

Northern poles of excellence

Canada has redrawn its landscape for science funding in an attempt to compete with the world's best — and reverse the brain drain to the United States. Josette Chen reports.

In 1999, Andrew Halayko was finishing a postdoc at the University of Chicago and had all but decided to continue his research in the United States. Now he is back in his native Canada and heading a lab at the University of Manitoba in Winnipeg, studying cellular and molecular mechanisms in respiratory disease. Ask Halayko if he could have hoped for such an opportunity in Chicago, and he exclaims: "Oh God, no! I got to develop my lab according to my wildest dreams and fondest wishes."

Stories like this would have been unheard of just five years ago. In 1997, Canada ranked 15th in the Organisation for Economic Co-operation and Development (OECD) league table for investment in research and development as a percentage of national wealth — and last but one among the G7 leading industrialized nations. Not surprisingly, many of the country's brightest young scientists were drawn to greener pastures south of the border with the United States.

But over the past few years, Canada's centre-left Liberal government has launched a concerted effort to increase its science spending, and now has the goal of lifting Canada into the top five nations for research investment by 2010. Rather than simply giving more money to existing bodies, the government has changed the face of Canadian science funding. The country's



Light relief: this new synchrotron was kept on track by the Canada Foundation for Innovation.

main medical research agency has been reconstituted, while money has been poured into an effort to provide university chairs for both rising stars and established names. The largest sum has been channelled into an entirely new agency, the Canada Foundation for Innovation (CFI), which has been given the explicit task of building up the country's research infrastructure.

Virtual institutes

For a fortunate élite, including Halayko, these moves have transformed the research environment. He was given Can\$140,000 (US\$88,000) by the CFI to establish his lab, and was then able to turn to the Canadian Institutes of Health Research (CIHR) — formerly the Medical Research Council — for further support. "This led to hiring seven people, all within a year of starting," says Halayko.

The CIHR, launched in June 2000, is Canada's answer to the US National Institutes of Health. It remains tiny by comparison with its US counterpart, but its 2002 budget of Can\$560 million is more than twice that of its predecessor. The agency has tried to create a more strategic focus for Canada's dispersed medical researchers, linking scientists working on related topics into 13 'virtual institutes'.

"The CIHR has really invigorated the biomedical research community," says Tony

Pawson, a leading cell signalling researcher at Mount Sinai Hospital in Toronto.

But perhaps the most significant move was the creation of the CFI in 1997. In his budget speech that year, finance minister Paul Martin announced: "The CFI is about investing in the future growth of our economy, making a down payment today for much greater rewards tomorrow."

That down payment now stands at Can\$3.15 billion, financed from the national budget surpluses of the late 1990s. With the latest round of funding announced last month (see *Nature* **415**, 568; 2002), Can\$1.55 billion has so far been committed to 1,900 projects. The rest of the money is already banked — so the CFI won't face budget cuts, whatever subsequently happens to the Canadian economy.

Something of an innovation in itself, the CFI has been created at arm's length from the federal government. It has complete autonomy, with the proviso that it must have ploughed all of its funds into research infrastructure by 2010, after which it will be wound up. "After our initial funding agreement with the government, we can set our own agenda with no more political intervention," says CFI president David Strangway.

The CFI's funding model has been designed to leverage further spending. It will only pay 40% of the costs of any project it supports: the rest can come from any source,



Andrew Halayko: Canada's funding initiative helped him realize his 'wildest dreams'.

▶ although usually 40% comes from provincial governments and the remaining 20% from industry. Given these matching funds and accrued interest, more than Can\$9 billion should have been invested in research infrastructure by 2010. "It's allowed institutions to do research that they only dreamed of before," claims Carmen Charette, senior vice-president of the CFI. "People are coming back and people are staying."

Nature found this positive assessment echoed by numerous Canadian researchers — although, perhaps predictably, there has also been some grumbling from those who have not benefited from the CFI's largesse.

Winds of change

Karen Bartlett, an assistant professor studying aerosols of airborne pathogens at the University of British Columbia in Vancouver, effuses about the CFI. When she returned to Vancouver from a postdoc at the University of Iowa, the agency paid for all the equipment to set up her lab. Bartlett argues that the CFI offers more support than other agencies to projects that do not fall within traditional subject boundaries. "The unique thing about the CFI," she says, "is that it recognizes multidisciplinary and interdisciplinary research." Her work, for instance, tries to integrate field and lab research with efforts to educate doctors about microbial dangers in the workplace.

In addition to equipping newly appointed academic staff, the CFI also supports major infrastructure projects. The largest of these initiatives is the University of Saskatchewan's Canadian Light Source (CLS), a synchrotron that will be completed in Saskatoon by 2004. The project, which will provide Canadian scientists with a state-of-the-art facility for protein crystallography and other studies requiring intense X-ray beams, won the scientific approval of the Natural Sciences and Engineering Research Council (NSERC) — the main granting body for non-medical research — in 1995. But the price tag of Can\$141 million was too much for the NSERC. "Without the CFI the project would not have gone ahead," says Peter MacKinnon, president of the University of Saskatchewan.

Michael Bancroft of the University of Western Ontario, scientific director of the CLS, agrees. But he adds that raising matching funds from industry and provincial governments proved a major headache. "The 60% was a big problem," says Bancroft, who has spent much of the past three years crisscrossing the country on fund-raising trips. The CFI's initial policy of not providing running costs also proved problematical. "People had to sign to say they wouldn't need it," says Bancroft.



Looking to the future: David Strangway views the fruits of Canada's investment in technology.

Although the CFI has no plans to relax its rules on matching funding, complaints about the difficulty of raising running costs have been common. In this latest round of large-infrastructure awards, the agency responded to these concerns by allowing 30% of its contributions to new facilities to be put towards initial running costs.

More difficult to address have been complaints that the CFI has widened the gap between the haves and the have-nots in Canadian science. Given the government's stated aim of using the CFI to stimulate future economic growth, disciplines such as biomedicine, with obvious potential for commercial spin-offs, have inevitably been favoured. Researchers in smaller universities and the less prosperous provinces have also complained about being sidelined. "The awards are not a reflection of excellence, just mass," claims Gerald Johnston, head of microbiology and immunology at Dalhousie University in Halifax, Nova Scotia.

Concentrated cash

Although the CFI, as a privately constituted body, is not accountable to Canada's government auditors, it has brought in external reviewers to judge its decision-making. Last year, the agency asked the Royal Society of Canada to appoint an international panel of scientists to evaluate the impact of the CFI. The resulting report, published in September 2001, concluded that concerns about the CFI's tendency to concentrate its funding were valid, but added: "it is difficult to identify any readily available solutions". Indeed, some concentration of resources is desirable, argues panel member Peter Lachmann, an immunologist at the University of Cambridge and founding president of Britain's Academy of Medical Sciences: "You need centres of excellence to maximize bang

for the buck, otherwise you lose impact."

But the report did recommend that more money should be given to Canada's granting councils, to ensure that investment in people to run the machines purchased with CFI money does not fall behind the build-up of infrastructure. The government seems to be heeding this advice, which has been echoed by vocal sources within Canada. Indeed, despite the worsening economic climate, the latest Canadian budget, announced shortly before Christmas, allocated healthy increases for both the NSERC and the CIHR (see *Nature* 414, 832; 2001). "This tells me that the government is putting its money where its mouth is," says Tom Brzustowski, president of the NSERC.

It is still too early to gauge the long-lasting effects of the Canadian government's investment, but by the end of 2001 the country's ranking had moved up one place to 14th in the OECD ranking of research expenditure. "We still have a long way to go," says Strangway. "The whole world is investing in the knowledge economy, so we are trying to hit a moving target."

But if the mood of the young researchers who have benefited from CFI funding is anything to go by, the agency can already claim a measure of success. "I have colleagues thinking of coming back," says Halayko, "and I'm telling them they couldn't be coming back at a better time." ■

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Canada Foundation for Innovation

♦ www.innovation.ca

Canadian Light Source

♦ www.cls.usask.ca

Canadian Institutes of Health Research

♦ www.cihr.ca

Natural Sciences and Engineering Research Council

♦ www.nserc.ca

