

Canadian Biotech: An Article by Michael Rosen

Canadian biotech: a profile of our northern neighbor

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Canada is fertile ground for biotech. Over the years, I have had the opportunity to visit frequently Toronto, occasionally Montreal, Edmonton (once), but had always wanted to go to Canada's West Coast and see Vancouver. Opportunity presented itself recently at a request by Illinois' Office of Trade and Investment (OTI), a division of the Illinois Department of Commerce and Economic Opportunity, to present Illinois' growing bioscience business to the British Columbia Life Science Association.

First, a little background on Canada: it is actually larger than the United States, but with only 33.4 million people versus the United States' 300 million (in fact, according to CIA.gov, Canada is the second largest country in the world in territory, second only to Russia). Canada has 10 provinces (equivalent to our states) and 3 territories. Let's take a look at some of the key comparators with the U.S.:

Characteristic	Canada	U.S.
Territory (million square km.)	10.0	9.8
Population (million)	33.4	301.1
GDP (2007 - trillion)	\$1.4	\$13.8
GDP/Capita	\$38,200	\$46,000
GDP Annual Growth (2007)	2.7%	2.2%
Unemployment Rate (2007)	5.9%	4.6%
Inflation Rate (2007)	2.4%	2.7%
Current Account Balance (2007 - billions)	\$28.5	<\$747.1>
Main Export Partner/% of Exports	U.S./ 81.6%	Canada/22.2%
Telephones: Land/Cell (millions)	20.8/17.0	172/233
Internet Users (millions)/% of population	22/66%	208/69%

Source: <<http://www.cia.gov>> CIA.gov

Needless to say, with the expansion and growth of the European Union, the United States needs to look north to its largest trading party, Canada (and south to Mexico) to remain competitive on a global scale. Although there are many aspects of Canada and the United States that are similar, there are also clear differences. In many ways, Canada still is far more linked to Europe (both the United Kingdom and France) than the United States: 23% of the population officially speaks French (versus about 12-15% of the United States population speaking Spanish), and Canada also is both a constitutional monarchy and a parliamentary democracy where the head of state is Queen Elizabeth II, the head of government is the prime minister, and the legislative branch is Parliament.

Like the United States, Canada is multi-cultural and multi-ethnic. According to Richard Lewis' book *When Cultures Collide*, Canada is the most multicultural country in the world. He writes: "In 2000, over 12 million Canadians, or 40% of the population, were reported as having an ethnic origin other than British or French. Among the larger groups are German, Italian, Ukrainian, Dutch, Polish, Chinese, Vietnamese, Korean, Jewish, Caribbean, Portuguese, Finnish and Scandinavian."

Lewis further explains that over 60 languages are spoken by more than 70 ethnocultural groups. One significant difference with the U.S. (which shares the same ethnic diversity) is that the Canadian government "...is very active in protecting this heritage, and multicultural and antiracist education programs exist at all level," he writes.

The Canadian dollar has appreciated 50% against the U.S. dollar since 2003 and is now actually slightly stronger than U.S. dollar. American imports into Canada have become more price competitive.

Illinois and Canada

Although Illinois does not border Canada, it realized almost 20 years ago the importance of this northern neighbor by establishing a trade office there in 1990. In fact, according to the Illinois OTI, Canada is Illinois' largest export market, with exports of \$12.9 billion in 2007 (construction machinery, motor vehicles and motor vehicle parts/accessories, food and agricultural products, agricultural implement machinery, to name some of the key sectors).

Total trade between Illinois and Canada reached \$41.1 billion last year (\$28.2 billion in Canadian imports including oil and gas extraction, newsprint, food and agricultural products, heavy duty truck manufacturing, metal smelting and refining, etc.). Today, there are an estimated 201 Canadian companies operating in Illinois employing 40,274 Illinois residents. It is no wonder that the State of Illinois has such an interest in Canada. Traditional industries have been

the source of trade between the two countries but in the 21st century, biotechnology could well become a key driver of future trade.

Canadian and U.S. Biotech: A Comparison

Biotech is an industry which garners high interest in both the U.S. and Canada, and Canada may have less companies than the U.S., but has far more on a proportionate basis relative to the size of its population. Let's take a look at some of these key parameters of this industry comparing the two countries:

Biotech Characteristics Canada U.S.

of Biotech Companies: • Total • Public • Private 465 82 383 1,452 336 1,116

Annual Biotech Sector Revenue (millions) \$3,242 \$55,458

Annual Biotech Research (millions) \$885 \$22,865

Number of Biotech Employees 7,190 130,600

Total Biotech Financing: IPO/follow-on/VC (2006 - millions) \$1,803 \$20,313

Scientific Paper Citations/Rank 4,194/6 37,822/1

% Share of Global Biotechnology Patents/ Rank 2.7%/6 43.3%/1

High School Science Proficiency Rank 6 20

Source: Ernst & Young's Global Biotechnology Report 2007

Canadian Biotech

According to Ernst & Young 2006 census of Canadian biotech, all 10 provinces in Canada had biotech companies.

Canadian Province	Public Companies	%	Private Companies	%	Total Companies	%
Ontario	26	31%	143	37%	169	36%
Quebec	24	29%	137	36%	161	35%
British Columbia	16	20%	75	20%	91	20%
Others	16	20%	28	7%	44	9%
TOTAL	82	100%	383	100%	465	100%

Source: E&Y's Global Biotechnology Report 2007

Ontario holds the leadership role in Canadian biotech, and is the "California" of Canadian

biotech, with the key city of Toronto and the Toronto suburb of Mississauga, where many U.S. and European Pharma companies have their Canadian subsidiaries. It is not coincidence that two of the annual BIO International Conferences have been held in Toronto.

Quebec province is a close second with two key biotech hubs: Montreal and Quebec City.

British Columbia, with Vancouver as its key biotech center, is the main Canadian biotech cluster on the Canadian West Coast. It should be noted that Vancouver is just a few short hours drive to U.S. biotech cluster Seattle. Both Toronto and Vancouver house stock exchanges which include biotech companies.

British Columbia may have less biotech companies than both Quebec and Ontario provinces, but during 2006 it was more successful in raising capital, raising almost \$697 million versus Quebec province's \$632 and Ontario's \$269 million.

Cross-border mergers & acquisitions of biotech companies is common between Canada and the United States. E&Y estimates that there were 60 publicly-disclosed M&A deals in Canada during 2006. Most of the deals were for less than \$10 million each, but there were two mega-deals. Angiotech, based in Vancouver, acquired of American Medical Instruments, valued at more than \$785 million according to E&Y. The second deal was Genzyme's acquisition of the Canadian company AnorMED for over \$580 million.

Canadian biotech companies have acquired a number of U.S. companies in recent years (e.g. QLT's acquisition of Atrix Labs and Cangene's acquisition of Chesapeake Biologicals), however, most of the acquisitions are in the \$30-\$40 million range as Canadian companies have smaller market caps than their U.S. equivalents.

British Columbia and Biotech

According to the Canadian bank BMO Provincial Monitor report from Winter 2008, British Columbia has a population of 4.4 million people (about 13% of the Canadian population) and is the third largest province, with a GDP per capita of \$42,549, substantially higher than the national average. It trails Ontario's 12.8 million population, with a GDP per capita of \$45,411 (39% of Canadian population), and Quebec province's 7.7 million population (23% of Canadian population) with GDP per capita of \$38,090.

According to <http://www.wikipedia.org/> Wikipedia, Canada's largest cities (metropolitan areas were:

- * Toronto (Ontario): 5.1 million
- * Montreal (Quebec): 3.6 million

* Vancouver (BC): 2.1 million

The Illinois State Office in Canada estimates that in 2006, about 40% of Vancouver metro area residents (831,300) were foreign-born, with the area having attracted 151,700 immigrants between 2001 and 2006 (1.1 million immigrants came to British Columbia during the last 5 years), of which 26% came from the People's Republic of China. Other leading sources of immigrants over the past 5 years include India (12%) Philippines (11%), South Korea (8%), and Taiwan (5%). Wikipedia data from the 2006 Canadian census shows that two of the largest ethnic groups in British Columbia, Indians from the Punjab area of India (Sikhs) number about 160,000 people, and Chinese number about 350,000.

Before I visited Vancouver, I was aware of the large Chinese population there, mostly due to Hong Kong residents that emigrated to Canada prior to the annexation of this territory to mainland China, but I had no idea of the large Indian (and specifically Sikh) population in the Vancouver metro area. I was quickly introduced to this important ethnic group at a dinner hosted by the Illinois OTI and the Indo-Canadian community. OTI's managing director, Rajinder Bedi, is the ranking Sikh government official in the U.S. Rajinder, a long-time Illinois, providing an excellent bridge for Illinois to British Columbia. Illinois, in the 2000 census, had approximately 125,000 Indians out of the more than 2.3 million Indians in the U.S.

The British Columbia Life Science Association (www.lifesciencesbc.ca) is the main biotech-related organization in this part of Canada, and is akin to IBIO (<http://www.ibio.org/> www.ibio.org). Biotech in this part of Canada focuses not only on drugs and medical devices, but forestry-related biotech, agricultural biotech, marine biotechnology, industrial and environmental biotech, and bioinformatics.

The focus of one of its regular events was a presentation by Illinois (the main reason for my visit) about why Illinois (and the Midwest) is a critical place for this region of Canada to consider establishing a U.S. presence. There are many biotech similarities to the both the Midwest and British Columbia not the least of which is the diversity of biotechnology (beyond just drugs).

In addition to having local offices for Big Pharma companies such as Pfizer, AstraZeneca, Eli Lilly, Novartis, Sanofi-Aventis, GlaxoSmithKline, Roche, Merck, Bayer and Bristol-Myers Squibb, and a large local biotech community, there are a number of BC government and academic institutions which include:

- * The BC Cancer Agency
- * The Child and Family Research Institute
- * The Providence Healthcare Research Institute
- * The Vancouver Coastal Health Research Institute

- * BC Children's Hospital
- * BC Women's Hospital and Health Centre
- * Vancouver General Hospital
- * The University of British Columbia (with several research institutes, centers and faculties):
 - * Faculty of Pharmaceutical Sciences
 - * MRI Research Institute
 - * Brain Research Centre
 - * Bamfield Marine Sciences Centre
 - * Biomedical Research Centre
 - * Centre for Biodiversity Research
 - * Bioinformatics Centre
 - * Cardiovascular Research Centre
 - * Fisheries Centre
 - * Centre for Applied Conservation Biology
 - * Avian Research Centre
 - * Canadian Genetic Disease Network

The University of British Columbia ranks among the leading universities in North America with its annual research funding of \$486 million. Over 120 companies have spun out of its research activities, according to the university's website (<<http://www.publicaffairs.ubc.ca/>> www.publicaffairs.ubc.ca). Newsweek Magazine ranked UBC 27th of the top 50 public universities of the world in 2006. Shanghai Jiao Tong University in China, which annually ranks universities around the world, ranked UBC 36th in the world (University of Toronto was ranked 23rd in the same ranking); by comparison the University of Chicago was ranked 9th, the University of Wisconsin-Madison ranked 17th, the University of Michigan ranked 21st, the University of Illinois - Champaign/Urbana ranked 26th, and the University of Minnesota ranked 33rd in the same study.

I was fortunate to get a brief tour of the grounds of UBC (the dedication to life science research in several different areas was clearly evident by the large campus infrastructure), its Faculty of Pharmaceutical Sciences, the Brain Research Centre, and the Centre For Drug Research and Development, an organization set up between several universities to harvest promising discovery new drug research and take it through preclinical development with in vivo efficacy data.

The Brain Research Centre, with its focus on neurodegenerative diseases (ALS, Parkinson's, and Alzheimer's), multiple sclerosis, mental health and addictions, stroke, neurotrauma, and vision, was very impressive with its cutting-edge research and research tools and equipment. This institution recently received new government funding of \$25 million for its activities. I came away from this tour with optimism about real progress being made towards a whole field of

diseases.

Likewise, the tour of the Centre for Drug Research and Development (CDRD) was equally uplifting. The rationale for this centre was extensive analysis into Canadian discovery research and its commercialization with two important conclusions: 1) there is a lack of early stage funding in Canada (sound familiar Midwest?), and 2) technologies/products are often spun out of a university too early into companies that have limited capabilities to develop these technologies due to lack of experienced drug development personnel and funding.

A decision was made by several regional universities and institutions to create an infrastructure to develop several drugs from the discovery to the preclinical stage and thus gain key proof of concept data for which to capture more value out of further licensing efforts and new company formation. A related organization called Drug Development Inc. (DDI) will then take on further development of selected drug candidates from the CDRD by providing additional capital and expertise.

CDRD has received initial government funding of \$8 million by the government and more recently an additional \$15 million for the next 5 years, as well as \$1 million from Pfizer Canada, with a total raise of \$62 million since its inception, according to a February, 2008 article in Business in Vancouver. The CDRD has plans to raise \$140 million. The team running CDRD are not academics. All have come from senior management roles at Canadian biotech companies and are experienced in drug development.

Several universities in the U.S. are considering such activity (under the label of "translational research") including the University of Illinois, but few have actually put it into place.

Finally, a pleasant surprise in the trip was finding out that the Dean of UBC's Faculty of Pharmaceutical Sciences, Dr. Robert Sindelar, is a native Chicagoan (and an active supporter of BCLSA), and keenly interested in establishing links between the biotech community in his hometown and his adopted home of Vancouver. In fact, many of the people I met throughout the trip knew Chicago and had a great appreciation for the city, its universities, and overall environment, and were looking forward to coming to BIO 2010 in Chicago (if not sooner).

One of the positive lessons of NAFTA, and the growth of the EU, is that the U.S. needs to build more and more bridges with its northern neighbor. Canadians involved in biotechnology (and nanotechnology) that I have met over the last 12 months from Vancouver, Alberta province, and Toronto, seem to have a genuine interest in the Midwest, and we should seek to strengthen these interests and ties!