

Biotech Focus Editor: Ulrike Knies-Bamforth
ddt@elsevier.com

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British Columbia's biotechnology industry: blending research, business and lifestyle

Joyce Groote, jgroote@shaw.ca
and Barry Gee, bgee@bcbiotech.ca

In addition to its reputation for unbeatable lifestyle and beauty, British Columbia (BC) boasts a thriving biotechnology industry. Centred in Vancouver with a growing base of companies also in Victoria, it is now the seventh largest biotech cluster in North America*. It is also one of the fastest-growing. With its world-class research and commercial success, the BC biotech industry is now well positioned to take its place on the world stage.

World-class research

The international spotlight first shone on BC when the University of British Columbia (UBC)'s Michael Smith was awarded the Nobel Prize for Chemistry in 1993. Ten years later, that spotlight again reached BC researchers when members of the BC Cancer Agency's Genome Sciences Centre became the first to sequence the SARS virus in 2003**. These accomplishments are just two examples of the world-class research conducted in BC – research that forms the cornerstone of the biotech industry in BC (see [Box 1](#)).

In terms of research conducted by industry, BC is again world-class. BC-based QLT has established itself as a leader in the area of photodynamic therapy, successfully commercializing Visudyne for the treatment of macular degeneration. In addition, Angiotech Pharmaceuticals is now an internationally-recognized leader in the area of drug-device combinations with their first product, a paclitaxel-eluting coronary stent now having been implanted in over a million patients worldwide, making it the most successfully launched product in medical history.

The vast majority of BC's 90+ biotech companies were created as spin-offs from the province's universities and research institutions, the most prolific one being the UBC. Annual research funding for the university has increased over 250% in the past five years to ~CDN\$350 million. There is currently > \$1.2 billion in construction underway on the UBC campuses, including the new Life Sciences Centre and the Michael Smith Biotechnology Laboratories. The latter is a \$30-million biotechnology research facility, which opened in September 2004 with ~250 research personnel. Additional research facilities at UBC include the Bioinformatics Centre, the Brain Research Centre and the James Hogg iCAPTURE Centre for Cardiovascular and Pulmonary Research.

The provincial government has been instrumental in funding the basic research on

which the industry in built. It has contributed over \$450 million to life-science research, showing commitment to developing the biotech industry in BC. Investment contributions to the various agencies include the following:

- \$210 million Michael Smith Foundation for Health Research
- \$134 million Life Sciences facilities at UBC, the University of Victoria, and Simon Fraser University
- \$100 million Knowledge Development Fund
- \$34 million Genome British Columbia

At the federal level, the creation of Genome Canada and continued support of federal programs such as the Canada Foundation for Innovation, Natural Sciences and Engineering Research Council (NSERC), Canadian Institutes of Health Research (CIHR) and the Network of Centres of Excellence have all provided invaluable financial assistance for research. As an example, BC projects have been awarded \$44 million from Genome Canada alone.

Those projects cover a wide array of research, with examples of human health-related projects that include:

- Cancer Genomics: The Early Stages of Cancer
- Genotype-specific Approaches to Therapy in Childhood (GATC)
- Application of Pharmacogenomics for Rational Chemotherapy of Lung Cancer
- Innovative Genomic Applications to Develop Clinical Biomarkers and Novel Therapies for Common Iron Metabolism Disorders

Entrepreneurial spirit and investors: the right mix to building value

An abundance of research is not sufficient to create successful industrial sectors. To translate research into commercial opportunities requires entrepreneurs and a favourable

*Ernst and Young, Resurgence, The Americas Perspective, Global Biotechnology Report 2004.

**Canadian laboratory first to sequence coronavirus believed to cause SARS, by Helen Branswell

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BOX 1

Web Resources

BC Biotech

www.bcbiotech.ca

Genome British Columbia

www.genomebc.ca

Michael Smith Foundation for Health Research

www.msfr.org

Canadian Genetic Diseases Network

www.cgdn.ca

Centre for Molecular Medicine and Therapeutics

www.cmmt.ubc.ca

BC Cancer Agency

www.bccancer.bc.ca

Michael Smith Biotechnology Laboratories

www.biotech.ubc.ca

Brain Research Centre

www.brain.ubc.ca

James Hogg iCapture Centre

www.icapture.ubc.ca

Vancouver Coastal Health Research Institute

www.vchri.ca

Simon Fraser University

www.sfu.ca

University of British Columbia

www.ubc.ca

University of Victoria Proteomics Centre

www.proteincentre.com

BioPartnering North America

www.techvision.com/bpn

business climate. BC has that great combination.

British Columbia's success is driven by a strong entrepreneurial culture, and many researchers have founded one or more companies based on their work. Once 'love money' provided by friends and family has been depleted, entrepreneurs turn to Angel investors and seed funds, enabling the company to build value before approaching Venture Capital investors. Vancouver has a very unique angel community that has been instrumental in helping entrepreneurial companies build sufficient value to attract venture capital and institutional investors. This community works through the Life

Science Angel Network (LSAN) which was formed in June 2002.

The LSAN provides a forum for start-up/early stage companies in the life science industry to present to the regions high net worth individuals. This includes companies in the health care, agriculture, aquaculture, forestry and environmental sectors. The LSAN also provides individual investors seeking high risk – high-return investments with an opportunity to view start-up companies as well as to network with one another. Often, a group of investors will informally co-invest in a company and provide their mix of expertise to the company to help build value for the next phase of financing.

Typically 3–5 companies present to this network every second month in 15 min slots. As a prerequisite to presenting, all companies are pre-screened and their presentations are reviewed and assessed by a volunteer screening committee. The company presentations are marketing oriented to help secure investor interest for a second, more-in-depth meeting.

Of the 48 companies that have presented to the LSAN, 25% received angel investments ranging from \$250,000 to \$1.5M. To date, a total of \$17.6 million has been raised in the LSAN from angel investors since its establishment in 2002 plus many times more investments in follow-on rounds for a cumulative total of \$242.8M. This includes angel investments, follow-on Venture Capital financing and successful initial public offerings IPOs. The LSAN has also provided impetus for companies to form new alliances, restructure when necessary, refine business strategies or to close shop when financing could not be secured.

The provincial Investment Capital Branch of the Ministry of Small Business and Economic Development has also played an important role in facilitating investment in BC. Since 1985, >\$400 million has been raised from local private investors benefiting more than 575 early stage companies in BC. All of this has been possible under the Equity Capital Program. This Program, which is guided by the Small Business Venture Capital Act, provides a refundable 30% tax credit to individuals who invest in companies



registered as Eligible Business Corporations under the Act. The tax credit is limited to residents of BC and is ideal for investors who want to be actively involved in the growth of small business throughout BC. The program also allows for investments to be made using funds held within self-directed registered retirement savings plans RRSPs.

In general, BC companies have been able to attract significant amounts of investment capital to further their business goals. In 2003, BC public and private companies accounted



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BOX 2

British Columbia cluster leaders

Angiotech Pharmaceuticals (NASDAQ:ANPI; TSX:ANP)

www.angiotech.com

Angiotech is a world leader in the emerging field of drug-coated medical devices and biomaterials. Its lead product is the paclitaxel-coated coronary stent to prevent restenosis (re-narrowing) in coronary arteries. Angiotech was among the first companies to focus on paclitaxel as a therapeutic for indications other than cancer and is developing an intellectual property portfolio with the aim of providing protection for a broad range of uses of paclitaxel for chronic inflammatory diseases. Its strategy is to focus on enhancing medical devices using disease-modifying drugs through its Therapeutic Device Program. Exclusive, worldwide licensing agreements are in place with Boston Scientific Corporation and Cook Incorporated for the development of coronary and peripheral stents.

Aspreva Pharmaceuticals Corporation

www.aspreva.com

Aspreva is a pharmaceutical company with a unique business model based on an asset-partnering approach: identifying, developing and commercializing new applications for existing medicines are anticipated to have high therapeutic value for underserved diseases. Headquartered in Victoria, it has a Swiss subsidiary and is in the process of establishing operations in the UK and the USA. A collaboration agreement with Hoffmann-La Roche gives Aspreva exclusive worldwide rights (excluding Japan) to develop and commercialize CellCept (mycophenolate mofetil) in all autoimmune disease applications, thereby enabling Roche to maintain focus on CellCept's core market, transplantation, while extending its potential benefits to autoimmune disease patients. Aspreva is the recipient of one of the largest series A financings reported in North America, completing a USD\$57 million private equity financing round in 2004 and their IPO in March 2005.

Cardiome Pharma Corporation (TSX: COM; NASDAQ: CRME)

www.cardiome.com

Cardiome is a product-focused cardiovascular drug development company with three clinical drug programs, two focusing on atrial arrhythmia (intravenous and oral dosing) and one on congestive heart failure. With a core expertise in cardiology and a product development focus, Cardiome takes a portfolio approach to risk diversification by: ensuring its drug candidates address multiple independent cardiac disease targets; developing a pipeline with products at various stages of development (pre-clinical to Phase III); and utilizing two potential methods of dosage (intravenous for acute therapy and oral for chronic therapy). Cardiome's particular expertise is in the lead optimization of ion-channel modulating drugs as embodied by its strengths in synthetic chemistry (gram-scale synthesis of ion-channel modulating drugs), analytical chemistry (accurate analysis of drug substance concentration), and *in vivo* and *in vitro* bioassays (*in vitro* cardiac pharmacological testing and in electrophysiology).

Neuromed Technologies

www.neuromedtech.com

Launched in 1998, Neuromed is a UBC spin-off developing chronic pain drugs. Its lead candidate for chronic pain works by blocking N-type calcium channels located in the membrane at the synapse between two communicating neurons. In its second major development program, Neuromed has identified three novel gene targets for T-type calcium channels, found in brain, heart and endocrine cells which allow drug development for the treatment of epilepsy and cardiovascular disease. Neuromed's fast-tracked drug discovery platform has delivered small organic calcium channel blockers with significant competitive advantages such as reduced side effects and addiction risk, greater efficacy and more convenient delivery. Neuromed has been very successful in its financing activities, having raised CDN\$68 million in three rounds.

QLT (NASDAQ: QLTI; TSX: QLT)

www.qltinc.com

The anchor tenant of BC's biotechnology cluster, QLT is one of the world's few profitable biotechnology companies. Following a 2004 acquisition of Atrix Laboratories (NASDAQ: ATRX) QLT is now a leading global biopharmaceutical company focused on ophthalmology, oncology, dermatology and urology. QLT has commercialized two products to date: Visudyne® and Eligard®. Launched in 2000, Visudyne® therapy is approved in >70 countries for AMD, pathologic myopia and presumed ocular histoplasmosis. Eligard®, launched in 2002 is used for the palliative treatment of advanced prostate cancer and is approved in eight countries.

for >50% of all the biotech financings in Canada, raising ~\$850 million (Ernst and Young), led by Angiotech, QLT and ID Biomedical. Also noteworthy is the fact that BC's two largest private venture rounds, those of Neuromed Technologies and Aspreva Pharmaceuticals, were both led by US venture capitalists, demonstrating the world-class status of BC companies, and the ability of BC to facilitate cross-border investment. Aspreva's IPO was completed on March 4,

2005 at USD\$11/share, representing a 20-fold increase for the initial angel investors and raising USD\$100 million for the company.

In addition to the ability to attract much-needed capital, BC companies have also attracted the attention of the international pharmaceutical companies, forming the strategic partnerships needed to bring a drug to market. Examples of successful partnerships include:

- QLT and alliance partner Novartis

Ophthalmics co-developed Visudyne®, the first bio-pharmaceutical treatment for wet age-related macular degeneration (AMD) and one of the most successfully launched ophthalmology products;

- Chromos Molecular Systems and Pfizer established a collaborative agreement to develop cell lines using Chromos' ACE System for production of Pfizer recombinant proteins;
- Xenon Pharmaceuticals and Novartis

biotech focus

signed a USD\$157 million drug development deal for obesity and metabolic disorders;

- Cardiome and Fujisawa Healthcare established a USD\$68 million partnership for the co-development of Cardiome's proprietary intravenous antiarrhythmic agent, RSD1235;
- Aspreva and Roche announced a unique partnership to develop and commercialize CellCept in autoimmune diseases;
- Angiotech Pharmaceuticals and Boston Scientific Corporation received approval from the U.S. Food and Drug Administration (FDA) to market the TAXUS™ Express2™ paclitaxel-eluting coronary stent system;
- Stressgen Biotechnologies and Roche co-developed and commercialized Stressgen's innovative proprietary heat shock protein;
- Xenon and Pfizer signed a CDN\$87 million agreement to collaborate on drug discovery in HDL-cholesterol.

The industry association, BC Biotech, provides a support to the industry. It is actively working with the provincial government to develop public policies which will foster the translation of research investment into significant industry growth and economic activity in the province.

Lastly, British Columbia represents a globally cost-competitive location, and is ranked as the most cost effective location for biomedical R&D, clinical trials management and medical devices manufacturing on the Pacific Region of North America, ahead of states such as California, Oregon, and Washington^{***}.

Commercial success

As a result of BC's world-class research, favourable business climate, and successful

partnerships, it is now home to two profitable biotech companies: QLT and Angiotech Pharmaceuticals, have become recognized as world leaders in their respective fields and both have generated significant returns for investors (see [Box 2](#)).

In 2003, the combined value of BC's 18 public companies (approximately \$5 billion, Ernst and Young) was second only to Ontario, and approximately twice that of Quebec companies. As well, the combined value of BC company revenues generated approximately CDN\$780 million in revenue (Statistics Canada), the second highest of any Canadian jurisdiction. The commercial success achieved to date is expected to continue as several additional BC companies such as Cardiome Pharma, Aspreva Pharmaceuticals and AnorMED have drugs in late-stage clinical trials, and on the verge of becoming BC's next profitable biotech firms.

Perhaps the most important factor in the success of any biotech company is its people. Lifestyle and the expanding biotechnology community make BC an attractive location to recruit biotechnology scientists and business professionals.

BC: attracting international partners

Since 2003, BC has been home to the prestigious BioPartnering North America (BPN) conference. Held annually in Vancouver, the conference has already established itself as one of the most important international partnering conferences in the world, attracting ~850 delegates from 350 companies and 25 countries to the 2005 event.

Conclusion

The biotechnology sector in BC has grown dramatically over the past decade and has become a significant cluster in North America. It is home to strong research institutions and



world renowned scientists as well as >90 companies. Much of the success of companies in this sector is due to the combination of strong science, a healthy entrepreneurial environment and access to public and private financing. There are a multitude of research institutions and active universities that have provided new technologies and help to feed the product pipelines for many companies. An active angel community, seed financing, Venture and institutional capital have all contributed to establishing a financing continuum, which provides the necessary financing for the biotechnology companies. Companies have also been successful in securing necessary partnerships for the development and commercialization of new products.

Joyce Groote

*Crossing Sectors Inc,
3806 W 33rd Ave,
Vancouver, BC*

Barry Gee

*BC Biotech,
900 – 1188 West Georgia St.
Vancouver, BC
V6E 4A2*

^{***}KPMG, Competitive Alternatives Study.