



Biotechnology in Canada - A Regional View

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Life Sciences Branch
Industry Canada



Objective and Contents

Objective:

This presentation compares key biotechnology statistics across Canadian regions—Atlantic, Quebec, Ontario, the Prairies and B.C. It provides a quick reference tool for those looking for statistical data on Canadian biotechnology from a regional perspective.

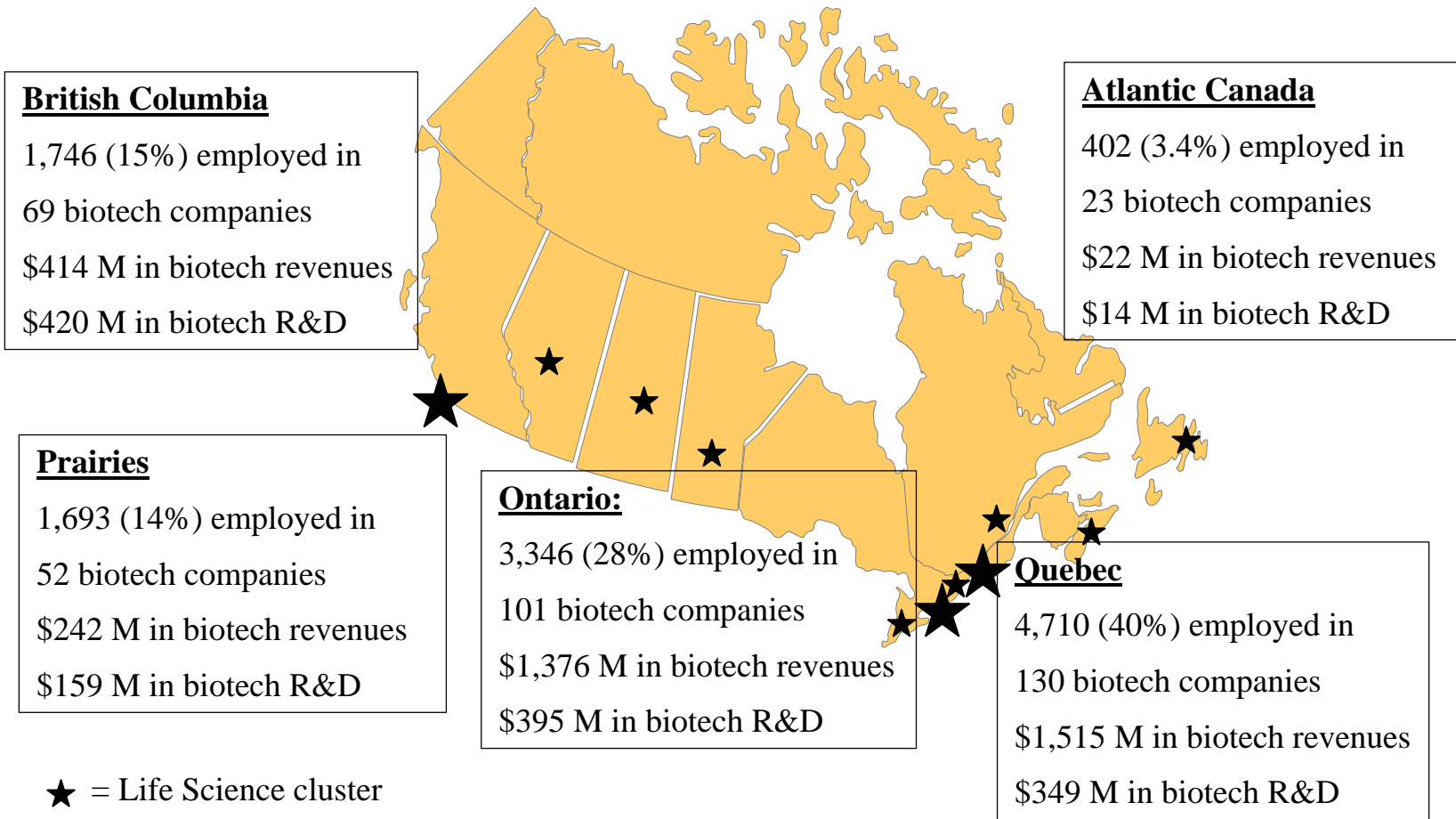
Contents:

- | | |
|---|--|
| <ol style="list-style-type: none">1. Statistical Overview by Region2. Sector Overview3. Growth in Firms and Employment4. Growth in Revenues and R& D5. Patents6. Bibliometrics—Cluster Identification7. Spin-off Firms | <ol style="list-style-type: none">8. Corporate Alliances9. The Product Pipeline10. Financial Overview11. Federal Spending12. Human Resources13. Clusters14. Summary |
|---|--|



Statistical Overview by Region

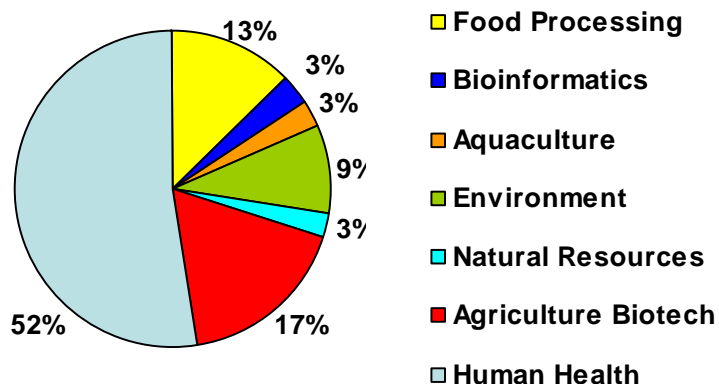
Biotech Activity spans the country, with Quebec leading the way



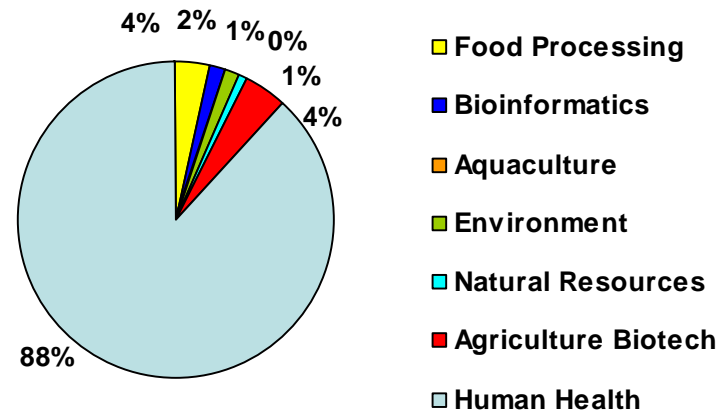
Human health continues to predominate Canadian Biotechnology

- The human health sector accounts for 52% of the total biotech firms and for 88% of the total \$1,337M in R&D spending
- The human health sector is followed closest by agriculture biotech sector, which accounts for 17% of firms and 4% of R&D spending

Number of Firms by Sector, 2001



R&D distribution by Sector, 2001

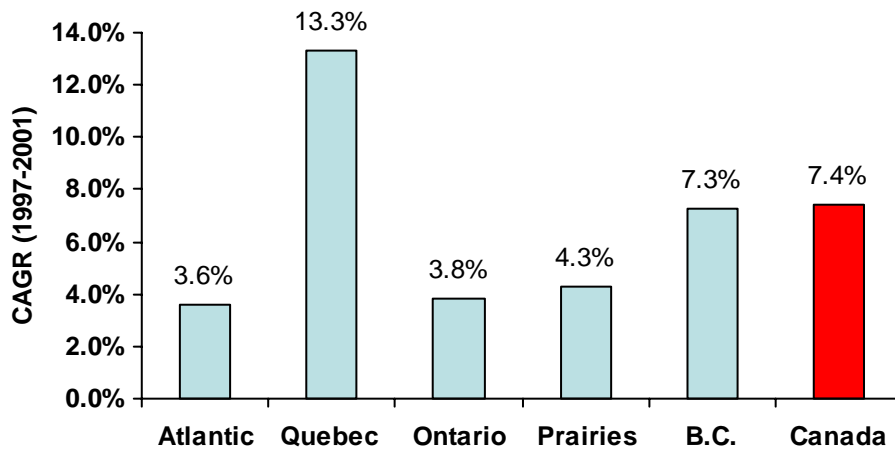


Note: A regional breakdown is not available

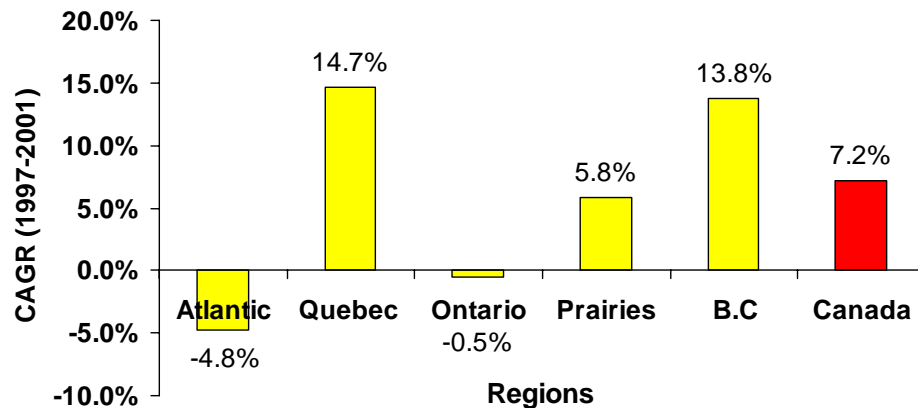


Growth in Firms and Employment

Biotechnology Firm Growth by Region (CAGR)



Biotechnology Employment by Region (CAGR)



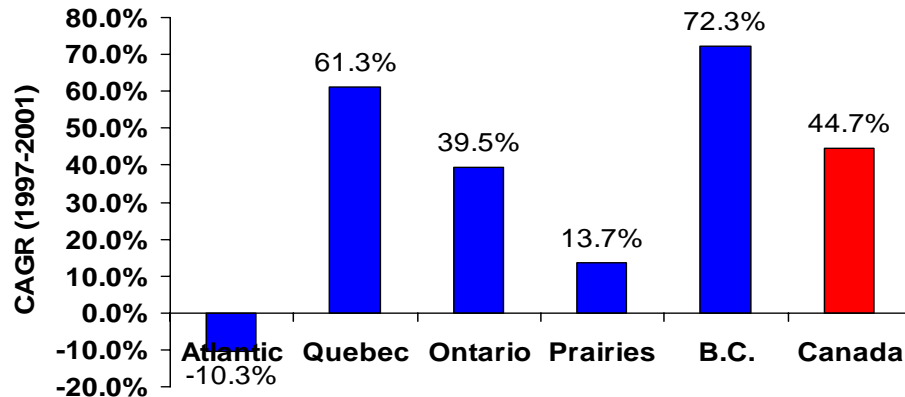
- Of the 375 biotech firms in Canada 71% are small firms (< 50 employees)
- Quebec has the highest growth in the number of biotechnology firms; B.C. is second
- Total number of employees with biotech-related responsibilities in Canada is 11,897
- Again, Quebec and B.C. have the highest growth in biotechnology employment, with Ontario and Atlantic experiencing negative growth.

*CAGR: Compound Annual Growth Rate



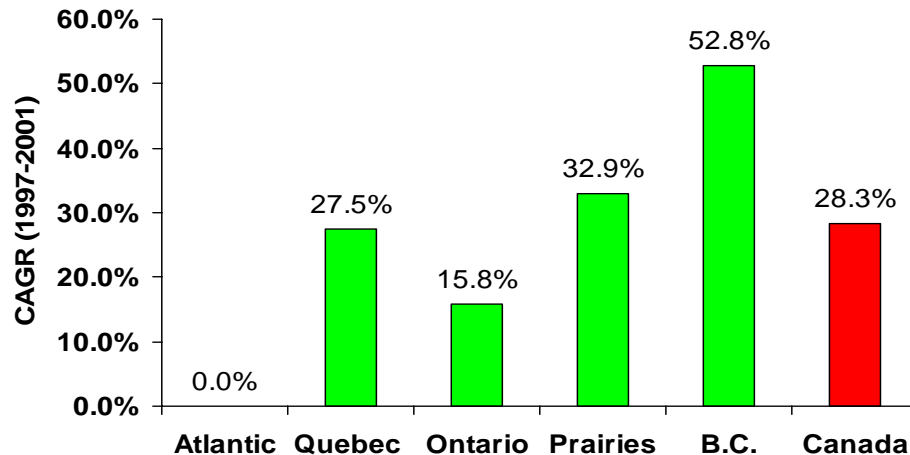
Growth in Revenues and R&D

Biotechnology Revenues by Region (CAGR)



- Canadian biotech revenues amounted to \$3.6B in 2001, with 67% (up 2% from 1999) of firms reporting revenues from biotech products and processes
- Average annual growth in biotechnology revenues has been increasing at 44.7% since 1997
- B.C. has the highest growth in biotech revenues, with Quebec and Ontario second and third

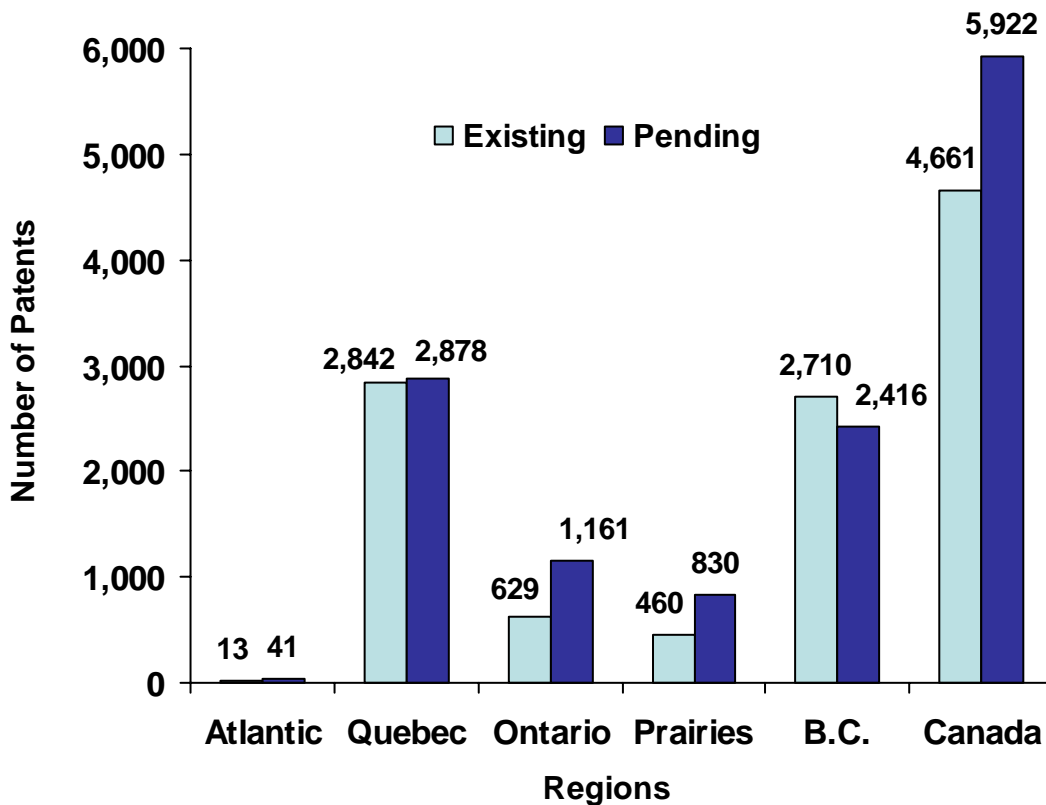
Biotechnology R&D by Region (CAGR)



- \$1.3B was spent on biotechnology R&D in 2001 with an average annual growth rate of 28.3%
- B.C.'s growth in biotech R&D spending stands out, with the Prairies and Quebec closer to the Canadian average, Ontario's below the average, and Atlantic Canada with no growth over this period

Patents

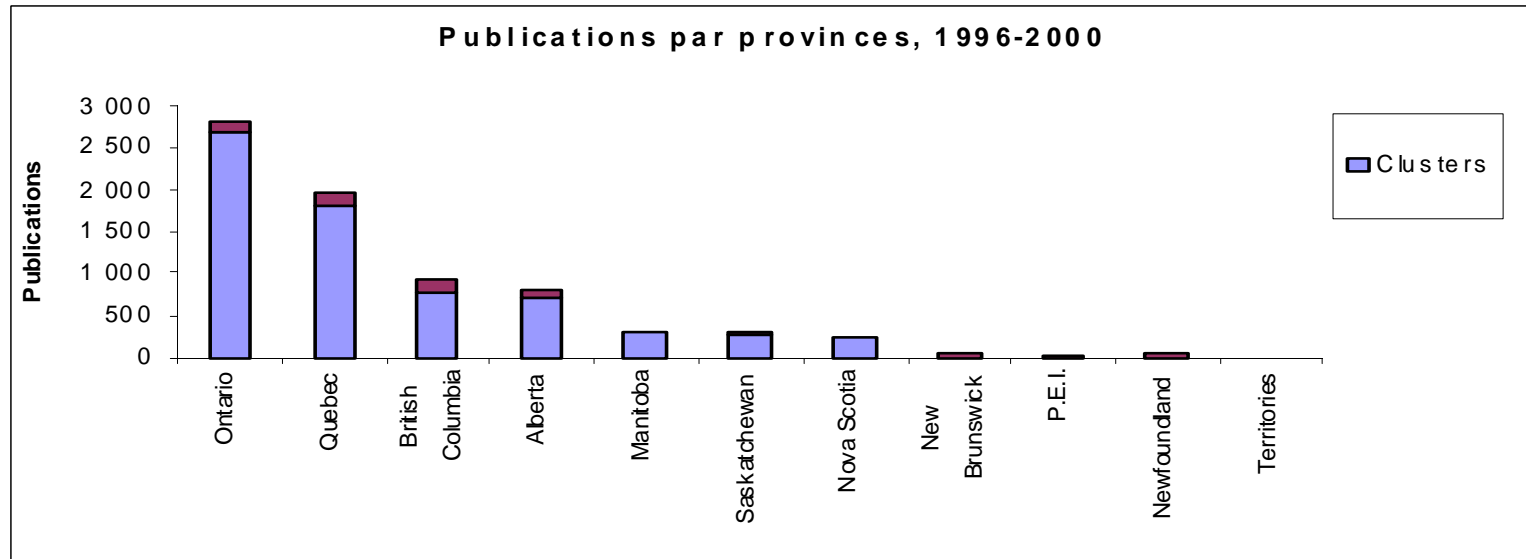
Biotechnology-related Patents Held By Canadian Biotech Firms, 2001



- From 1999 to 2001, the number of existing and pending patents for Canadian biotech firms increased by 26% and 39%, respectively
- Quebec and B.C. lead in both existing and pending patents
- Ontario is third, the Prairies fourth and the Atlantic Region fifth in existing and pending patents
- The majority of Canada's patents are in the human health sector followed by the agricultural sector



Bibliometrics: Cluster Identification



- A total of 6,827 scientific publications relating to biotechnology were published in Canada between 1996 and 2000
- The majority of publications were in Ontario(40.9%), Quebec (28.7%), B.C.(13.7%) and Alberta (11.7%)
- Most of publications come from clusters (cities) within the provinces
- The number of yearly publications has remained stable since 1996. In 2000, there were 1,291 publications and in 1996 there were 1,258.



Spin-off Firms

Biotechnology Spin-off Firms in Canada

Regions	Number of spin-off firms	Number of employees 2001	Total revenues (\$ '000's) 2001
Atlantic	6	43	N/A
Quebec	48	1,400	604,325
Ontario	27	300	9,516
Prairies	26	568	78,479
B.C.	33	1,299	166,412
Canada	140	3,610	\$840,000
% of total	37%	30%	24%

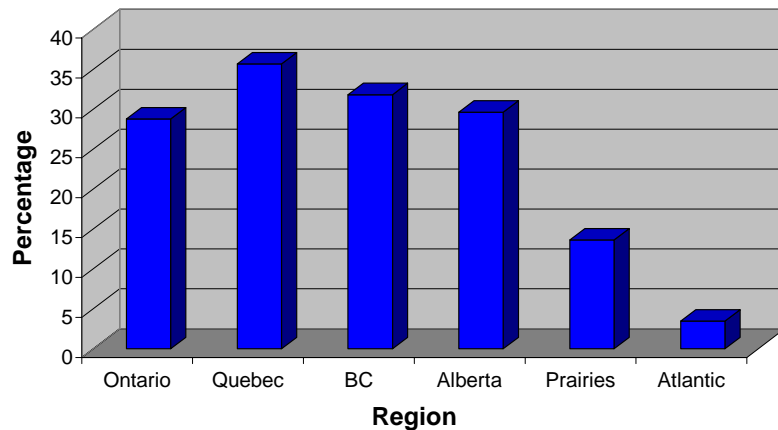
- Most spin-offs were from Canadian universities and hospitals
- Quebec and B.C lead in terms of number of spin offs, employees and revenues
- Ontario has one more spin-off firm than the Prairies but the latter has close to double the number of employees and about 8 times the revenues
- The Atlantic Region has a handful of spin-off firms and employees

- The total number of spin-offs reported increased by 14% from 1999 to 2001, with the majority of them being in the small firm category in both years



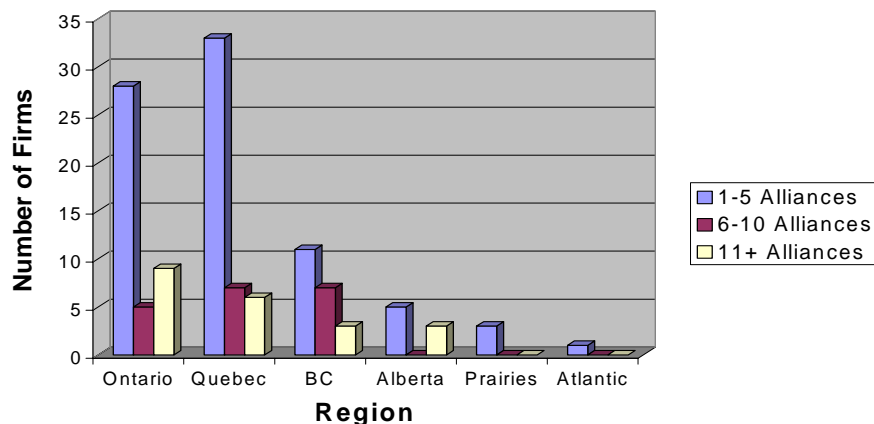
Corporate Alliances

Percentage Of Firms By Region With Alliances



- In 2001, Canadian biotech firms had over 120 corporate alliances (up six-fold from 1993), mainly with U.S. firms
- Corporate alliances are indicators of cluster strength (more innovations) and the maturity of firms
- Quebec, BC, Ontario and Alberta have more mature firms. Firms in the Prairies and Atlantic Canada are in a comparatively early stage of development
- Most corporate alliances in Canadian biotechnology involved licensing and R&D

Distribution of Alliances

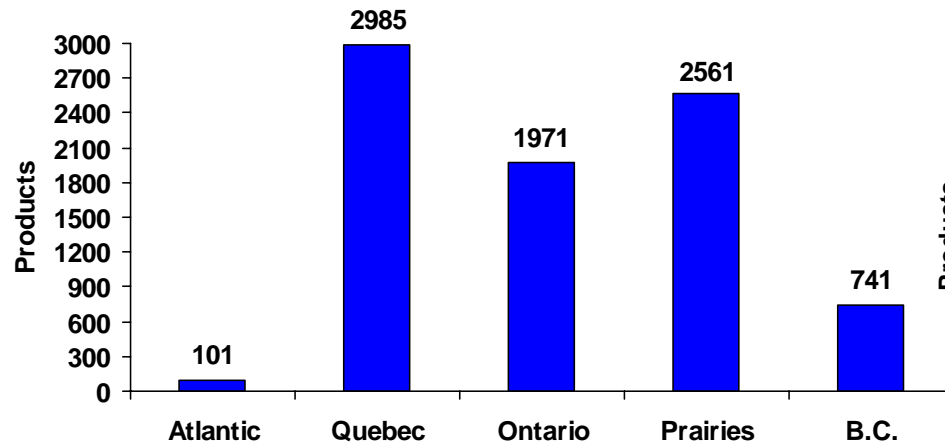


- In most regions, firms have predominately 1-5 alliances
 - Firms with more than 5 alliances typically have platform technologies that they license to other firms; (i.e., monoclonal antibodies, photodynamic therapy, etc.)
- 30% of firms in Ontario, Quebec, BC and Alberta have alliances and average roughly 2 alliances per firm. In the Prairies and Atlantic regions 15% or fewer firms have alliances

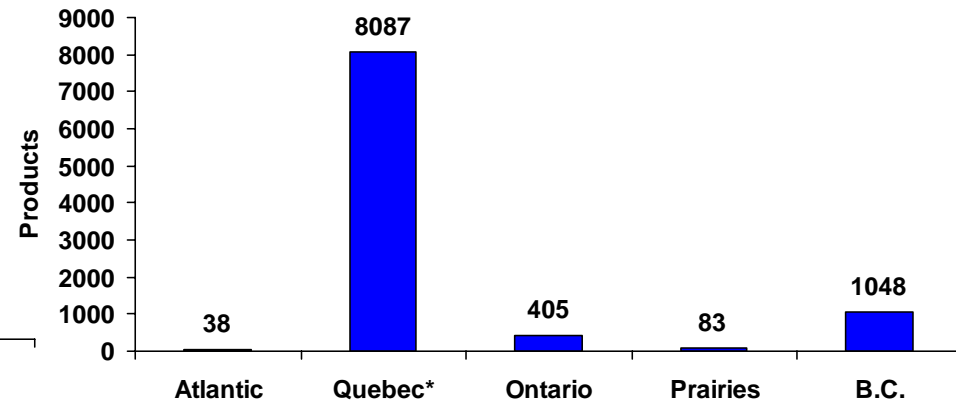


The Product Pipeline

Biotech Products/Processes In Development, 2001



Biotech Products/Processes Approved, on the Market or in Production, 2001

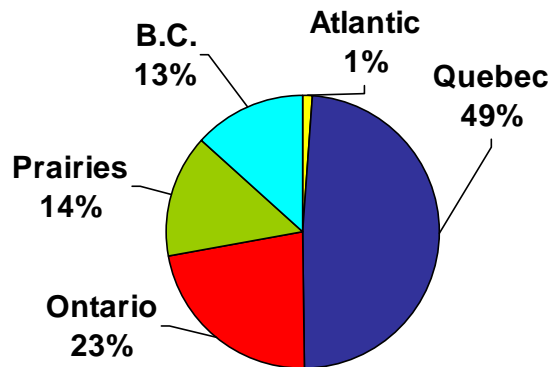


- The product pipeline is an indicator of future growth of the biotechnology sector. The anticipated revenue growth in the sector is dependant on the new products/processes entering the market place
- 46% (8,359) of Canada's 18,020 products/processes are "in development" and 54% (9,661) are "approved, on the market or in production"
- Quebec has the largest number of products/processes "in development," followed by the Prairies and Ontario. Note that Quebec's dominance* in products/products "approved, on the market, or in production" can be attributed to a few firms that, according to their web site, have large numbers (hundreds or thousands) of products in the areas of cosmetics and nutraceuticals, drug screening tools and technologies, and novel research reagents



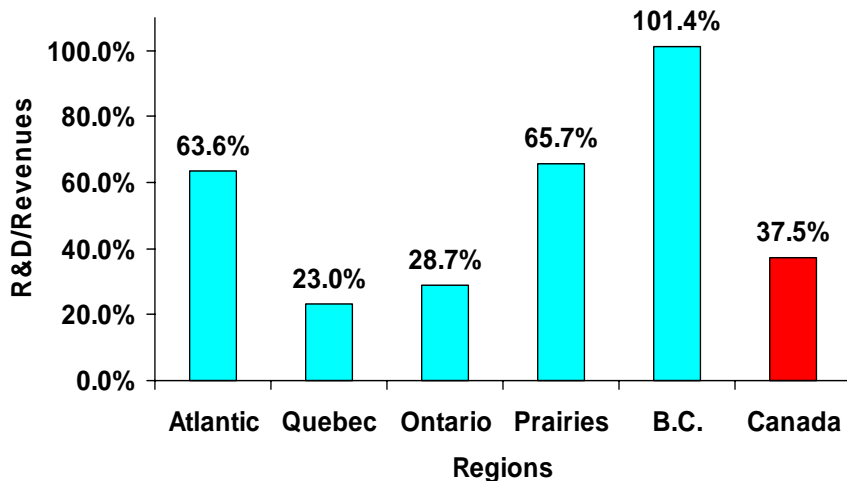
Financial Overview

Distribution of Total Capital Raised by Region, 2001



- Quebec raised almost half of the total capital in Canada
- Ontario raised almost one quarter of the total capital in Canada and the remainder was split between the Prairies and B.C.

Biotech R&D/Revenues by Region, 2001

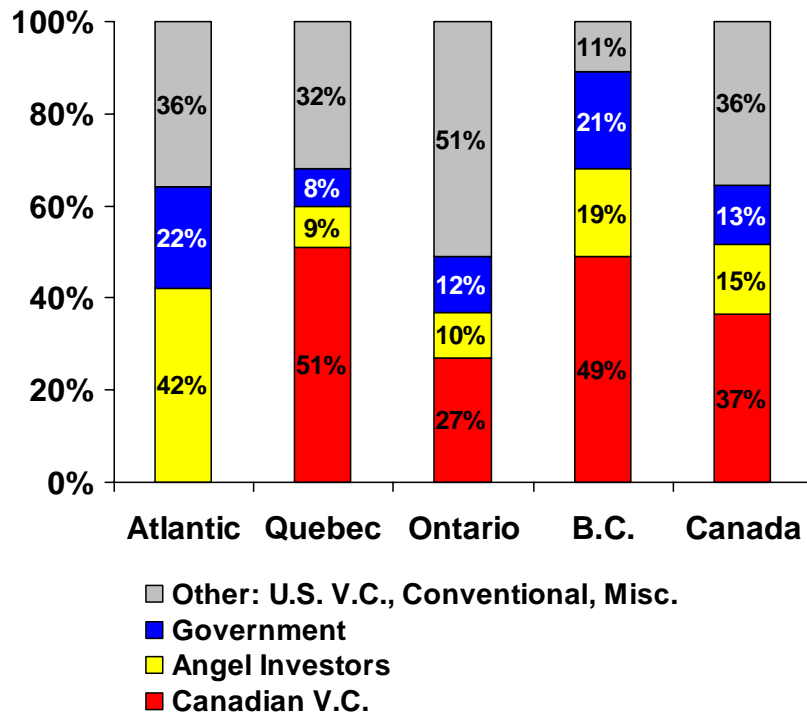


- B.C. has the highest research intensity in Canada, with Atlantic region and the Prairies being above the Canadian average
- Ontario and Quebec are below the Canadian average in research intensity because their revenues far exceed the other regions



Financial Overview, Cont'd

Distribution of Sources of Funding by Region, 2001



- Quebec and B.C. have the highest proportion of funding from Canadian V.C.s, while the Atlantic region appears to have little venture capital (Canadian or U.S.)
- Government funding is most significant for Atlantic and B.C.
- Ontario has the largest proportion of funding from Other sources (U.S. V.C., Conventional, and Misc.)
- There was difficulty in gathering complete data for the Prairie region



Federal Spending

Federal biotech S&T expenditures increased by 29% to \$513M by 2001/2002

Department/Agency	Biotech S&T Expenditures (thousands of dollars)	Biotech PYs
Agriculture and Agri-Food Canada	63,936	400
Canadian Institute of Health Research	176,406	65
Environment	1,576	7
Fisheries and Oceans	3,663	20
Genome Canada	34,268	22
Health Canada	7,552	43
Industry Canada (CFI, TPC)	34,683	19
National Research Council	130,592	825
Natural Resources	9,110	77
Natural Sciences and Engineering Research Council	48,588	21
Social Sciences and Humanities Research Council	2,530	1
Total Expenditures	512,904	1,500

Note: A regional breakdown is not available

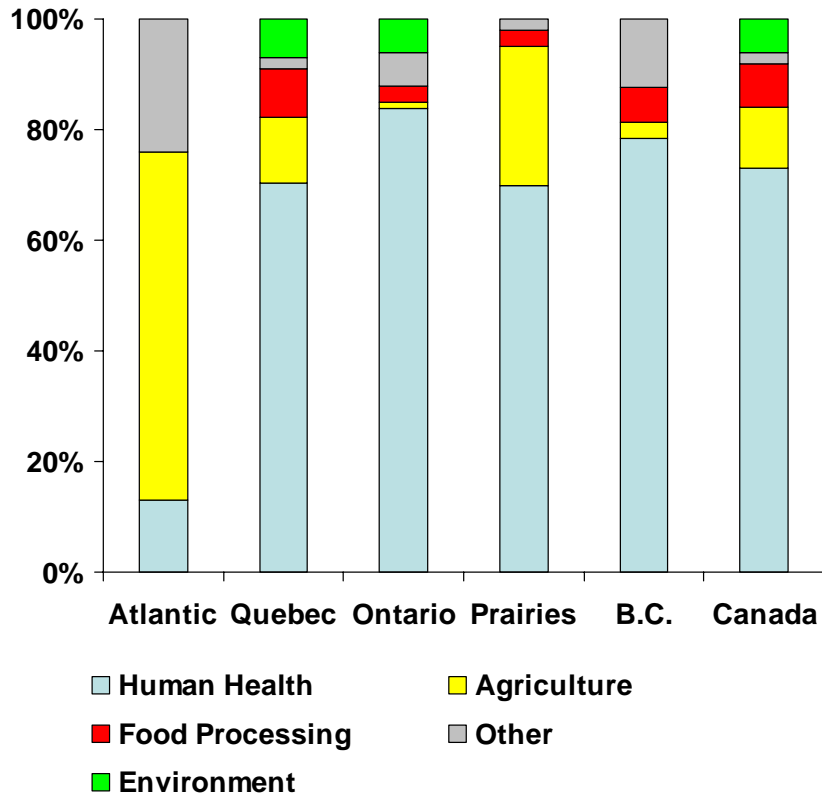


Human Resources: Regional Distribution by Sector

Biotech Employment by Region

Atlantic	Quebec	Ontario	Prairies	B.C.	Canada
402	4,710	3,346	1,692	1,746	11,897
3%	40%	28%	14%	15%	100%

Distribution of Biotechnology Employees in Canada by Sector, 2001



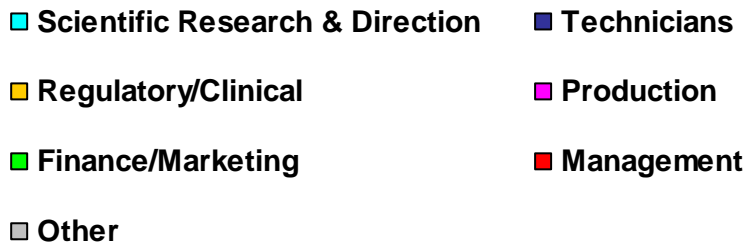
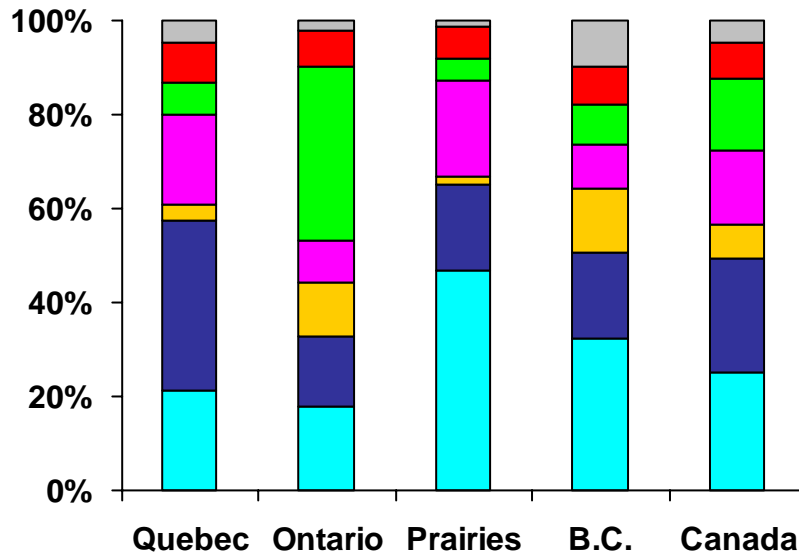
- The majority (73%) of Canada's biotechnology employees work in the human health sector
- All regions except for Atlantic have the largest proportion of their workforce in the human health sector, with Ontario being most dominant
- Most Prairie region biotech workers are in the human health and agricultural sectors
- Atlantic Canada has most of its biotech workforce in the agricultural sector
- Most food processing workers are in Quebec and B.C.
- Quebec and Ontario are the only regions with significant employment in the environment sector

Note: "Other" includes natural resources, aquaculture and bioinformatics as well as environment and food processing where these are not shown separately



Human Resources: Regional Distribution by Type of Position

Employment Distribution in Biotech Firms in Canada by Type of Position, 2001



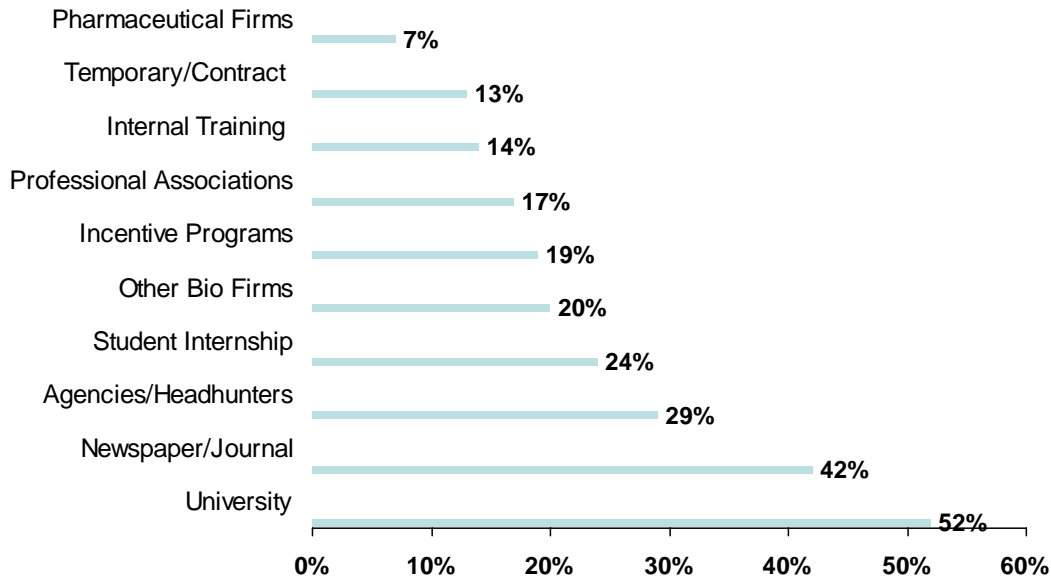
Note: Atlantic figures are not available

- “Skill-intensive” positions (scientific research/direction & technicians) make up the bulk of biotech employment in Canada, with 52% in 1999 and 49% in 2001
- Quebec, the Prairies and B.C. have more than half of its biotech workforce in scientific research and technician jobs; these categories account for only one third of biotech jobs in Ontario
- Ontario has the largest portion of its workforce in finance and marketing positions, a sign of its growing maturity
- Almost half of the Prairie workforce is in scientific research jobs
- B.C. and Ontario have the majority of regulatory/clinical positions
- The proportion of management jobs is similar across Canada at about 8% of the total

Human Resources: Recruitment Sources

Recruitment sources for biotech positions are similar across Canada

Sources of Recruitment For Canadian Biotech Firms, 2001



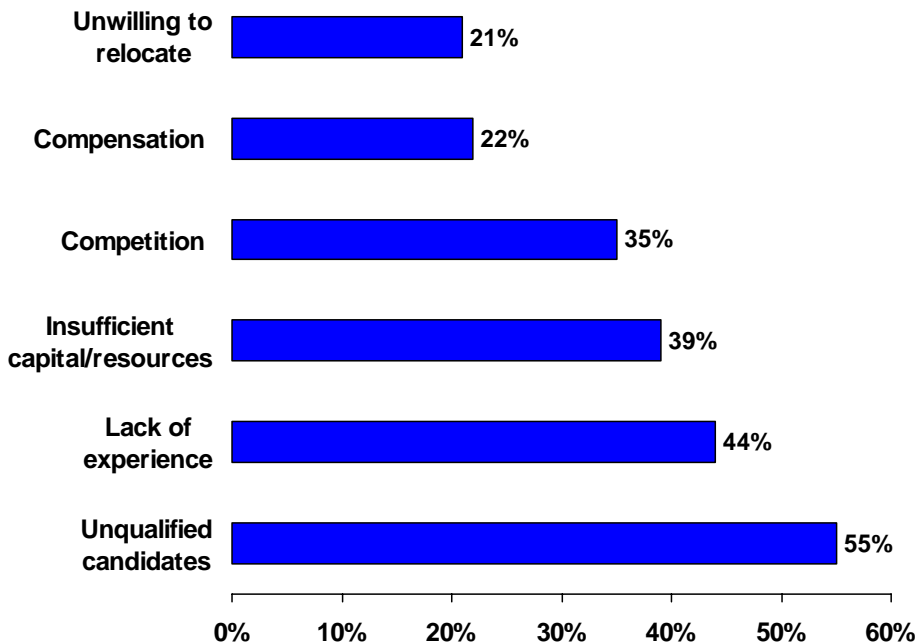
- The top two recruitment sources for biotech positions in all Canadian regions are universities and newspapers/journals
- Agencies/headhunters are in third place as a recruitment source in Quebec, Ontario and B.C.
- Student internships and professional associations are the third most used recruitment source in the Prairies and Atlantic region
- 91% of firms in Canada are successful at recruiting biotech employees



Human Resources: Factors Affecting Hiring

Factors affecting hiring for biotech positions vary by region

Factors Affecting Hiring for Biotechnology
Positions in Canada, 2001



The number 1 factor affecting hiring:

Region	Factor	Percentage
Atlantic	Insufficient capital/resources	46%
Quebec	Competition	62%
Ontario	Unqualified candidates	55%
Prairies	Lack of experience	42%
B.C.	Compensation	44%

- “Lack of experience” is the only factor in the top 3 for all regions
- Most of the 953 vacant Canadian positions are in Quebec (58%), followed by Ontario (19%) and B.C. (12%)

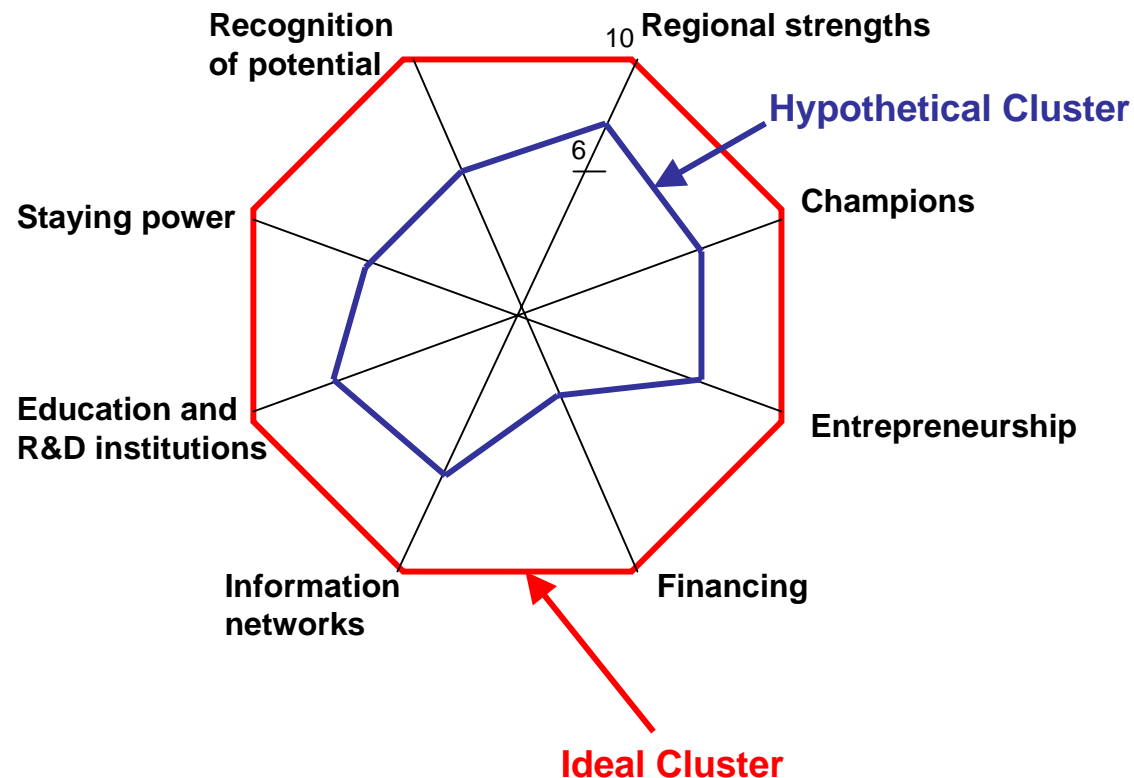


HR Summary

2001 Survey	Atlantic	Quebec	Ontario	Prairies	B.C.
Sector Strengths	Agriculture Human health	Human health Food processing Environment	Human health Food processing Environment	Human health Agriculture	Human health
Predominate Types of Positions	Not Available	Scientific, research & technical	Finance & marketing Regulatory/ Clinical	Scientific, research & technical	Scientific, research & technical
Recruitment Sources	Universities and Newspapers/journals				
Impediments to Hiring	Competition	Unqualified candidates	Compensation	Lack of experience	Insufficient capital/ resources

Clusters

A Qualitative Tool For Measuring Cluster Success



- Clusters foster innovation and growth in the industry
- Web diagrams can be used to compare clusters or to follow the growth of a cluster over time
- Understanding the operational dynamics of a cluster helps to frame policy issues in a readily comprehensible and accessible manner
- Toronto, Montreal and Vancouver are the biggest biotech clusters in Canada

Web Resources:

- [Canadian Biotechnology Clusters](#) (Strategis)
- [Biotech Ontario - Regional Clusters](#)
- [Bio Quebec](#)
- [BC Biotech - Industry Overview](#)

Quebec, Ontario and B.C. are at the forefront of Canadian biotechnology

- **Quebec** is the clear leader, largest in terms of number of firms (including spin-offs), employment, revenues, patents, products and capital raised. More growth in R&D spending is needed to maintain this lead
- **Ontario** is second largest in terms of number of firms, employment, revenues and capital raised and strongest in R&D spending and number of publications. However, growth is slower than expected in key variables as is the number of alliances, spin-offs, patents and products, both in development and on the market
- **B.C.** is the region to watch. It is third largest in terms of number of firms, employment, revenues and R&D spending and exhibiting very

Quebec, Ontario and B.C. are at the forefront of Canadian biotechnology

strong growth in R&D spending and revenues as well as strong growth in number of firms and employment. B.C. is second in number of patents, spin-offs and products on the market but needs more capital, publications and products in development

- The **Prairies** ranked fourth in terms of number of firms, employment, revenues, R&D spending, products on the market, patents and number of spin-off firms. The Prairies are growing strongly in R&D spending and placed first in number of corporate alliances and second in number of products in development

- The **Atlantic** region ranked fifth, likely due to its smaller population. Substantial recent investments should be reflected in 2003 results