

Coming back to life Montreal

The phosphate backbones of a massive DNA helix curl their way around a concrete column, reaching towards the ceiling of Thomas Hudson's office. The art installation may be a conversation piece, but it also indicates how important this little molecule is to Hudson and to Montreal. In 2003, Hudson opened the McGill University and Genome Québec Innovation Centre, a glass and limestone building nestled between the university campus and the city's famous Mount Royal Park. Its more than 100 employees, from graduate students to senior scientists, plan to put Montreal at the hub of the world's genomics and proteomics map.

Montreal has always held the life sciences close to its heart — multinational pharmaceutical companies such as Abbott Laboratories, Novartis and Merck Frosst line the Trans-Canada Highway that runs through the middle of the island. But recently, government and private sector investment has helped establish academic research facilities dedicated to cancer biology, genomics and proteomics in the heart of the city. As well as foreign investment, the boost could bring some Canadian-trained brains back home.



Thomas Hudson: bringing expertise together.

INTELLECTUAL CAPITAL

In 2002, Montreal had more university research investment, at Can\$802 million (US\$587 million), than any other Canadian city. Last year, two of its universities — Montreal and McGill — ranked among the six best-funded Canadian research universities. According to Robert Lacroix, rector of the University of Montreal, the grey-matter concentration here is second only to that of Boston in North America: Montreal has 4.17 students for every 100 residents.

Although Montreal's universities are now at the



T. BOGNAR/CORBIS

heart of its research community, it wasn't always so. Students graduated with exceptional educations, but went away to find jobs or postgraduate positions. Hudson says that most of the changes began about five years ago. "There was a realization that we can do things here, we can develop and we can do the best," says Hudson. "Before that people always had the attitude: 'Let it happen in the United States.'"

Backing that change of view, federal and provincial funding for research infrastructure has soared. The McGill centre has received Can\$40 million from the Canadian Foundation for Innovation (CFI), an independent body set up with a Can\$3.65-billion operating budget to strengthen the infrastructure of Canadian research. Another Can\$52 million has come from not-for-profit provincial corporations, including

Nano state

Aerospace, telecommunications and pulp and paper are Quebec's core industries, and nanotechnology is increasingly important to all of them. So it is no surprise that Montreal has a strong nanoscience presence. "Montreal is going to be one of the major hubs of nanotech development in Canada," says Robert Sing, administrative director of NanoQuebec, the province's university network in nanoscience and nanotechnology.

Montreal's nanotech research community has taken a broad approach to strengthening the field. The Quebec college system recently introduced a training programme that would produce graduates with technical training in nanomaterials, nanobiotechnology and nanofabrication. At university level, there has been significant infrastructure funding from the Canadian Foundation for Innovation, NanoQuebec and provincial and federal governments. One product of this increased funding is the

J.-Armand Bombardier pavilion, which will house an interdisciplinary group of more than 700 chemists, physicists and engineers dedicated to nanoscience and nanotechnology research, with more than Can\$200 million (US\$146 million) of equipment.

But Neil Gordon, president of the Canadian NanoBusiness Alliance, says that there has been a failure to capitalize on the commercialization of knowledge. "We are creating excellent opportunities for students and government research, but we're not creating jobs," he says. He is pushing for Can\$100-million government investment at the commercial and industrial level.

Although this would be a significant leap, it isn't unthinkable. For the first time in 30 years, the prime minister now has a national science adviser. Formerly head of the National Research Council, science adviser Arthur Carty will be expected, among other duties, to foster commercialization.

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Valorisation-Recherche Québec, which helps finance and market university research, and Genome Québec. The money has funded robotics, high-throughput sequencing systems and shelves of machines for amplifying DNA using the polymerase chain reaction.

In return, the innovation centre has been good for the economy. Within 21 months of opening, it had generated more than Can\$4 million in revenue from its four core services: sequencing, genotyping, DNA microchips and proteomics. In May 2004, its status as one of the few centres in the world to have integrated the Illumina genotyping system won it a Can\$1.2 million service agreement with GenoMed, a genomics company based in St Louis, Missouri.

The McGill information centre occupies one corner of a high-tech courtyard. Close by are the chemical engineering department's MH Wong building, the Ernest Rutherford physics building (the New Zealand Nobel laureate spent seven years teaching at McGill) and a new information technology department. "To be able to ask large-scale questions with genomics and proteomics, you need to build large-scale infrastructure and you need mathematicians, chemists and biologists," says Hudson. "We planned this environment. We wanted to bring cores of expertise together in one place."

Across Mount Royal Park, the University of Montreal is constructing Canada's first systems-biology institute. The Institute for Research in Immunovirology and Cancer (IRIC) aims to let researchers from different fields interact seamlessly. Its building is linked to the university's bioinformatics building and next to the J.-Armand Bombardier Pavilion: a massive new nanosciences institute (see box, opposite).

The Can\$100-million IRIC building, funded largely by CFI grants, is due to open in September with 200

Bright future: Montreal's city hall is at the heart of a community whose commitment to innovative research is calling scientific exiles home.

students, researchers and technicians in biochemistry, biology, genetics, structural biology and immunology. "We want to be able to continue recruiting according to the needs and directions of research," says director Pierre Chartrand. "Closer to 2008 there will be about 40 research groups working at the institute."

Chartrand intends to make the IRIC one of the strongest institutes in Canada. Its high-tech environment will include platforms for proteomics, genetic manipulation and cellular and structural biology, not to mention an entire spectrum of organisms from bacteria to mice — including a 100,000-mouse transgenic facility.

LURE OF THE LAB

"We've planned it so that from day one, the researchers will walk into the lab and be able to start working — it will be fully equipped," says Chartrand. He believes that the impressive infrastructure and resources will attract new people to Montreal.

In the past, Canada has lost some of its best minds to the United States and Europe, but the investment may change that. Hudson, formerly assistant director of the Whitehead Institute/Massachusetts Institute of Technology Genome Center, was lured home to Canada by new opportunities. Another exile, Canadian cancer biologist Katherine Borden, is returning from New York's Mount Sinai School of Medicine to join the IRIC in September. "I feel many things for Canadian science have changed," she says.

One change is the federal government's dedication to promoting research excellence by developing well-funded research professorships across the country. In 2000, the government earmarked Can\$900 million to establish 2,000 Canada Research Chairs. Borden will be one of seven IRIC staff to hold one of these, along with researchers from the United States and Europe.

At Montreal International, a non-profit body set up to attract investment and international organizations, vice-president for life sciences Michel Leblanc is trying to capitalize on these new opportunities. "The life-sciences sector in Montreal is very well integrated," he says, meaning that there is an unbroken chain from basic to clinical research, with a wide variety of work opportunities along the way.

Strong ties between industry and academia bring international drug companies to the region, where, says Leblanc, they benefit from the province's system of post-secondary colleges of general and vocational education. "Quebec's pre-university training produces strong technicians," says Leblanc, adding that this makes Montreal a popular destination for European companies. "They'll find the manpower they need."

Montreal's provincial charm is often overshadowed by Toronto's flash. But in reality, Toronto and Montreal are nose-to-nose in the life-sciences and biotech sectors. "Toronto has a lot more generic jobs in the drug industry, whereas Montreal is very active in new innovative pharmaceutical companies and in-house research," says Leblanc. "And the biotech sector is larger in Montreal, in terms of jobs, venture capital and number of companies."

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