

CAREERS

EMPLOYMENT TRENDS Academia is the top destination for US PhD students **p.1135**

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Doha in Qatar with the Pearl Monument in the foreground. The city is host to branch campuses of renowned universities from around the world.

MIDDLE EAST

The growth of a desert jewel

Qatar's research machine is a work in progress, but its funding opportunities are already luring international scientists to its increasing number of institutions.

BY WALEED AL-SHOBAKKY

Khaled Machaca enjoys the high-risk, high-reward aspects of a start-up project. His latest is particularly demanding. Machaca has been tasked with establishing a research programme at a newly founded medical college in Qatar: a small Middle Eastern country whose science enterprise, initiated only in the past decade, is itself a start-up of sorts.

The challenges are manifold. Machaca has had to convince funders, the larger medical community and the public of the importance of his work. He has also had to source lab equipment in a place with few suppliers. To foster international collaborations, crucial to Qatari researchers' success, he has had to help craft and customize a code of research ethics, created by Qatar's Supreme Council of Health, that complies with both US and Qatari laws. And he has had to convince young scientists that they can advance their careers and conduct cutting-edge science in a country known

less for research than for hosting the news network Al-Jazeera and, as was announced this month, the 2022 soccer World Cup.

"We had serious challenges," says Machaca, who is associate research dean at Weill Cornell Medical College in Qatar (WCMC-Q), based in Doha. But he relishes the notion of building a programme from scratch. And the country has a big advantage: money. Scientists working in Qatar will find good funding and ample opportunities for big projects, but, like Machaca, they might have to deal with rigid bureaucracy, evolving research-ethics regulations and rules — on stem-cell research, for example — that could limit collaborative ventures. These trade-offs will help to determine Qatar's success as it attempts to build a sustainable science enterprise.

OASIS FOR RESEARCH

Qatar's efforts to be hospitable to science come amid a region-wide drive to engage with international — mostly Western — academia and

scientific centres. From the early 2000s to mid-2008 (when oil peaked at US\$147 a barrel), fuel prices repeatedly hit record highs, bringing a petrodollar downpour to the six oil-rich Gulf states of Saudi Arabia, Kuwait, the United Arab Emirates (UAE), Qatar, Bahrain and Oman. The revenues have driven attempts to energize ailing higher-education and research centres and to create new ones. This coincided with belt-tightening among academic and research institutions in Europe and North America — a trend that increased with the global financial crisis.

Saudi Arabia is pushing ahead with a programme that pairs international research centres such as Germany's Max Planck Institutes with domestic universities to modernize local science departments. And 2009 saw the launch of the more ambitious, more visible King Abdullah University of Science and Technology (KAUST), a graduate-level research university in Thuwal with a US\$10-billion endowment. In the UAE, Abu Dhabi campuses of major higher-education and research institutions such ▶

► as New York University and the Sorbonne University in Paris have been set up. And in 2006, Qatari emir Hamad Bin Khalifa Al-Thani pledged that 2.8% of the country's gross domestic product (which was about \$100 billion in 2008 according to the Economist Intelligence Unit in London) would be spent on scientific research.

In general, government leaders in the Gulf states are setting up multibillion-dollar research projects and high-profile partnerships not only because they can, but because they must. "The Gulf countries are in a developmental phase," says Kristin Diwan, a Gulf expert at the American University in Washington DC. They see a genuine need, she says, for the "skills and learning that are required to run their economies" and to diversify beyond the rather volatile hydrocarbon sector.

Thus far, sustained Qatari government funding has helped Machaca to increase his diabetes and obesity research programme from a handful of staff to 60 faculty members, postdoctoral fellows and research-support personnel in less than two years. He says that Qatar's research and funding environment is preferable to what many would find in the United States, given that country's recent science-funding woes.

In Qatar, the job of luring high-calibre researchers goes to the Qatar Foundation for Education, Science and Community Development and its sprawling offshoot institutions, which include branch campuses of US and European institutions, domestic research centres and the Qatar National Research Fund (QNRF). This agency aims to attract researchers from far beyond the country's borders to collaborate with Qatar-based scientists on problems that the tiny state confronts — from diabetes to network security. The main QNRF grant mechanism, the National Priorities Research Program (NPRP), has over the first three years of its existence doled out close to a quarter of a billion US dollars on 266 research projects, with participants from more than 30 countries.

That funding comes with conditions that are, at times, onerous. Collaborations must involve a Qatar-based researcher and most of the money must be spent in Qatar. The Qatar Foundation's July 2010 request for proposals states that at least half of the proposed funded research days must be spent in Qatar; and at least 65% of the total annual budget must be used there.

"We needed to make sure that international researchers collaborate with scientists based in Qatar while allowing at least 50% of the effort



"We needed international researchers to collaborate with scientists in Qatar."

Abdul Sattar Al-Taie

to be conducted inside Qatar," says Abdul Sattar Al-Taie, executive director of the QNRF. "That should contribute to our main goal of building a research environment in the country." Arguably, such provisions help to diversify Qatar's economy for the post-hydrocarbon era by transferring knowledge from foreign countries to researchers inside Qatar.

But the rules mean that Qatar's abundant funds can go only so far in attracting new research proposals — the small nation has a limited number of domestic collaborators. Eventually its science base will become "saturated", says James Holste, former associate research dean at Texas A&M University in Qatar, the Doha branch of the institution based in College Station. At that point, investments will have drastically diminished returns.

Already there are signs of strain. In the last NPRP cycle, Texas A&M in Qatar limited the number of proposals that faculty members could submit; its researchers qualify as Qatar-based, and demand for them from international institutions was so high that the school had to step in to regulate collaborations. "We were getting to the point where the labs were full and we had no place to put the people," says Holste.

Also laborious is the complex documentation required by the NPRP to detail how grant money is spent. It can be difficult, for example, to secure extra funding for a project in progress, says Bernardine Dias, a robotics researcher at Carnegie Mellon University's campuses in both Doha and Pittsburgh, Pennsylvania. Inflexibility in a funding programme, says Holste, is "a kiss of death". He advises the programme to mitigate excessive paperwork and documentation by affording its officers more discretion, according to the peculiarities of each project. One project might need more equipment; another might involve hiring postdocs to make up for the absence of PhD students (so far, no graduate programmes are offered in Qatar).

CULTURE CLASH

Machaca has experienced, first-hand, another challenge for scientists in Qatar: accommodating research practices that may contrast with those in other nations. "Most of those differences are culturally oriented," says Machaca, noting, for example, the particular importance in Qatar of involving family members during the informed-consent process.

Generally, where rules differ, researchers are expected to adopt the more stringent regulation. In such situations, the level of international collaboration may complicate matters.

The Qatar Foundation has acknowledged the need to rethink how researchers report expenses and when extra funds should be allocated. The NPRP procedures can be strict, says Amer Al Saady, science adviser to the Qatar Foundation and a member of the QNRF's steering committee. "The QNRF is being cautious, or perhaps over-cautious, in adopting this attitude," he says, emphasizing that the NPRP is only a few years

old. Complicating matters is a legacy of rare but infamous cases of plagiarism and abuse of funds. Caution will prevail, says Al Saady, until a more robust research culture has been established.

Already the QNRF is tweaking the process. "Compared with the first cycle, the QNRF has improved a lot," says Dias, who in the first NPRP cycle received funding for two proposals of about US\$750,000 each. "And what is important is that it is taking feedback from the people who are submitting proposals." The foundation has asked the outgoing dean of Carnegie Mellon's business school in Qatar to suggest ways of simplifying expenditure reporting and accommodation of unforeseen expenses.

At KAUST and the UAE's New York University Abu Dhabi Institute (NYUAD), initiatives to engage Western researchers generally entail fewer restrictions. Outside researchers who receive funding from KAUST are not required to partner with Saudi Arabia-based researchers; usually, the university just requires grant recipients to participate in a couple of seminars or workshops in the country each year, to report on their research findings and progress.

KAUST and NYUAD do have their own constraints. KAUST awards its grants to faculty members in specific institutions with which the university has signed collaboration agreements; and NYUAD bestows funds only on eligible faculty members who work full-time at New York University or NYUAD. NPRP grants are open to any researcher, from academia or industry.

Qatar's sizeable financial resources, meanwhile, allow the QNRF to fund a relatively high proportion of proposals. In the most recent cycle, for example, its success rate was 23% for



"The Qatar National Research Fund has improved a lot."

Bernardine Dias

medical and health sciences, says Al-Taie. By comparison, the US National Institutes of Health accepted approximately 20.6% of proposals. As the number of applicants to the NPRP has increased, the foundation has had to decide whether to stay on budget and turn down more proposals, or increase the budget and fund further investigators. The latter choice won out, says Al Saady.

Qatar may offer funding opportunities, but that does not guarantee top recruits. A paucity of graduate students adds to the difficulties of keeping a lab. Currently, scientists at Doha campuses get graduate students from the main campuses on short-term contracts, one or two semesters, or hire postdocs to do the work that PhD students would usually do.

Postdocs, too, may face challenges. Some principal investigators can make it difficult to

garner independence, says Rachel Jones, a postdoctoral fellow in biomedicine at the WCMC-Q. "Others give a looser rein and let their postdocs pursue their own interests as well as their supervisors," she says.

Jones credits support from her postdoc supervisor for helping her to pursue the QNRF's Young Research Scientist Experience Program, launched in May. She received an award of US\$100,000 a year for up to three years, which she views as a bridge to more substantial grants.

Many researchers would like the benefits that come with tenure, an option yet to be offered to faculty members hired at Doha branches (as opposed to those visiting from the US home campuses). This is partly explained by Gulf countries' labour and immigration laws, which frown on recruitment options implying a right of permanent residence. "Everything is set up so people who are not citizens are encouraged to leave after five or ten years," says Holste.

And Qatar and other Gulf countries rarely offer citizenship to expatriates. "A broad extension of citizenship rights to non-nationals would be extremely unpopular," says Diwan. Extensive state welfare programmes in the Gulf, along with the delicate sectarian balance to be maintained between Sunni and Shi'a Muslims, render any programme to naturalize foreigners unpalatable to most. Foreigners wishing to be hired need a Qatari sponsor (who can be an individual, a firm or a government agency). And most contracts span two to five years.

Officials at the branch campuses say that they are discussing options with the Qatar Foundation, and Al Saady notes that proposals to modernize labour laws are under way. Others in the region have proven faster than Qatar on the tenure front. The UAE, which has a thriving trade hub in Dubai, plenty of oil in Abu Dhabi and no sectarian divide, has more open labour and immigration laws than most of its neighbours.

Qatar's litany of challenges has not dissuaded enterprising researchers such as Machaca, who sees a long-term future in the small state. "As a scientist, what do I need? To do cutting-edge science, to publish it, and hopefully in the long term to be able to commercialize it. And of course you want your family to be happy," he says. "Can I do this in Doha? Absolutely." ■

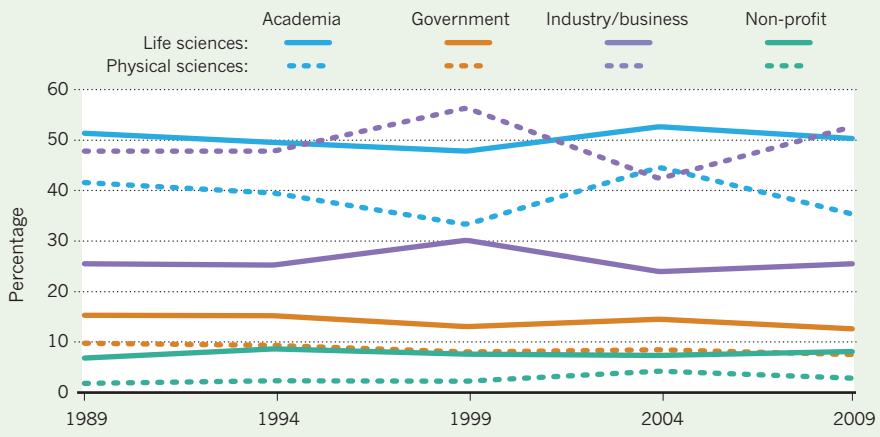
Waleed Al-Shobakky is a freelance writer based in Doha.

CORRECTION

The story 'A helping hand' (*Nature* **468**, 721–723; 2010) inadvertently implied that Anuj Kapadia is a clinical radiologist. He is an assistant professor of radiology.

DIVISION OF LABOUR

Proportion of US doctorate recipients with definite post-graduation employment commitments in the United States, by field and sector.



EMPLOYMENT TRENDS

Drawn to academia

Low salaries and elusive tenure didn't dim the appeal of self-directed research for US scientists last year.

BY KAREN KAPLAN

Despite a struggling economy, lower salaries and an increase in adjunct and contingent positions, a higher proportion of US scientists headed to academia than to any other sector in 2009, according to numbers from the US National Science Foundation (NSF). Published on 3 December, *Doctorate Recipients from US Universities: 2009* includes salary data for the first time in the annual report's 43-year history.

Even with universities offering much lower salaries than industry, half of all life-sciences PhD recipients who had secured jobs said that they were entering academic positions, according to the survey. This proportion, which has varied little since 1989, is a testament to the powerful lure of positions that enable self-directed research, say analysts. "Many scientists want the independence of working on their own research, rather than on what's handed to them," says Mark Fiegenger, an NSF programme manager based in Arlington, Virginia. The NSF received survey responses from 420 US universities and 49,562 PhD recipients.

The industrial sector proffered the highest median early-career salaries — up to US\$95,000 in some instances — in most disciplines in the physical and life sciences. The median for an academic post in biological sciences was \$45,000, compared with \$85,000 for a commercial position in the same subfield, including biochemistry, marine biology and zoology. Other fields had similar disparities.

Academia dominated life-sciences employment in 2009, but industry was stronger for physical scientists, despite changes to job numbers since 2008 that run counter to five-year trends and could be due to pharmaceutical layoffs (see 'Division of labour'). Richard Freeman, an economist at Harvard University in Cambridge, Massachusetts, attributes the five-year trend in part to hiring increases at drug-making and chemical firms. He says that mergers and layoffs will continue to slow the field down.

Industry's constraints will put pressure on academia, which is already pinched by the recession, says Marc Bousquet, an associate professor at Santa Clara University in California who is on the executive council of the American Association of University Professors. Scientists in all fields will struggle to find academic posts — and few of those available will be tenure-track, he says.

The report also uncovers significant pay differences between early-career men and women with PhDs. Men earned up to \$10,000 more than women in nearly all fields except astronomy, where they earned \$30,000 more. Joan Herbers, president of the Association for Women in Science in Alexandria, Virginia, says women need help learning to negotiate salaries and raises. "When you start out at a lower salary," she says, "that dogs you for the rest of your career."

Postdocs earned \$37,500 to \$45,000, which, given their average schedule, Freeman estimates, works out to \$12.50 to \$15 an hour. "Some of the best and brightest people in our country earn a pittance," says Freeman. ■