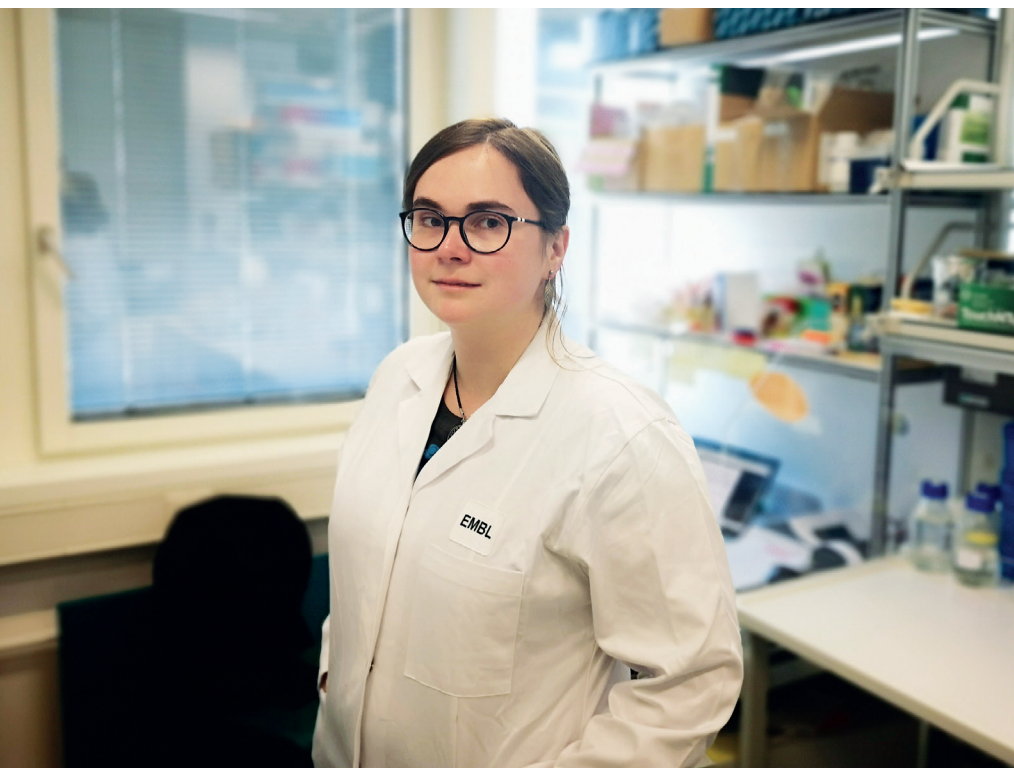
Non-EU scientists should learn well in advance about visa requirements and work permits in their country of choice. They should also check on opportunities — such as the Emmy Noether programme in Germany — to continue their research careers in Europe after their initial funding expires. The scheme, run by Germany's main funding agency, the DFG, gives highly qualified early-career researchers the chance to lead an independent junior research group for a period of six years.

"You want to make sure you can survive in an unfamiliar environment," says neuroscientist Sha Liu from China, a group leader at the Centre for Brain and Disease Research of the Flanders Institute for Biotechnology (VIB) in Leuven, Belgium. "Try to learn the local language as best as you can. If you need to recruit junior scientists, lose no time looking around for talent. And do get familiar with local funding mechanisms: if there is only one opportunity per year to apply for certain grants, you don't want to miss the deadline."

Liu had spent eight years as a postdoc at Johns Hopkins University in Baltimore, Maryland, before he moved to Belgium in 2017. He wanted to expand his research on the function of sleep in the brain, focusing on the underlying molecular and cellular mechanisms, but didn't want to join a less-venerated US lab to pursue his career, due to competition for the limited number of positions in his field. One year before his US contract ended, a senior scientist at the VIB encouraged him to apply for a grant from the European Research Council (ERC), the basic research arm of the EU's multi-billion-euro research programmes. He quickly wrote a grant proposal, but hardly expected to be invited to Brussels for an interview. He was overwhelmed to learn that he would get a five-year, €1.7-million (US\$1.9-million) starting grant that would allow him to set up his own independent lab in Leuven.

He knew little of Belgium, and, after nearly a decade in the United States, wasn't sure at first whether Europe was the right place for him to do science. Relocating also brought some

"After this international experience I was really another person — much more confident, personally and as a scientist."



Russian scientist Yulia Ermakova says that EMBL in Heidelberg, Germany, is a “scientific paradise”.

DMYTRO DZILUBA

difficult new tasks. “Finding PhD students and postdocs was quite a challenge,” he says now. “I didn’t expect that.” But thanks to extensive coaching, which young faculty members receive in Leuven — including training in language, communication, teaching and management skills — he soon settled into his new surroundings. He found that the research environment at the VIB is as liberal and inspiring as it was in Baltimore. “I’m free to do exactly the science I want to do in a very open and international atmosphere,” he says. “Most group leaders here have gathered experience in the United States, and there’s no director telling us what to do. I feel very comfortable indeed.”

ON THE MONEY

Researchers of any nationality are eligible for ERC grants provided that they are able to do most of the work at an EU research institute. “It was a terrific experience,” says Anna Harris, an Australian anthropologist at Maastricht University in the Netherlands, who in 2016 secured a €1.4-million starting grant from the agency for her research on how digital technologies reconfigure medical practices. “I loved having the opportunity to think up a dream project. Having it funded was extraordinary.”

Although scientists face strong competition for ERC grants, research fellowships are also available from scientific societies such as the Federation of European Biochemical Societies and from the European Commission’s Marie Curie research fellowship programme. National agencies such as the German Academic Exchange Service or the Alexander

von Humboldt Foundation also provide stipends and fellowship opportunities for non-EU researchers at all career levels.

When Harris was a PhD student in Australia, she didn’t have the budget to attend overseas conferences, so she rarely had a chance to meet the scholars whose works she read. In her field, she adds, the most eminent scholars were working in Europe. “Here,” she says, “I find that I meet people who write what I read all the time.”

Europe can be expensive, however. Exceedingly high living costs in cities such as London, Paris, Stockholm and Zurich, which host some of the continent’s best science institutes, are an issue for early-career researchers with modest salaries. “I find the cost of living much higher compared to the United States and Sri Lanka,” says Dilushan Jayasundara, who earned a physics PhD from the University of Houston, Texas, and was a postdoc at Trinity College Dublin from 2010 to 2013. Since then he has been a lecturer at the University of Colombo in Sri Lanka.

But Europe’s science is not confined to expensive capital cities. Smaller, more affordable university towns, such as Leuven in Belgium or Heidelberg in Germany, offer excellent research conditions and stimulating learning environments, too. And the relatively short distances (and good transport connections) in Europe also provide opportunities to meet people and establish connections.

As elsewhere in the world, early-career scientists in Europe face tough competition for funding and are under pressure to produce and publish results. But a reasonable work–life balance is still easier to achieve in Europe than

in countries where the level of social protection is poor and exhausting working hours are common in science.

“Science is not a recognized profession in Brazil, where I come from,” says Bernardo Franklin, an immunologist at the University of Bonn in Germany. “In Germany, PhD students are given working contracts, with regulations that provide them with insurances, pension and other benefits, and protect them from exploitation and abusive supervisors.”

SETTLING IN

Other elements of European culture might not be as easy to digest for scientists who hail from other regions. Maral Dadvar, an Iranian computer scientist at Stuttgart Media University in Germany, felt irritated at first by how reserved some Germans tend to be in everyday life. It also took her quite a while to decipher social conventions. “I wish I had known right away that it’s OK to ask for help and not a sign of weakness,” she says.

But she soon found that the advantage of working in a climate where science is unimpeded by religious state ideology or gender discrimination far outweighs cultural disparities. “As a woman, I have much better opportunities to pursue my career in Europe,” she says. “Computer science is already a male-dominated domain everywhere in the world. In Iran the limitations would be severe.”

Staying in Europe for an extended period — beyond a three-year postdoc position, for example — requires careful planning and perhaps some luck. Tenured positions are rare and highly sought after, meaning that scientists in Europe face an employment bottleneck. But EU science is closely connected to industry and policy-making, thus helping to absorb a portion of the qualified workforce that cannot stay in academia.

Flexibility and networking are key for establishing a career outside academia, says molecular biologist Clarissa Rios, a Peruvian postdoc at the Geneva Centre for Security Policy’s global fellowship initiative in Switzerland. A five-month traineeship last year at the European Commission’s Joint Research Centre — a science and knowledge service in Ispra, Italy, where she wrote a report, as yet unpublished, about social dimensions of human genetics — raised her interest in policy advice and science diplomacy.

Rios founded an online mentorship programme to help Latin American young researchers to develop professionally. Her advice to young scientists who are spending time in Europe is to step out of the lab often and look beyond their science.

“Don’t live in a silo,” she says. “Go out and learn how the problems we’re facing are tackled from different sides. It will broaden your horizon — and your career prospects.” ■

Quirin Schiermeier is Nature’s German correspondent in Munich.