

CAREERS

TURNING POINT Teenager takes up venture capitalism in bid to help cure ageing p.399

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Singapore has become a research hotbed, attracting scientists from around the world.

WORKING IN ASIA

The siren song of Singapore

The city state offers opportunities for intrepid scientists, but working there has drawbacks.

BY QUIRIN SCHIERMEIER

Jayne Thompson's truth is stranger than fiction. The young quantum-information theorist is studying the very foundations of existence. "Is there an objective reality out there?" she asks. "Or is reality strangely dependent on the actions of observers like us?"

The quest to understand the arcane laws that rule the world of quantum physics took Thompson from Australia to Singapore, the diminutive city state at the southern tip of the Malay Peninsula. Last August, she joined the 5-year-old Centre for Quantum Technologies at the National University of Singapore (NUS). There, 20 principal investigators and roughly 180 other researchers including post-docs and PhD students are probing the innermost workings of the Universe, unburdened by teaching obligations or excessive grant-writing duties. "It's a fantastic place, very open

and collaborative," says Thompson. "I am supported very generously and I can discuss my ideas with amazing people from different continents and cultures."

Singapore, a former British colony with an area of little more than 700 square kilometres, has become a hotbed of research. Lucrative funding opportunities, high salaries and a welcoming environment have lured leading researchers to the city state, and flocks of aspiring young scientists have followed. Institutions and organizations are seeking foreign talent, and about half of the 5,700-strong academic workforce at the NUS comes from overseas.

But newcomers will have to adjust to an insular scientific environment in which personal relationships can take on inflated importance — for better or worse. In tiny Singapore, it is hard to escape past interactions with funding agencies, ministries or academic administrators. And in a country where science is

governed by five-year plans, researchers must reckon with sometimes perplexing shifts in funding priorities.

KNOWLEDGE GROWTH

Singapore did not always have a booming knowledge economy. In the 1960s, when it became independent, the city state had its fair share of notoriety and social problems. Apart from a medical college founded by the British colonists, from which the NUS emerged, science was absent and public education was in its infancy. The nascent republic — made up mostly of indigenous Malays, and Chinese, Indian and Tamil immigrants — was not unified by language, history or religion. Singapore could not afford to be Singaporean: it had to be international to survive.

Science investments have been a major part of its strategy for economic growth. In the past 15 years, Singapore has become ►

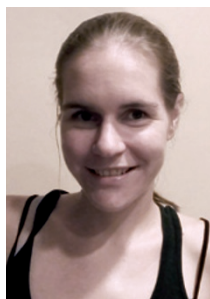
► a magnet for scientific talent. Its international ambience — superficially Western-seeming, except for the tropical climate — makes it easier for Europeans and Americans to live and work there than in China or Japan. “Accommodation is not hard to find and employment contracts are handled easily,” says Thompson. Her arrival “was a very smooth transition”.

All career levels are being recruited — from postgraduates to senior researchers (see ‘Welcome package’). The government’s Agency for Science, Technology and Research (A*STAR) offers scholarships and fellowships for graduate students and postdocs, and operates a programme under which PhD students from partner universities in Asia and the West spend up to two years at an A*STAR institute.

Postdocs are normally offered three-year contracts, with an option for another three-year term depending on a successful review. More-senior researchers negotiate a start-up package for the first one to two years, and then have to compete for grants.

Success rates for grant applications at A*STAR and other government funders vary between 15% and 25%, roughly the same as at the US National Institutes of Health. Generally, grants are about the same size as those in the United States and Europe — up to US\$500,000 per year. Salaries lie somewhere between those in Europe and those in North America.

International researchers tend to find Singapore welcoming. “I came with the ready-made notion of a country leaning a bit on the totalitarian side, where you would be hugely fined for jaywalking and the like,” says Artur



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PRODUCT PUSH

The Singaporean government has ruffled some feathers in the past three years by refocusing its science priorities — mainly in the life sciences.

In 2006, husband-and-wife cancer geneticists Neal Copeland and Nancy Jenkins left the US National Cancer Institute in Frederick, Maryland, for the A*STAR Institute of Molecular and Cell Biology (IMCB), which had made them a generous offer. “We both liked Asia and I was getting tired of working for the government,” says Copeland. The couple shipped their lab mice — and three

Ekert, the Polish-born director of the Centre for Quantum Technologies. “What I found is a relaxed and well-organized place — maybe a little boring, but safe, family-friendly and with a wonderful education system — where science is held in high esteem.” Although some authoritarian tendencies linger in Singapore — for example, Human Rights Watch, a non-governmental organization based in New

York, notes continued restrictions on political opposition and freedom of speech — the city state has become more liberal in recent years.

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CULTURE CLASH

Some Western scientists complain that decisions by Singaporean funding agencies are not always transparent, and that the path to career advancement is unclear. Others have difficulties with the customs of Asian academics.

AWARDS SELECTION

Welcome package

Singaporean funding agencies offer a range of long-term support options for scientists from around the world. For example, the Singapore Translational Research Investigator Award from the National Medical Research Council is meant to attract experienced scientists to do translational and clinical research in Singapore. The five-year renewable grants include start-up costs, research support and salary (go.nature.com/jroafe).

Under the National Research Foundation Fellowship Scheme, postdoctoral and junior researchers from all nations and fields can apply for research grants of up to 3 million Singaporean dollars (US\$2.4 million) over five years. Recipients set up a group with at least one postdoctoral fellow and two PhD students to conduct independent research at a research organization of their choice (go.nature.com/xy6wwr).

The Agency for Science, Technology and

Research (A*STAR) Investigatorship aims to attract talented early-career researchers from all over the world. Awardees are appointed for three years, with provisions for a further three, and receive up to US\$500,000 a year (go.nature.com/ozl7os).

The Singapore International Graduate Award, a collaboration between A*STAR, Nanyang Technological University and the National University of Singapore, targets overseas students interested in doing a PhD in Singapore (go.nature.com/vxozwz).

Under the A*STAR Research Attachment Programme, PhD students from international partner universities can spend one or two years at an A*STAR institute under the joint supervision of staff from A*STAR and their home university (go.nature.com/ie1a3o).

The Singapore International Pre-Graduate Award funds overseas undergraduate students to spend 2–6 months at A*STAR institutes (go.nature.com/recdnj). **U.S.**

Brendan Orner, a chemical biologist at King's College London, often felt alienated during his six years as an assistant professor at Nanyang Technological University in Singapore. "Students called me 'Sir' and wouldn't enter the room if I held the door for them," he says. "That was quite amusing, but the problems I had with superiors were less so." In one instance, he tried to get feedback on a failed grant application. But the university research-support officer thought that Orner was asking for the names of the reviewers. "I couldn't tell him that he had misunderstood me because that would have been an impossible affront," he says.

Confucian tradition, which is influential in Singapore, holds that senior people are not supposed to be challenged publicly. Westerners often find Asian restraint unsettling — whether in business meetings or in the seminar room. "You have to tell Asian students again and again that it is OK to challenge authorities," says Ekert. "But they are beginning to embrace Western concepts of discourse — and not only in science."

Barry Halliwell, the British-born deputy president for research and technology at the NUS, regularly has coffee or lunch with new recruits to get a sense of how they are getting on, and to help to settle any problems related to research



"Things can change overnight, but if you get a good job in science, it is definitely worth going."

Neal Copeland

administration, employment contracts or lab space. "Most settle in easily," he says. The odd problem — with lab space not being ready, for example, or with missing clearances for animal experiments — can normally be resolved in a short time.

Many foreign scientists will find a stay in Singapore a scientifically rewarding and character-building experience. "We have benefitted from the opportunity to work in a culturally diverse entity like A*STAR," says Karen Mann, who maintains productive collaborations that she started in Singapore with scientists in the United Kingdom, Australia and New Zealand.

Thompson is not yet sure where her inquiries into the nature of reality might lead her. "But Singapore," she says, "is nothing I'd wish to leave behind quickly." ■

Quirin Schiermeier is Nature's Germany correspondent.

TURNING POINT

Laura Deming

Laura Deming was working in a research lab at the age of 12. Two years later, she was admitted to the Massachusetts Institute of Technology (MIT) in Cambridge and, at 16, she won one of the inaugural Thiel Fellowships, which encourage students to leave university and pursue business. As her fellowship winds down, Deming, now 19 and a partner at a venture-capital fund, remains devoted to pursuing anti-ageing therapies.

What prompted your interest in finding a cure for ageing?

When I was eight, my grandma had this wonderful spirit and wit, but she couldn't run around and play. I thought about all these people I know who have arthritic joints and disease, and whether there was anything that could be done to help them. If there was a way to make that happen, I wanted to work on it.

What was your first career turning point?

E-mailing molecular biologist Cynthia Kenyon at the University of California, San Francisco. She studies ageing, and I was reading about her, and thought, holy cow — someone is working on this stuff. So I contacted her and said, I'm 12, but I have to see if I could work in your lab. She was struck by my interest and let me come in as a volunteer. I experimented on genetically mutated strains of the roundworm *Caenorhabditis elegans*. Cynthia was my first mentor — she taught me how to think and be creative. She thinks as if there are no rules. Watching her changed how I am as a scientist in a very deep way. And working on this thing that I am passionate about changed my life.

What did you get from the Thiel Fellowship?

The fellowship — launched in 2010 by Peter Thiel, co-founder of PayPal — requires you to leave school and develop your business ideas with mentors in Silicon Valley, California. There is a lot of talk about human health in academic labs, but so many people in academia don't understand how the outside world works. Even graduate students don't have a picture of what happens once you make a discovery and how that could be developed into a drug. The fellowship was an extraordinary opportunity to see what happens from the venture perspective after the drug leaves the lab.

Will you return to MIT after your fellowship?

I'm a partner in the Longevity Fund in San Francisco, California, and I am going to stay in venture capital. My passion is to see that I'm getting therapies to market that will extend the



CHRISTOPHER RASCH

human lifespan. I could remain in academia and rely on a grant to support my research into those therapies, or I could see whether that research already exists, and do my best to help drugs to market.

Have you encountered age discrimination?

No. I have actually been surprised by the number of people I encounter who take me seriously. If you meet someone you might want to work with, the most important thing is that you're competent and have a good idea.

Should you take a lot of risks?

There is no downside to trying something. When I e-mailed Cynthia, the worst case was that she would read my e-mail and forget it, but the best case was that it would change my life.

What's the most effective way to network?

Find the best person in your field, think of a way that you can help them and get in touch. And don't overlook your friends. I worked with a graduate student at MIT who treated me like a true colleague, and I felt much more motivated as a result.

How can you get the most value from mentors?

Trekking out on your own is extraordinarily stupid. The best way to get ahead is to find the smart people and learn everything that you can from them. Apply those insights to what you're doing. You will avoid a lot of mistakes.

Do you have other advice for young scientists?

Be clear with yourself about what exactly you want to do in the long term. Know how you want to affect the world and what you are passionate about. Ignore boundaries and pursue what you want most to do. ■

INTERVIEW BY KAREN KAPLAN