

Focus on Germany

With the German Government now five years into a major program for investment in scientific research and innovation, we take a look at the new career opportunities that have opened up.

By Julie Clayton

Growing up as a Japanese immigrant in Germany, **Jun Okuda** saw a very different world in the 1970s and '80s to the one he sees today. "The German system, both East and West, was very closed and they just would not accept foreign people in much."

Although Okuda had a happy childhood and teenage years, with no experience of discrimination, when it came to developing his scientific career his Ph.D. supervisor told him "you're Japanese, you may have no chance in the German academic system—it's too closed. There are very few foreign academic researchers."

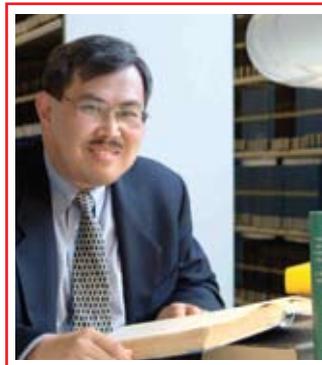
Feeling impatient, Okuda resolved to "forget about Germany" and went to the United States. But by the '90s, it was clear that Germany was changing dramatically and was actively encouraging an influx of foreign researchers. Okuda was in New York when he was offered positions in Marburg and Mainz, and in 2003 he became chair of Organometallic Chemistry at the RWTH Aachen University.

"Politically, increasing diversity has become a goal. Our university has really tried, and has increased the number of foreign faculty significantly in the last couple of years," says Okuda.

This shift in attitude toward foreign scientists reflects not only the emergence of a more outward-looking German society since the reunification in 1990, but also Germany's desire to raise its scientific profile and modernize the science system. Formalized by the Federal Government in August 2006, the wide-reaching "High-Tech Strategy" forms part of a push to invest three percent of German gross domestic product in research and development by 2010, as per the EU's Lisbon Agenda. In November 2006, the Federal Ministry of Education and Research launched an initiative to "Promote Innovation and Research in Germany", including a commitment to invest approximately €15 (\$19) billion. But to achieve this would require more recruitment and retention of both women and foreign workers if Germany were to stave off a predicted shortfall in skilled workers over the next couple of decades.

Another pillar of the new research and development policy is the Excellence Initiative, a major funding package of €1.9 (\$2.4) billion over five years. This was intended to shake up the university system and counteract the consistent failure for German universities to rank with the top 50 universities worldwide, despite Germany having Europe's largest national budget for R&D. Germany had no equivalent of Harvard or Oxford when it came to citations and other scores (see "A Strategy for the Future," *Science*, 2007; DOI: 10.1126/science.opms.r0700039).

The DFG and the German Council for Science and Humanities selected a total of 85 institutions to receive Excellence Initiative funds during 2006 and 2007. In total, 39 graduate schools (some



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newly created) received an average of €1 (\$1.27) million per year over five years. They promised to improve the education and training of Ph.D. students and move away from the old system of poorly supervised research that could often take six or seven years to complete. Thirty-seven so-called 'Clusters of Excellence' received an average of €6.5 (\$8.24) million per year for establishing new local research collaborations focused around specific topics and goals. And nine 'elite' universities were awarded up to €3.5 (\$4.46) million per year for their new 'Institutional Strategies'. These included a range of improvements in teaching, research output, and competitiveness, as well as recruitment procedures for women and foreign researchers. The winners were the universities of RWTH Aachen, Free University of Berlin, Göttingen, Heidelberg, Karlsruhe, Freiburg, Konstanz, Munich LMU, and the Technical University of Berlin.

With just one year to go to the end of this first five-year phase, its impact is already apparent in many areas, with **continued »**

UPCOMING FEATURES

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abundant new research collaborations and networks. And according to the DFG, the Excellence Initiative has led to the creation of over 4,000 additional scientific jobs.

BREAKING FREE OF HIERARCHY

RWTH Aachen, for example, hosts three Clusters of Excellence, a graduate school, and has a range of programs around gender, diversity, and interdisciplinary research. Okuda is part of a Cluster of Excellence for the development of new “Tailor-Made Fuels from Biomass.” It means that university researchers can break free of traditional vertical hierarchies to work together with others from different disciplines—engineering, aerodynamics, chemistry, and biotechnology—on a specific topic that is internationally competitive. Other Cluster members are the Fraunhofer Institute for Molecular Biology and Applied Ecology and the Max Planck Institute of Coal Research, Mülheim. “It has been difficult but interesting to work for one project. It has been an experience that was not possible before,” says Okuda.

“The Excellence Initiative as a whole, but especially these Clusters have really made a difference in Germany because people had to think about what they could achieve together,” agrees **Katja Sträßer**, an independent group leader at the Gene Center of the University of Munich. She participates in the Cluster known as the Center for Integrated Protein Science Munich (CIPSM), which investigates proteins at the level of biological systems, such as folding, transport, and interactions with nucleic acids. Other collaborators are groups from the Technical University of

Munich, two Max Planck Institutes (Biochemistry and Neurobiology), and the Helmholtz Association’s German Research Center for Environmental Health.

The Cluster has enabled strategic appointments to be made that boost expertise in particular areas. A major coup was the appointment of German scientist **Ulrike Gaul**, who, like Okuda, had spent several years in the United States before returning to Germany. An added bonus is the creation of new microscopy and high throughput sequencing facilities for the cluster.

Another outcome of the Excellence funding is a significant increase in the number of junior professorships on offer, permitting early independence and the availability of tenure-track positions. These are “new to the German system,” says Sträßer. But the tendency for young Germans scientists to seek postdocs abroad, particularly in the United States and the United Kingdom, means that it can be difficult to persuade the best local candidates to stay. This raises the prospects for foreign researchers wishing to work in Germany (and returning Germans), although Sträßer emphasizes that nationality is not the issue: “It’s a question of quality of incoming researchers, not their location.”

TAKING FAMILIES INTO ACCOUNT

Sträßer also sees women scientists being taken more into consideration for top positions following concerns about women dropping out of science typically after their postdoc, which coincides with the time most people start a family. Appointment committees at LMU, for example, now **continued on p. 1682 »**

● **FEATURED PARTICIPANTS** ●



CENTER FOR INTEGRATED PROTEIN SCIENCE MUNICH

www.cipsm.de/en/index.html

CHARITÉ MEDICAL SCHOOL IN BERLIN

www.charite.de/en/charite

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www.bmbf.de/en/14575.php

FRAUNHOFER INSTITUTE FOR MOLECULAR BIOLOGY AND APPLIED ECOLOGY

www.ime.fraunhofer.de/EN

FREE UNIVERSITY OF BERLIN

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GERMAN CANCER RESEARCH CENTRE

www.dkfz.de/index.html

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www.wissenschaftsrat.de/1/home

HELMHOLTZ ASSOCIATION OF GERMAN RESEARCH CENTRES

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www.leibniz-association.eu

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RWTH AACHEN UNIVERSITY

www.rwth-aachen.de/go/id/bdz

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The change in attitude towards women scientists has been "really dramatic."
—Frauke Melchior

take family commitments into account when they are considering a candidate's list of publications. Rather than criticizing a woman scientist for too few papers in top journals, committees are now more likely to say "Yes, but she has also had two kids during that time so we should invite her and see what her plan is for the future." Sträßer herself has three young children.

"Women scientists are scrutinized and the more of us there are, the more it becomes normal rather than special—things are moving in the right direction," notes **Blanche Schwappach**, a Wellcome Trust Senior Research Fellow at the University of Manchester who is due to take up a full professorship and to become head of the department of Biochemistry I, Medical Faculty, at the University of Göttingen.

The change in attitude towards women scientists has been "really dramatic," agrees **Frauke Melchior**, full professor and member of the DKFZ-ZMBH Alliance (a collaboration between the German Cancer Research Center and the Center for Molecular Biology at the University of Heidelberg). She is also involved in Heidelberg's Cluster of Excellence on Cellular Networks. "I studied chemistry for my diploma and was constantly being told that I wouldn't get a position as a woman...a woman wouldn't have leadership capabilities because she wouldn't be respected." But with a working mother as a role model, Melchior had the confidence not to give up.

In her experience, women scientists are more likely to face "dual career" challenges, with partners who are also seeking high-level appointments. "The men still very frequently have a partner who has a job that is much more transferable. But if a university tries to recruit a successful female all of a sudden there is this problem that the spouse wants to have at least as good a job."

To address this issue, the University of Heidelberg and others have set up dual career services with Excellence Initiative funding. These provide advice and information about employment opportunities to encourage the partners of new professors, male or female, and are becoming increasingly popular. "We provide intensive counseling on the individual situation of the partners. We don't offer positions but we support them in finding a position, or refer them to a network of partners where they can get help," says **Christiane Stümke** project manager for Heidelberg's Dual Career Program, which has helped more than fifty couples in the past two years, around ten of whom have come from abroad.

PHASE TWO

Not everyone is happy with the results of the first round. Along

with all the excitement, the Excellence Initiative has also attracted criticism for its emphasis on research. "People are worried that this might create a split so that low-profile universities do all the teaching and the high-profile ones are research universities," says Sträßer.

Looking ahead, universities and other institutions in Germany are now gearing up for a second phase of Excellence Initiative funding, which begins in November 2012. This will increase the Excellence Initiative Funding to €2.7 billion (\$3.4 USD) over five years for new projects and renewal of existing projects for graduate schools, Clusters of Excellence, and Institutional Strategies. More broadly, the challenge for the universities will be to sustain the new initiatives supported by the first five year phase. "We have to see how it consolidates," says Schwappach. "The first round has unleashed a lot of potential but it's not clear how many initiatives will stay." Schwappach also points out that certain subject areas, including taxonomy or certain medical specialties such as radiology for children, are at risk of being "swept away" as universities play on their strengths in other areas.

WIDER OPPORTUNITIES

In addition to the Excellence Initiative, the German government provides a range of other funding streams including up to twelve years of support for Collaborative Research Centers (CRCs). Each CRC is hosted by a university, but involves collaboration with other institutions around specific research topics and can include institutions in neighboring countries.

One such CRC focuses on Biomechanics and Biology of Musculoskeletal Regeneration and is coordinated by the Charité Medical School in Berlin, and includes the **continued on p. 1684 »**

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CRCs also enable universities to “hire more professors around a specific research topic in a more sustained way.”

—Peter Fratzl

Julius Wolff Institute and the Department of Biomaterials at the Max Planck Institute of Colloids and Interfaces in nearby Potsdam. “The right people happened to be in the Berlin area,” says **Peter Fratzl**, director-professor at the Institute.

The project, which includes funding for 12 research groups, pits together the skills and expertise of scientists across a range of disciplines: including biomechanics, surgery, genetics, and molecular biology.

In addition to emphasizing interdisciplinary research, CRCs also enable universities to “hire more professors around a specific research topic in a more sustained way,” according to Fratzl. The result, he says, is “increased competence in that area.”

Fratzl, who is Austrian, is aiming to recruit more foreign scientists with the offer of competitive research funding and a better working environment. He has already hired an Australian junior group leader in biomechanics, **John Dunlop**, for his department. After a Ph.D. in Grenoble, Dunlop was attracted to the MPI four years ago by the interdisciplinary work environment, as well as Berlin’s culture and affordable living. “For me this is incredible,” he says.

Matthew Harrington, a postdoc originally from the University of California at Santa Barbara, agrees, “The Berlin-Potsdam area is a very easy place to work in.” He is a junior group leader (the equivalent of an assistant professor in the United States), and has not experienced any language barrier: “You have to force people to talk with you in German because in the lab everyone speaks English.”

The German Federal Government and state governments (or Länder) also fund a Joint Initiative for Research and Innovation for the publicly funded non-university institutions, such as the Helmholtz Association, the Fraunhofer Society, the Max-Planck Society, and the Leibniz Association. They are now promised an increase of three to five percent to annual budgets every year from 2011 to 2015, plus additional funds for new programs that increase networking, international cooperation and recruitment, and partnerships between science and industry.

The Fraunhofer Society has already launched one new initiative, “Fraunhofer Attract,” which has brought in 24 new young group leaders to build and run a group over five years, with a focus towards industrial product development. Of these, twelve came from abroad and five were women, which is an above-average recruitment of female scientists according to program director Raoul Klingler.

Similarly, the Helmholtz Association, which employs around 30,000 scientists in sixteen centers across Germany, has ap-

pointed 116 new “Young Investigators” (since 2006) to set up research groups, spending a total of €68 (\$86.2) million. Approximately half of the group leaders have come from abroad and around forty percent were women (from an average of twenty to thirty percent of female applicants), according to press officer **Antonia Rötger**. The Helmholtz centers are geared towards strategic goals such as renewable energy, and are now increasing their networking with universities. The Association also has a new mentoring program for women researchers and management skills training that is open to researchers from other organizations.

TRAINING BEYOND BORDERS

In 2008 came Germany’s new “Strategy for Internationalization of Science, Research, and Development” which aimed to promote cooperation beyond Germany’s borders. One component is the DFG’s International Research Training Programs, which is enabling Okuda at RWTH Aachen to bring young Japanese researchers, from the University of Osaka, to conduct research and participate in conferences and workshops. “We educate young researchers toward being more global scientists and managers. I think such experience in a completely different cultural setting is quite important. They have quite a culture shock, but they’re young and adaptive, and learn very quickly how European society works,” notes Okuda. In return, German researchers spend up to six months in Japan.

Meanwhile, the German Academic Exchange Service, DAAD, has €15 (\$19) million to spend between 2010 and 2013 on the “International Doctoral Studies in Germany” program. This aims to make German universities more attractive to foreign students and to encourage German students to study abroad. Firstly, it funds the creation of structured Ph.D. programs more akin to U.S. graduate schools—but with less course work. Graduate students receive language classes and mentoring, and can complete their Ph.D.s within three years. Secondly, it funds binational cooperation between departments of universities in different countries. By the closing date, there were 86 applications for the two programs, with around thirty-five of these likely to be awarded, according to **Christian Schäfer**, the director. The initiative also serves as a boost to the universities that did not receive Excellence Initiative funding. “These incentives ensure that new developments cover the whole of Germany, so that these are not limited to the very big and rich institutions,” he says.

With all the push towards internationalization, Okuda is convinced that prospects in Germany are “getting much better now” for foreign scientists wishing to take up senior positions. Nonetheless, the future is hard to predict. “Germany is in real turbulent times. I wouldn’t dare to predict what it’s going to be like in five years time.”

Julie Clayton, a freelance science writer and journalist, works out of Bristol, UK.

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Note: A response to the Focus on Spain feature, published 11 June, 2010, has been posted online. View it at dx.doi.org/10.1126/science.opms.r1000090.