

Where biotechs are taking root



Area Development Site and Facility Planning

May 1, 1999 | Bastian, Lisa A

Why have certain locations in the United States and abroad attracted a critical mass of biotech companies?

FUELED BY INNOVATION, research, and bucks, biotechnology is a white-hot industry destined to be a powerful economic force in the twenty-first century.

But behind the mesmerizing, media-hyped tales of cloned sheep, genetically altered vegetables, and oil-eating bacteria is another engaging story: the high-stakes competition by states and cities to attract biotech companies. Read on to learn about successful programs some economic development entities have created to help R&D firms discover biological treasures to benefit our world.

What Do Biotechnology Firms Want?

Let's start with a broad-based definition. A biotech company is a business that applies new scientific techniques using living cells and their molecules to develop new drugs or products.

Biotech companies began emerging in the United States in the 1970s, and their numbers grew exponentially in the 1980s. Today, they perform minor miracles by discovering new ways to improve human health, boost agricultural production, and protect or restore the environment.

While the best recipe for luring biotech companies to an area - and nurturing them - is relatively straightforward, the right ingredients must be on hand to make it work. A large measure of the intangible element known as synergy helps, too.

In general, biotech firms cite two major inducements: access to freeflowing capital and superb university/private-sector linkages (i.e., the presence of a university or major medical center, science education, highquality research programs, and

university access and support).

Other key enticements include favorable tax incentives; a highly skilled, quality work force; abundant R&D activity and access to research; cooperation/critical mass among other biotech firms; good infrastructure (transportation, pleasant industrial parks, agricultural land); plus excellent quality-of-life amenities and a good climate.

"Nation's Medicine Chest" Has the Right Prescription

New Jersey certainly knows what biotech firms need. Proudly ranking as the country's fourth-largest center for the biotech industry, it's home to more than 115 biotechnology companies. They are located in three million square feet of combined space and employ 5,000-plus people.

A major reason these firms come to New Jersey is because the state is also home to more than 500 pharmaceutical companies with combined annual sales of \$700 billion. Fifteen of the world's largest drug companies have major facilities there. This activity has earned New Jersey the nickname "the nation's medicine chest."

In addition to the large number of drug companies, firms have been lured to move to the state by the high-quality work force developed over the years to serve the drug companies as well as the state's determination to target biotech firms. Moreover, New Jersey holds the money trump card over other states due to its proximity to New York City, the nation's financial center.

Another plus is the Biotechnology Council of New Jersey (BCNJ), a statefunded organization representing biopharmaceutical, biomedical, bioagricultural, and bioremedial firms. "We'll do anything to help the companies," says Debbie Hart, BCNJ's executive director. "We represent them when meeting with legislators, the media, and the general public." When founded in 1994 the organization was one of four such councils in the nation; now there are well over two dozen.

Hart confirms that the state is a major factor in a biotech company's decision to relocate or remain in New Jersey. For example, legislation passed in 1996 established financial assistance for the biotech industry while prohibiting local regulation. More recently, in June 1998, the largest biotech meeting in the world was held in New York City. In attendance were 4,000 representatives of 1,400 companies from 40 nations. During the event New Jersey Governor Christine Whitman was honored for her ardent support of the biotech industry. She also was recognized for signing several bills creating a new high-technology legislative policy that may serve as model legislation for other states. These bills encourage biotech R&D investment by:

Advancing the net-operating-loss deduction carry-forward to 25 years

Extending the carry-forward of R&D tax credits from 7 to 15 years

Establishing a 10 percent tax credit for investments in small high-tech firms

Allowing emerging biotech companies to take R&D credits plus netoperating-loss deductions (unusual until the firms show a profit) and to exchange them with profitable firms in return for financial help

Currently the state is finalizing details for its new Technology Business Tax Certificate Transfer Program. It allows emerging biotechnology and technology firms to sell unused New Jersey net-operating-loss carry-forward deductions, plus R&D tax credits, to other corporations for at least 75 percent of the value of the surrendered state tax benefit.

BCNJ also is helping plan next year's Global Health Industry Summit, which is being hosted by New Jersey. R&D firms and suppliers will address the impact of globalization on the biomedical industry in the new millennium - and again spotlight the state's solid support of the industry.

A New Cash Crop for Virginia

Recently the Virginia Biotechnology Research Park in Richmond conducted a study to gauge the size of the state's biotech industry. "We found there are 373 biotech companies, representing almost 17,000 jobs," relates Robert Skunda, the park's president and CEO. The average annual employee wage is \$54,000; the industry's yearly economic impact in the state is \$1.9 billion.

Opened three years ago, the park is the location of choice for almost three dozen companies and research institutes that employ 650 people. One biotech tenant has a drug in clinical trials that will help detect and more effectively treat Type II diabetes in humans. Another is building a device allowing an operating room medical team to determine if a patient's blood will clot - and when - during surgery.

The 34-acre facility is less than 20 percent developed, and construction has just begun on the sixth building available for biotech tenants. A major draw for companies, says Skunda, is the adjacent campus of Virginia Commonwealth University, which features "an outstanding medical center."

In order to remedy the situation where, in Skunda's words, "a biotech firm may employ brilliant scientists, but not necessarily brilliant businesspeople," the region has

created partnerships for biotech businesses with universities, chambers of commerce and other business organizations, and various government agencies.

Collaboration between biotech firms and companies in related industries is boosting growth, too. Skunda says Richmond is fast emerging as the "East Coast center for microelectronics," possessing a strong base of chemical, pharmaceutical, and manufacturing companies in the area, including Dupont and American Home Products. Many of these diverse technologies are starting to produce products together -- including biotech ones.

In government news, this past March the state passed legislation Skunda terms "very unusual. It's an R&D tax credit for qualifying biotech companies and research aimed at helping those companies. If they can't get tax credits because they haven't yet brought a product to market, they can convert the credits into cash in the form of a state grant."

Lobsters, Cloning, and Genetics: New England Activity

The Massachusetts Biotechnology Council, Inc. (MBC) headquartered in Cambridge is situated in the midst of the world's largest concentration of renowned scientists, economists, law academics, business academics, teaching hospitals, and other complementary academic institutions. Perhaps that's why neighboring Boston has been chosen as the site of the International Biotechnology Industry Organization's annual meeting on March 25-30, 2000.

MBC is a nonprofit trade association representing 246 members in the state. Of those, 171 are biotech companies; the others are in support industries such as accounting and legal services. Member firms produce products in areas ranging from the environment and agribusiness to diagnostics, therapeutics, and pharmaceuticals.

Stephen Mulloney, MBC's manager of government relations and communications, recognizes that other states are offering incentives for biotech firms to locate within their borders. "But we have so many superb, deeply rooted institutions here, I doubt our primacy will be challenged seriously any time soon. Harvard, MIT, our teaching hospitals, and many other centers of excellence here keep coming up with the most brilliant science and commercializing it. [It's impossible] to put institutions of this caliber together in a couple years, add tax incentives, then tell a company you have a biotech/scientific region equal to ours."

MBC's members include both startup biotech companies and several of the world's most mature industry leaders. To represent members' interests and promote the long-term acceptance of biotechnology in the marketplace and society, MBC is actively

involved in public policy and legislative initiatives at the state, federal, and international levels. These issues have ranged from state tax incentives to genetic discrimination, cloning, federal Food and Drug Administration (FDA) reform, manufacturing regulations, and labeling and pricing issues.

Further up the coast, Maine is home to at least 70 biotech firms and currently ranks ninth nationally among state biotech sectors. With gross revenues in 1997 estimated at \$400 million, the biotech sector is more vital to Maine's economy than its traditional income-producing sectors: lobsters and potatoes.

Always hungry for financing sources, start-up biotech firms in the state have been able to find them through two new outlets. Maine's \$5 million Small Enterprise Growth Fund allows qualifying companies to borrow up to \$150,000. (Firms must post less than \$2 million in annual sales and have fewer than 25 employees.) Additionally, the Portland-based regional office of Zero Stage Capital Company expects to invest \$15 million in qualified Maine-based companies. Another financial boost came from the Maine legislature, which recently passed laws exempting raw materials and equipment used in R&D and biotech product manufacturing from sales tax.

Assistance is also available from the Portland-based Center for Innovation in Biotechnology (CIBT). Created to spur biotech and medical growth by promoting scientific excellence, commercial innovation, and business development, the nonprofit organization makes awards encouraging collaborative projects with commercial potential; promotes networking among the entrepreneurial, venture-capital, biotech, and biomedical communities; and facilitates access to product development services and funding.

Among the newest Maine firms are Phylogix (cell-therapy technology), Genetic Design (CAD-CAM systems genetic modeling), and Phycogen (marine biotechnology focusing on genetically engineered algae). One of the largest biotech firms is IDEXX Laboratories, a 1,000-employee firm that sells more than 100 products in 50 nations; 1996 sales exceeded \$180 million. It develops diagnostic test kits for veterinary and environmental markets as well as animal health products. AquaBio, a firm applying calcium receptor technology to the marine industry, is now finding ways to grow bigger, better pearls; improve lumpfish caviar eggs; and control lobster and soft-shell crab molting. At Sea Run Holdings, employees examine the potential medical uses of fish blood. Its founder believes parts of the bloodclotting system in farmed trout and salmon can also be used to control bleeding in humans. ImmuCell Corp. produces milk-based passive antibody products to prevent or treat gastrointestinal infections. Its new CryptoScan monitors drinking water for deadly bacteria.

North Carolina: Well-Executed Programs

North Carolina is home to almost 100 biotechnology companies, ranging from entrepreneurial startups to Novo Nordisk, the largest industrial enzyme production plant in North America, and the U.S. headquarters of Glaxo Wellcome, the world's largest pharmaceutical company. About 5,700 of the 20,000 industry employees in the state work directly with biotechnology. Another 133 firms support the industry with products and services.

A major player in the state is the North Carolina Biotechnology Center. Not a laboratory research site, it's a facility that supports biotechnology research, development, and commercialization in order to provide longterm economic benefits in the state. Created in 1981 by the general assembly, this private, nonprofit corporation was the nation's first state-sponsored initiative to develop biotechnology. Today, its 40-member staff works with scientists, entrepreneurs, financiers, educators, and government policymakers to help move biotechnology from the mind to the marketplace.

A primary task of the center's Science and Technology Development Program is to provide grants to ensure that North Carolina's colleges and universities have highly trained faculty plus state-of-the-art laboratories and research centers. State researchers have leveraged \$7.6 million in center research funding to gain \$114 million in federal agency funding.

Each year, the center's Business and Technology Development Program helps more than 50 companies with business-plan development, marketing surveys, venture financing referrals, federal grant applications, site location, technical problems, technology transfer, and industry-university partnerships. "We serve as a one-stop shop for very early-stage companies," says Doug Darr, program director. "We're similar to a small business association, but different because we focus on biotechnology."

Since 1986 the program has given \$5.8 million in seed funds to 46 emerging companies. In turn, they've attracted an additional \$332 million through stock offerings, venture-capital investments, federal grants, and other public and private sources.

State bioscience companies receive program funds through two low-interest loan avenues: The Economic Development Finance Program supports research leading to the development or refinement of a product or process with clear commercial potential, while the SBIR Matching Fund Program helps companies bridge the gap

between funding phases of the federal government's Small Business Innovation Research Program.

Finally, the center's Education and Training Program is designed to create a trained work force for the industry. Each year it sponsors workshops that help science instructors (kindergarten through high school) better explain biotech's science, products, and issues. About 850 educators have gone on to teach biotechnology-related lessons to more than 400,000 students across North Carolina. (The first textbook on biotechnology for high school and college students, *Recombinant DNA and Biotechnology*, was created by the program's staff.)

According to Darr, many of the state's biotech firms are clustered in or near the renowned Research Triangle Park (RTP) to tap into the resources of the park's tenants and nearby schools. The prestigious 6,900-acre RTP is dedicated to nurturing R&D organizations and is named for the triangle formed by three nearby cities and universities: Duke University at Durham, the University of North Carolina at Chapel Hill, and North Carolina State University at Raleigh. It houses 135 private, government, and nonprofit companies employing more than 40,000 people. Businesses in the park with some biotech operations include BASF, Novartis (agricultural products), Biogen (genetically engineered drugs), Covance Biotech Services, and Sphinx Pharmaceuticals.

Arizona: A Bioindustry Leader in Brain Imaging

In the recent past, Arizona's economy was driven by copper, cotton, cattle, citrus, and climate. Today it's energized by high technology, which accounts for 56 percent of all manufacturing jobs and, in some manner, supports one in five jobs. As in other states, this industry sector (with a \$32.7 billion annual economic impact) also helps build the infrastructure needed to attract and grow biotech communities.

Dr. Michael Berens is co-chair of the Arizona Bioindustry Cluster, developed to enhance the state's biotechnology competitiveness. "Arizona is the leader in Alzheimer's research, specifically brain imaging," he says, adding that bioindustry firms working in this area include Cranial Technologies, Inc.; Mayo Clinic-Phoenix; Barrow Neurological; and Harrington House. The latter is a biotech consortium with topnotch researchers working together on all areas of Alzheimer's to identify causes and effective drugs, screen for drug therapy, and ultimately find a cure.

Greater Phoenix, the nation's sixthlargest city, is also the address of more than 500 companies in the bioindustry supply chain, according to Dr. Berens. Almost half of the nearly 150 enterprises working directly in the biotech and high-tech medical-

device fields are located there; Tucson has snagged 56 of the firms.

Why do biotech companies move to or start up in Arizona, specifically Phoenix? Robert Case, the Arizona Bioindustry Cluster's other co-chair, cites four reasons: the existing highly developed technology and work force; a significant community of biotech companies; the opportunity to collaborate with or outsource from other biotechs; and the great number of industry suppliers serving cluster members. Moreover, several joint partnerships - involving Intel, Motorola, Arizona's universities/community colleges, and other entities have helped build a qualified hightech/biotech work force in the state.

Industry Challenges: Capital and Work Force Issues

According to a 1998 KPMG Peat Marwick LLP report, the majority of the nation's nearly 370 public biotech firms possess valuable technologies and products. Unfortunately, about 200 of them are hampered by market caps of \$100 million. This "small cap" situation means that most may encounter trouble realizing their full potential due to a lack of sufficient capital.

The solution? Robert Esposito, the report's author, advises biotech firms to become "nested within companies with [the] financial strength, scale, and expertise" to bring their biotech technologies and products to market. Nesting can take many forms: partnerships and alliances with - or buyouts by larger firms typically in the pharmaceutical or high-tech industries. For this reason, a number of biotech firms locate close to firms with whom they can develop these mutually beneficial relationships.

The aforementioned advice pertains largely to biotech firms developing drugs for humans, since they tend to require huge caches of cash to finance the 10- to 12-year FDA approval process required before their assets can be brought to market.

Other biotech firms, however, manufacture diagnostic, medical, environmental, and agricultural products that don't face the same regulatory hurdles, allowing them to bring their products to market in a much shorter timeframe. Therefore their need for intensive, long-lasting capital funding may not be as strong.

Another industry challenge is to find bright, properly educated employees. It's rare to find positions for individuals without a four-year college education, and practically none exist for those with only a high school diploma. A doctoral degree is essentially mandatory for the research staff, while a bachelor's or master's degree opens the door to business, management, sales, and marketing positions. (This explains the placement of many "biotech clusters" near universities.) Workers with an associate's

degree are most often hired for production jobs or some technical and field positions.

This young industry has already proven that it has tenacity and the power of the innately curious human mind on its side. No matter what other challenges it faces, millions of people seeking cures and a better life are hoping that the industry can overcome them.

[Sidebar]

International Biotech Activity Fueled by Global Programs

Although the United States is currently the world leader in biotechnology activity, Europe's biotech sector is experiencing major growth with assistance from national, European Union, and global strategic programs and alliances.

In Finland, for example, the industry is flexing its muscles at about 60 biotech firms. According to the Finnish magazine *Kemia-Kemi* many of the nation's larger biotech enterprises "concentrate on the production of industrial enzymes and on the application of biotechnology in food processing and pharmaceuticals and diagnostic test systems." Other firms offer services in "clinical research, patenting, and marketing analysis." One new, high-profile biotechnology-based project is the Helsinki Science Park, established in 1995 in the city of Viikki. A joint venture of the University of Helsinki, the Finnish government, and the local business sector, the facility is an international science, education, and product-development center specializing in the biological sciences and biotechnology. It's also the focus for the university's activities, including those of its Institute of Biotechnology and departments of biochemistry, genetics and general microbiology, and pharmacy. More than 1,000 research scientists and technicians work at the research institutes, two university facilities, and individual companies (a mix of established and start-up enterprises) located in the facility. The Helsinki site is one of 16 member parks making up the Finnish Science Park Association. Most member facilities are located in Finnish university centers and/or near research institutes, and all feature high-technology companies with a combined labor force of 10,000 highly skilled workers.

In Quebec, Canada, biotechnology infrastructure and research is provided by seven universities, four university hospital centers, 22 public hospitals, and numerous government research centers. Add friendly government incentives, plus a concentration of 100 biotech companies, and it adds up to a vibrant biotech industry that generated a half billion dollars in 1997. An exceptional source of expertise for both the Canadian biotech industry and the scientific community is Montreal's Biotechnology Research Institute (BRI). Its laboratories, offices, and bioprocess

facilities cover more than 18,000 meters, and it has an annual operating budget of approximately \$23 million. BRI performs cutting-edge industrial R&D with some of Canada's leading firms, including Biomira, ABI, Allelix, BioChem Pharma, Ibex Technologies, BioMEga, Glaxo Wellcome Inc., Merck Frosst, and Syntex. In fact, half of the 400 people working at the facility are guest workers from industry and universities. The institute takes a multidisciplinary approach to projects, bringing a diversity of experts together to form a cohesive team, then providing it with the advanced technology required to carry out the project. Its advanced facilities support collaborative research projects in molecular biology and biochemical engineering, including those involving radiocrystallography equipment, an ion spray mass spectrometer, computer-assisted molecular design, a confocal light-scanning microscopy system, and an analytical chemistry laboratory (for the environmental sector). Another industry resource is the CQIB Biotechnology Center, established in 1995 to help researchers/entrepreneurs in and outside Quebec start up their own businesses. Typically, companies stay two to three years at CQIB facilities, where they're provided with customized business support as well as input from other biotech-related businesses and institutes. Recently CQIB completed a \$1.3 million expansion project to increase its capacity from six to 11 companies.

Copyright S/H Publications Incorporated Dec 1998. Provided by ProQuest LLC. All inquiries regarding rights or concerns about this content should be directed to [Customer Service](#). For permission to reuse this article, contact [Copyright Clearance Center](#).

HighBeam Research is operated by Cengage Learning. © Copyright 2014. All rights reserved.

www.highbeam.com