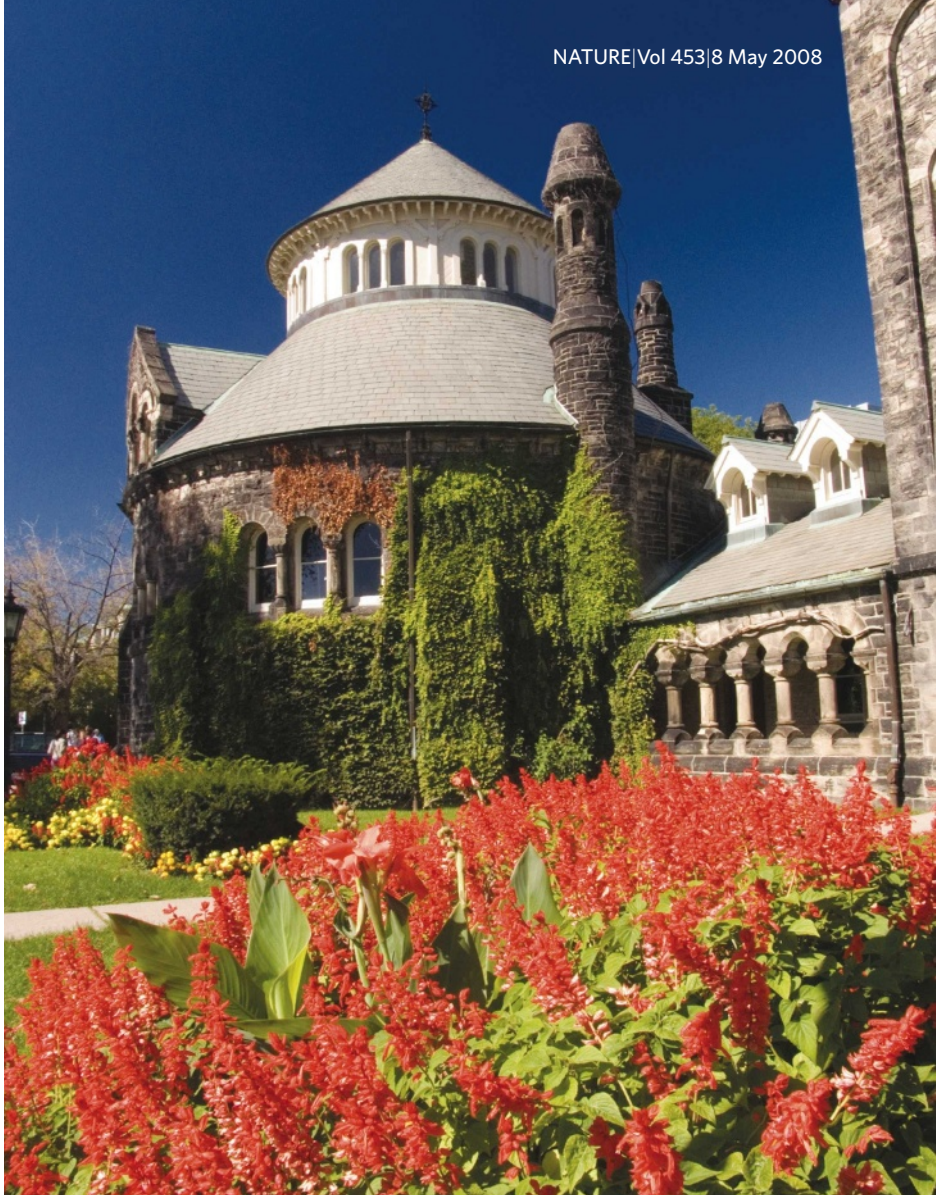

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TORONTO RISING

Specialist research centres are springing up in Canada's biggest city, nourished by government funds that also attract high-calibre scientists. **Kurt Kleiner** reports.

B. RAHN/A-FRAME

When the University of Toronto managed to lure chemical geneticist Guri Giaever away from Stanford University two years ago, part of the inducement was a new, bigger lab, and part was a prestigious government-funded research chair. But the biggest factor in the move, Giaever says, was the colleagues with whom she would be working. "In terms of what I'm doing, I would pretty much say hands down that Toronto is the best place in the world," she says.

Canadian scientists and administrators welcome such adulation. With the much bigger and richer United States to the south, Canada has often been preoccupied with a brain drain, as the brightest minds sought greater rewards at one of its neighbour's institutions. Increasingly, though, the country's biggest city, Toronto, is celebrating a 'brain gain' as it succeeds in attracting top researchers, often to work at brand new research centres. Federal and provincial efforts that began a decade ago are helping to attract high-calibre researchers and putting them in charge of long-term, 'big science' projects, according to researchers and business development officials. The new policies are an attempt to build on Toronto's impressive existing research infrastructure.

Billion-dollar budget

Most of this basic research is concentrated in Toronto's city centre. Within two kilometres of the intersection of University Avenue and College Street, on the University of Toronto campus, there are nine research hospitals, roughly 5,000 principal investigators, and research budgets totalling about Can$1 billion (US$990 million) a year. Since 2005, 93,000 square metres of research space have been added in this zone, with twice as much more planned.

The main research engine is the University of Toronto, along with its affiliated research hospitals, including the Hospital for Sick Children, St Michael's, Sunnybrook and Mt Sinai. Also downtown is the Centre for Addiction and Mental Health, which employs 100 research scientists and is building an 110,000-square-metre site at the cost of Can$380 million. Other universities in the area include Ryerson University, York University to the north, and McMaster University, about an hour away in Hamilton. McMaster is building a 158,000-square-metre innovation park, which will include space for the Canadian government's Materials Technology Laboratory, and a new Engineering Technology Centre.

Giaever was recruited in 2006 to set up the HIP-HOP (HaploInsufficiency Profiling/Homozygous deletion Profiling) Chemical Genomics Lab, which explores yeast gene function and conducts drug screening. Her lab is in the Donnelly Centre for Cellular and Biomolecular Research at the University of Toronto, which was completed two years ago at the university's downtown hub. As part of her package, she received a federally funded Canada Research Chair. The Canada Research Chair programme began in 2000, and spends Can$300 million a year to attract and retain research professors across the country.

Another of the new specialized research centres is the Ontario Institute of Cancer Research (OICR) at the University of Toronto, started in 2005 and funded by the provincial government with Can$350 million over

five years. The multidisciplinary translational centre will eventually employ 50 principal investigators.

The OICR's scientific director, Thomas Hudson, says that he is not only in the enviable position of recruiting researchers for a well-funded centre, but he has benefited from the Toronto area's wealth of potential candidates and its favourable reputation among researchers in many parts of the world. "There are 5,000 principal investigators within 15 minutes' walk of here," says Hudson, who helped found the International HapMap Project and is former director of the McGill University and Genome Quebec Innovation Centre. "There are few centres like that in North America."

Just across the street, Aled Edwards runs the Structural Genomics Consortium, a collaboration between the University of Toronto, the University of Oxford, UK, and Sweden's Karolinska Institute.

"We've gained this remarkable ability to do huge projects," says Edwards. The University of Toronto has long conducted good research, he says. But the new funding commitment has freed many researchers from having to chase two- and three-year grants. Edwards claims that the research culture in Toronto tends to give younger scientists more responsibility early in their careers compared with many places in Europe and some in the United States. "If you want to launch your academic career, Toronto is a fantastic place to do it," Edwards says.

Postdoc Ian Weaver agrees. Weaver, a developmental biologist from England, works on stem-cell research at the Hospital for Sick Children in Toronto. He praises the city's strong stem-cell science. (Scientists James Till and Ernest McCulloch were the first to prove the existence of stem cells in 1963 while at Princess Margaret Hospital's Ontario Cancer Institute.)

Although the cost of living is relatively high, notes Weaver, it still pales in comparison to that of cities such as London, Boston and San Francisco. Weaver himself hopes to stay in Toronto, and has applied for a tenure-track position at the University of Toronto.

Recent postdoc arrival Roman Iakoubov, an MD–PhD from Germany, says he finds the University of Toronto has more funding and better equipment than he is used to. He is impressed with the quality of his fellow researchers and with the city's multicultural mix. The main problem, he says, is one that postdocs everywhere face — competition for tenure-track positions is intense.

Falling short

Toronto's growing pharmaceutical company presence complements its academic successes, although industry in the region has under-performed so far. Vaccine specialist Sanofi Pasteur is the latest entrant; in April it announced plans for a Can$100-million research facility on its campus in north Toronto. Work on the 15,000-square-metre facility will begin later this year, and finish by 2010. Thirty research jobs are expected. Toronto was attractive for its existing vaccine-research infrastructure, diverse work force, and reasonable cost of living, according to Sanofi communications manager Mark Beazley.

Other companies with a major presence in Toronto include Apotex, GlaxoSmithKline, AstraZeneca and Eli Lilly. The pharmaceutical industry as a whole employs about 10,000 people in the Toronto region, mostly in sales, manufacturing and management. Province-wide, pharmaceutical companies spend about Can$500 million a year on research and development, according to Rx&D, the association of Canadian research-based pharmaceutical companies.

A. VANEK D. LEHTO

Gleaming: the new Donnelly Centre.

Where Toronto has had less success so far is in commercializing its academic research. Ontario has more biotechnology companies than any US state with the exception of Massachusetts and California. But judged against the amount spent on basic research in Toronto, the region generates only about half the commercialization opportunities it should, compared with successful biotech clusters such as Boston, says David Shindler, executive director of Biodiscovery Toronto, an organization that commercializes research.

"When you look at University Avenue and the billion dollars spent there annually, you're sort of saying, why aren't we the size of San Diego? Where are all the companies?" says Grant Tipler, chair of the Biotechnology Initiative, a non-profit organization committed to promoting the growth of biotechnology in Toronto and the surrounding region. He says there are a number of reasons Toronto has lagged — a research culture that values basic research more than entrepreneurship; lack of government funding for applied research; and a shortage of venture capital for early stage companies.

Therapeutic prospects

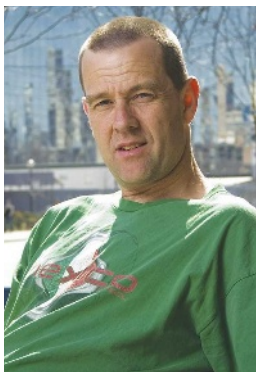
But there are some promising prospects. Among the region's emerging biotech companies is Amorfix Life Sciences, spun out of Neil Cashman's lab at the University of Toronto, concentrating on diagnosis and treatment of neurodegenerative diseases. Others include Transition Therapeutics, a drug-discovery company, and Arius Research, which develops therapeutic antibodies.

And Toronto has a number of initiatives attempting to bridge the gap between basic research and commercialization. Most visible is the Can$230-million downtown MaRS Centre, a non-profit organization that provides offices, lab space and business services for start-up biotech companies. It houses a number of biotech funding and commercialization organizations, including Biodiscovery Toronto and the Ontario Institute for Cancer Research.

The MaRS Centre has been at its current location — the old Toronto General Hospital building — since 2005. It plans to add new buildings with an additional 230,000 square metres of space by 2010. A programme called MaRS Innovation announced it had received Can$15 million in government funds in February to invest in commercialization ventures.

Tipler says the MaRS Centre has helped to provide a meeting place for discussion and ideas, one the advantages of big biotech clusters. He says that he runs into most of the important players in Toronto biotech simply by sitting in the atrium of the building. "Do we have a lot of the ingredients we need? Yes," says Tipler. But he acknowledges the challenges of forging a major Canadian biotech industry. "It may take a while," he says, "but we'll get there." ■

Kurt Kleiner is a science writer based in Toronto.



R. FAUBERT/CIHR

P. GAUTREAU

Settled in: Aled Edwards (top) and Guri Giaever recommend Toronto.