CAREERS

TURNING POINT An interest in mycology leads to a focus on bioenergy **p.127**

EUROPE Universities seek the right to pursue new income sources **p.127**

NATUREJOBS For the latest career listings and advice **www.naturejobs.com**

W. BIBIKOW/JAI/CORBIS

The Frontenac Hotel in Quebec City. The city hosts part of Quebec's optics and photonics research cluster.

REGIONS

Quebec's research ambitions

Some science fields in Canada's second most-populous province are booming; others are stagnating.

BY HANNAH HOAG

The Pavilion of Optics and Photonics at Laval University in Quebec City, Canada, resembles other university construction projects of recent years: grey, boxy and modernist. Yet, despite its sober design, the facility is one of the main reasons that physicist Younès Messaddeq moved to the area from Brazil last year. The 5,000-square-metre building, which opened in 2006, is devoted to the development and testing of lenses, optical coatings and fibre optics made of silica and exotic glasses. The building's design minimizes dust contamination, isolates the laboratories from vibration and controls temperature and humidity. Messaddeq says that the facility's participation in Quebec province's multi-institutional Centre for Optics, Photonics and Lasers (COPL) — the largest optics and photonics university research centre in Canada — as well as its modern equipment and laboratories, the depth and breadth of technical expertise among its employees and its close ties with the local photonics industry will allow him to develop complex optical devices quickly. "I've worked around the world and I've never seen a facility like this," he says.

Messaddeq took up his position as a professor of physics and optics at Laval after unemployment in Quebec peaked at 9.1% in late summer 2009. In another field, the timing might have been unfortunate, with industry partners hurting. But Quebec's photonics sector has fared well throughout the economic downturn, and still offers career opportunities in both industry and academia. By contrast, biomedicine in the province has partially withered, with parts of the biopharmaceutical sector shrinking and laying off workers, but bright spots remaining in areas such as genomics, proteomics and medical imaging. Even so, tax incentives, targeted research funding, infrastructure investments and a solid industry presence make Quebec a destination for many young scientists, including foreigners — especially those willing to embrace a new culture and possibly a new language.

PHOTONICS LEGACY

For decades, academic and industrial institutions in Quebec have excelled in optics and photonics, specializing in defence and telecommunication and expanding into remote-sensing and biophotonics. According to a 2009 survey by the Canadian Photonics Consortium, 104 photonics companies and 4,750 employees generated Can$600 million (US$609 million) in revenue. It's the ▶

second-largest research and development photonics cluster in Canada — beaten only by Ontario, which has 117 companies, 10,200 employees and Can$3 billion in revenue, notes Michel Têtu, chief executive of the Quebec Photonic Network in Montreal.

Large and small companies in the Quebec City region are all actively looking for research scientists with graduate degrees in laser photonics, chemistry or material sciences. Fernand Sylvain, co-founder and vice-president of operations at CorActive, a Quebec company that manufactures speciality fibres, says that his firm has grown by about 10% a year, even during the recession, generally hiring a scientist and two technicians each year. He hopes to have hired five more employees by the end of 2011. André Fougères, director of programme management at the National Optics Institute (INO), a design and development company, says that it employs 240 people and plans to double in size by 2016. Fougères says that the INO is looking for scientists with backgrounds in microfabrication and biophotonics. "But we're really looking for people who are application driven," he says. "They have to be willing to take risks, to jump on a project without all the details. They have to be entrepreneurial."

The high concentration of companies makes Quebec a good place for technology transfer, says Messaddeq. The Pavilion of Optics and Photonics is the administrative centre for the Canadian Institute for Photonics Innovations, a network of centres of excellence that brings together university, government and industry researchers. Messaddeq, whose research focuses on laser technologies, hopes to launch spin-off companies and technologies in the next five years, based on either university research or collaborations with the INO.

Messaddeq came to Laval through the first round of the Canada Excellence Research Chairs (CERC) programme. An initiative of Canada's three major federal funding agencies, the programme grants universities Can$1.4 million a year for seven years for each chair that it supports. Of the 19 CERCs awarded in 2010, three went to universities in Quebec. The next competition will be announced in 2015.

Federally funded programmes such as the CERC and the Canada Research Chairs programme, which the government started in 2000 and which grants Can$300 million a year, aim to attract and retain "the world's most accomplished and promising minds", and have been key to bringing early- and mid-career scientists to Quebec. Of the 1,845 CRCs awarded by November 2010, 30% went to academics recruited from outside Canada, including expatriates, and 20% were awarded to health, natural-science and engineering researchers at Quebec universities. Postdoctoral fellows have several possible sources of income, including federal and provincial funding agencies and the prestigious Banting Postdoctoral Fellowships, worth Can$70,000 a year for two years, for Canadian and international researchers. "It would be harder to recruit top-notch researchers to Quebec without these programmes," says Paul Fortier, vice-rector of research and innovation at Laval.

BIOTECH STUMBLING BLOCKS

The biopharmaceutical industry has long been a staple of Quebec's science community, but it hasn't fared as well as optics and photonics. Clusters of pharmaceutical and biotechnology companies, including spin-offs and multinationals, have assembled around Montreal. As of 2010, Quebec hosts 150 pharmaceutical, contract research and biotechnology companies, and about 18,600 people are employed in the field. Many companies set up in the province because of competitive tax incentives for companies and tax holidays for foreign researchers — a five-year tax break on 75% of their personal income while they participate in research and development activities at a corporation.

But in the past decade the industry has sagged. In 2001, Quebec had 110 health biotech research and development companies. By 2008, the latest date for which statistics are available, that number had dropped by almost half. Venture capital, which fuels such start-ups, has been drying up around the world, and Quebec is no exception. In Montreal, the most conspicuous loss was the closure of the Merck Frosst Centre for Therapeutic Research, a research lab for the pharmaceutical giant Merck. When the drug-maker closed the facility in July 2010, it laid off most of its nearly 200 employees.

"You can have a curiosity-driven career here, make a good living and do it all."
David Colman

These setbacks have come despite a decade in which Quebec has developed a genomics research niche. Montreal's McGill University and Génome Québec Innovation Centre, a high-throughput research facility, opened in 2002, and has contributed to, among other things, the HapMap project, a study of genetic diversity. Last month, McGill repatriated Mark Lathrop, a biostatistician from the Center for the Study of Human Polymorphisms in Paris, to lead the centre. His appointment includes a Can$5-million budget that can be used to help recruit more scientists.

EARLY-CAREER OPPORTUNITIES

Despite niche opportunities, recruiting and retaining early-career scientists from non-Francophone countries remains a challenge. Only three of Quebec's universities teach mainly in English. Those who don't speak French can still find a spot at a French-speaking university, but may have to forgo a year or two of teaching until their language skills catch up. When Huixiang Xie, a marine chemist, was hired by the Institute of Marine Sciences in Rimouski soon after he finished his postdoc at the Woods Hole Oceanographic Institution in Massachusetts and the US Environmental Protection Agency, he didn't know any French. "Frankly, I wasn't worried about it. I'd learned English in China, and I thought learning French would be similar," he says. Even with a tutor, he struggled, but his colleagues and neighbours have helped him improve to the point where he can teach in French.

Concordia University in Montreal prepares graduate students and postdocs for work in Quebec by offering French-language training as part of a suite of professional-development workshops. "It provides highly qualified personnel with job-ready skills that allow them to move into the academic, private or public sector workforce," says Graham Carr, dean of graduate studies at Concordia. Further workshops are being planned in entrepreneurship, communication skills and research ethics.

A move to Quebec can also present a cultural adjustment. "My first night, I told myself, 'I can't do this. It's a different culture and a different country,'" recalls neuroscientist David Colman, recruited in 2002 to head the Montreal Neurological Institute and Hospital, known as the Neuro. "But by the third day, after I'd met with the researchers, I realized there were a lot of things I could do here that I couldn't do in New York," he says. Colman was lured from the Mount Sinai School of Medicine with the promise of launching a multimillion-dollar neuroengineering research programme and making a neuroscience IMAX movie for pre-teens.

Since Colman's arrival, the Neuro has hired 16 faculty members, mostly at the assistant and associate professor level, recalling Canadians from abroad and attracting many international scientists. The CRCs and the Canada Foundation for Innovation, an independent corporation in Ottawa, Ontario, created by the government to fund research infrastructure and recruit scientists, helped the Neuro to get the scientists it wanted, says Colman. It has also hired radiochemists, pathologists and positron emission tomography (PET) physicists, and will soon recruit a magnetoencephalographist to round out the expansion of the McConnell Brain Imaging Centre, which is doubling its size to 4,600 square metres and adding two magnetic resonance imaging scanners, a PET scanner and a magnetoencephalography system.

"The US funding environment and the falling success rates have made it easier for us to recruit from the United States," says Bruce Pike, the centre's director.

Colman recommends taking a chance on Quebec. "You can have a curiosity-driven career here, make a good living and do it all." ■

Hannah Hoag *is a freelance writer in Montreal, Canada.*

O. EGAN, MONTREAL NEUROLOGICAL INST. HOSP.