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BIO2002 Heads To Toronto

Connecticut Makes Presence Known Again

Amidst financial market turmoil and ethical challenges, the state pavilion at international biotechnology conference showcases premier bioscience cluster and aims to recruit resources for continued growth.

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Cover Photo: Gary Wilson, Ph.D., CURE Managing Director, Scientific Programs and Marcia Valente discussing the State's many benefits with a visitor to the Connecticut pavilion on the BIO2002 exhibition hall floor.

From June 9 – 12, Keith R. Reynolds attended the BIO2002 conference to report on the presence of the State of Connecticut's biotechnology company, support service and State economic development organizations. In addition, Mr. Reynolds examined the industry dynamics, including scientific advancement, economic and financial, that impact this fast growth industry in the State of Connecticut.

"Science knows no country, because knowledge belongs to humanity, and it is the torch which illuminates the world"
-- Louis Pasteur

Over fifteen thousand representatives and 1,055 exhibitors from 47 US states and 28 countries -- including dozens of Connecticut delegates in a state-sponsored pavilion -- descended upon the Metro Toronto Convention Centre for BIO2002 from June 9-12.

It was a remarkable gathering of the best and the brightest in this highly scientific and fast growing industry. This is to provide a perspective on the State of Connecticut's presence at the show and how closely aligned the state's future economic development is with the overall biotechnology industry.

The annual international conference was the largest gathering ever despite a dreadful climate in the industry's financial markets. Beyond the difficult times that many in the industry face, the general themes of the conference were the expanded internationalization of the biotechnology industry and continued scientific discovery that the industry has achieved over the last year.

Toronto was host to a diverse crowd of over fifteen thousand representatives and 1,055 exhibitors. People came from 47 US states and 28 countries -- including dozens of Connecticut delegates in a state-sponsored pavilion.

Toronto is home to the famous CN Tower, a structure of remarkable beauty and grandeur; it is also very, very tall -- reaching no less than 1816 ft. into the Toronto Skyline. Photo taken from just a few blocks from the Metro Toronto Convention Centre.

Toronto, Canada's hub of bioscience, was an appropriate international forum for BIO. Canada, which ranks only behind the USA in terms of active biotech companies, featured prominently many of the country's leading firms at the conference. One of the most unique ideas at the show was from a Montreal-based biotech company that teamed with the U.S. military and others to develop genetically manipulated spider silk fibers, which combine extraordinary strength and versatility. Their goal is to create a range of products including: medical sutures, biodegradable fishing lines, artificial body parts, and flexible, yet bulletproof armor, among others.

In addition to scientific and business seminars, the convention included sessions covering biotechnology policy and ethical issues. This year there were also religious leaders participating on various panels. Among the ideas discussed by leaders from North America, Europe and the Pacific Rim at the conference were creating an industry "foreign policy" to advance making the development and availability of medicines for the world's poorest people and insuring that Third World Nations also profit when scientists and corporations make use of traditionally "folk" remedies as a catalyst for new drug products. "Our industry needs to formulate its first foreign policy, one which is cognizant of the mistakes of other industries in the past in order to avoid them," BIO President Carl Feldbaum said in a luncheon address.

As if to underscore the international flavor, one of the first speakers at the conference was Saudi Arabia's Dr. Sultan Bahabri, Chairman of the first "biocity" in the Middle East to be under development -- complete with a bio-focused research park. Following Dr. Bahabri's presentation, US Secretary of Health and Human Services, Tommy Thompson outlined "the largest areas on the horizon for my department" in terms of US policy on issues ranging from FDA policy evaluation, stem cells, the cost prescription drugs, and the modernization of Medicare.

Nobel laureate Walter Gilbert accepts the annual Biotechnology Heritage Award for pioneering efforts in the industry.

Gilbert, along with Phillip Sharp founded Cambridge, Massachusetts-based Biogen,. Both men were award recipients.

The cloud of scandal surfaced at the conference as ImClone Systems Inc. was referenced in multiple sessions during the show whenever issues of ethics and integrity were under discussion. On Wednesday, June 12th, former ImClone Chief Executive Samuel Waksal was arrested by federal agents, under investigation for possible insider trading. Dr. Waksal resigned as CEO in May of 2002, having become the center of controversy ever since insider trading patterns were discovered by friends and family members just prior to the Food and Drug Administration refusing to consider the company's application for its cancer drug, Erbitux.

On the last day of the conference, Nobel laureates Walter Gilbert and Phillip Sharp, founders of Cambridge, Massachusetts-based Biogen, received the annual Biotechnology Heritage Award for their pioneering efforts.

An Economic Engine For Connecticut

Following the opening ceremonies, the exhibition hall opened up and Connecticut's presence at BIO2002 was once again notable with twelve organizations housed under a single Connecticut pavilion. Considering the amount of science generated in the state and the number of companies that make up the biotech cluster, Connecticut's presence is not surprising.

Bioscience is one of the fastest growing industries in the world today. Based on a survey last year by Battelle for the Biotechnology Industry Organization, the trade group that is sponsoring the convention, it is estimated that forty-one US states have a program to stimulate life sciences economic development. Many of these states had a presence at the show and Connecticut's was one of the largest.

In its 2001 Biotechnology Report, Ernst & Young ranked Connecticut seventh in the nation in number of biotechnology companies now operating within its borders on a per capita basis. This places Connecticut ahead of such states as Georgia, Florida, Michigan, New York, Pennsylvania, and Texas. Only the longer established biotechnology centers of Massachusetts, Maryland, California, North Carolina, New Jersey and Washington were ranked ahead of Connecticut.

According to CURE, Connecticut-based bioscience research and development (R&D) investment in 2001 totaled $3.6 billion, an 18% increase over 2001. Bioscience R&D increased 137% in six years and more than 12% of all R&D dollars spent by pharmaceutical companies nationwide are originated from CT-based research facilities. The report also noted that biotechnology companies raised nearly $557 million in private and public capital last year despite a difficult financial environment nationally. Clinical studies investments increased 22 percent during 2001 to nearly $512 million from $418 million in 2000. The most significant growth (55 percent to more than $41 million from $26.7 million) occurred in the biotechnology sector.

For the first time, data was collected regarding clinical milestones in the biotechnology sector. Reporting companies noted work on 25 Phase I, II, and III clinical trials, a 57 percent increase from 2000. Additionally, during the 2001 calendar year, laboratory space occupied by biotechnology, pharmaceutical and academic sectors grew by almost 400,000 square feet, or eight percent, to a total of 5.6 million square feet. Projected growth of lab space is expected to grow at increasing levels through 2004.

What does this all mean to CT? The effects of the biotechnology/bioscience industry have far reaching implications for the state's economy. Connecticut's bioscience companies created nearly 500 direct new jobs in the year 2000. According to Mark Thompson, Ph.D. of **Quinnipiac University's School of Business**, total employment, including direct, indirect and induced jobs, the bioscience cluster contributes over 50,000 jobs to the CT economy.

The state accordingly has a strategy to foster growth in this economic sector. The people and organizations responsible for implementing the strategy were on hand at BIO2002. Arthur H. Diedrick, chairman of the board of Connecticut Innovations and Chairman of Development for the **Office of the Governor**, said at the convention, the State's approach to biotechnology is to invest for the future. "We try to leverage state funds wherever possible with outside capital to provide support for nascent technologies to come out of the universities and with more mature companies from out of state.

At the show, Harry H. Penner, Jr. and Kevin Crowley of the **State of Connecticut Department of Economic Development' s Office of BioScience** were focused on the development of this investment strategy. The office, just announced in December, is already helping companies get what they need to establish or expand operations in CT from the state in an efficient manner. According to Mr. Penner, former President and CEO of Branford-based Neurogen Corporation "The office helps biotech companies in the state that want to expand and those from out of state seeking to relocate or expand into CT with interactions across government functions." Issues the Office of BioScience might become involve with on behalf of a biotech company include permitting, site selection, financing, tax incentives, etc.

According to Crowley, two popular programs among biotech firms the state has enacted are a 65% credit exchange program, which allows companies the allowance of unused R&D tax credits to be exchanged for 65 percent of their face value, and the extension of the Net Operating Loss Carry-Forward program from 5 to 20 years. "There are also research and development corporate tax credits available from the state," said Crowley.

Using the R&D tax credit program, biotechnology companies in Connecticut exchanged unused R&D tax credits during the years 2000 and 2001 for a total reimbursement of $10.5 million and $6.3 million respectively. In comparison, Connecticut biotechnology companies invested $503 million in R&D spending during the same period, nearly 30 times the amount reimbursed by the State. The exchange, considered to be a national model for the industry, represents a source of capital not available to biotechnology companies in Connecticut two years ago.

Connecticut Science at Work And "In The Works"

To understand the pace and scope of the industry's development at a macro level, consider the statement made by the Biotechnology Industry Association, BIO, in a display at the convention hall: "Over the last twenty years more than 300 million people worldwide have been helped by more than 130 biotechnology-based drugs. Of the biotechnology medicines on the market today, 70% were approved in the last 6 years. Another 350 are in the pipeline today."

The scientific advancement of products is the result of the efforts a diverse set of biotechnology and pharmaceutical companies and academic institutions. Connecticut biotscience companies represented at the State's pavilion were Achillion, Boeringer-Ingelheim, CuraGen, Gennaisance and Vion. Pfizer, Bayer AG, and Bristol all had booths at the show while Perdue Pharma L.P. had representatives in attendance:

Achillion Pharmaceuticals, Inc. -- Achillion is a privately held pharmaceutical company focused on the discovery, development and commercialization of innovative small molecule drugs that combat drug resistance in infectious diseases, with a particular emphasis on antiviral drugs to treat diseases caused by hepatitis B and C viruses (HBV and HCV), HIV and herpes viruses. The Company's broad drug development pipeline includes antiviral compounds licensed from Yale University as well as those developed using our proprietary Zinc Finger

Targeting (ZFT) technology. Achillion focuses on developing drugs to treat diseases caused by human immunodeficiency virus (HIV); Hepatitis B virus (HBV); Hepatitis C virus (HCV); Herpes viruses; Bacteria; and Fungi.

Boehringer Ingleheim – Jim Kerns, Director, R&D Strategic Planning at the company's US headquarters in Ridgefield, CT, noted that Boehringer Ingleheim is the seventeenth largest pharmaceutical firm in the world. US-based research and development activities and headquarters management functions are located at the Ridgefield facility. There are roughly 600 scientists developing theraputics in areas such as central nervous system disorders, inflammation, allergies, oncology and virology, as well as respitory, metabolic and cardiovascular diseases. The firm was seeking corporate and academic research collaborators at BIO2002 to help advance several research initiatives in addition to recruiting qualified research personnel.

Jim Kerns, Director, R&D Strategic Planning, and Kim Butera represent Boehringer Ingleheim, the seventeenth largest pharmaceutical firm in the world, as part of the Connecticut bioscience pavilion at BIO2002.

CuraGen Corporation – Publicly traded Curagen is a Genomics-based pharmaceutical company. They are working to create drugs to address the medical needs of humans based upon their knowledge of the human genome. The company has developed a "technology platform" that enables the company's researchers to find those places in the human genome that are pharmaceutically tractable enabling them to intervene and stop a disease, or put it into remission. It is developing protein drugs, antibody drugs, and small molecule drugs across four disease areas – cancer, central nervous system diseases, diabetes and obesity. The firm is considered "pre-clinical" but is considered to have a strong pipeline and expects to have products in clinical trials in the next twelve months.

Genaissance Pharmaceuticals, Inc. – Genaissance, also publicly traded, is developing the science of personalized medicine -- the application of population Genomics and informatics to improve the development, marketing and prescribing of drugs. Medical scientists and researchers are mining the enormous volume of genetic data being made available through various public and private human genome-mapping initiatives. The sheer volume of genetic diversity being discovered in human genes strongly suggests that the clinical variation seen in patient response to medication is due in part to genetic variation. Thus, one of the applications from these research efforts will be the development of personalized medicines — prescriptions based on the DNA of individual patients. Genaissance has discovered a set of proprietary "genomic bar codes," or HAP™ Markers, that are predictive of which patients will respond or develop a side effect to a particular medication. Genaissance is currently marketing its HAP™ Technology in a variety of models to pharmaceutical and biotechnology companies to improve the efficiency and effectiveness of clinical trials and to differentiate drugs currently on the market.

Dawn Symonaitis, Manager, Business Development and Paul Oestreicher, Ph.D., Vice President, Strategic Marketing and Communications for Genaissance Pharmaceuticals at their booth in the Connecticut Pavilion.

Vion Pharmaceuticals, Inc. -- Publicly traded Vion Pharmaceuticals, Inc., focuses on the discovery, development and commercialization of novel therapeutics and technologies for the treatment of cancer. The Company's portfolio consists of one drug delivery platform and two distinct small molecule anticancer agents. The drug delivery platform, TAPET® (Tumor Amplified Protien Expression Therapy), is the Company's drug delivery system that uses live Salmonella bacteria. TAPET is designed to deliver cancer-fighting drugs preferentially to solid tumors and is currently being evaluated in Phase I human safety trials. Triapine®, a small molecule anticancer agent, is designed to prevent the replication of tumor cells by blocking a

critical step in the synthesis of DNA, and is currently in Phase I combination studies and Phase II single agent trials. A second set of small molecule anticancer agents, Sulfonyl Hydrazine Prodrugs (SHPs) are unique, potent alkylating agents that are currently being evaluated in Phase I human safety trials. Each of the Company's three anticancer programs has demonstrated broad potential to treat cancer in preclinical tumor models.

Other Connecticut Pavilion Corporate Attendees:

There were also several support services companies represented at the pavilion as a testament to the breadth of the state's industry.

The general practice law firm of **Wiggins and Dana, LLP** had a booth in the CT pavilion. According to attorney, Todd E. Garabedian, Ph.D. the firm has a strong biotechnology practice in Hartford, CT. Garabedian has extensive experience as an intellectual property attorney in a wide variety of disciplines related to the biological sciences. His areas of expertise include chemistry, biochemistry, organic chemistry, pharmaceuticals, molecular biology, and materials science. His experience also extends to trademark and copyright issues. He began his professional career as a research biochemist at the UCLA School of Medicine and thereafter at Washington State University where he worked in a variety of biological fields mainly centered on protein structure, function, and characterization.

Merton Gollaher, Patricia Melick and Todd E. Garabedian, Ph.D. attorneys with Wiggins Dana, LLP at their booth in the Connecticut Pavilion.

According to Jim Birge, of **Fletcher Thompson, Inc.**, an architectural and engineering firm headquartered in Bridgeport, CT, with offices in Hartford and New Jersey, his firm helps biotech clients – from start-up biotechs to large pharmaceutical companies – link facilities strategy to business strategy. FT is a full-service Architectural, Engineering, and Interior Design firm with

expertise in the areas of scientific laboratory and office facilities. The practice is structured around four design studios, each with an area of specialization: Corporate and Industrial Design; Educational Design; Preservation and Urban Design; and Engineering – which complement the design studios. Fletcher Thompson provides all aspects of structural, mechanical, electrical and fire protection engineering. Clients include Bayer AG, Boehringer Ingleheim, PerkinElmer Instruments, Watson Laboratories, Inc, Dianon Systems Inc. Taconic Farms, Inc. and Western CT State University.

Jim Birge, design consultant with architectural and engineering firm Fletcher Thompson headquartered in Bridgeport, CT at the Connecticut Pavilion.

Norwalk-based **Windover Information** offers a database service of news about strategic transactions in the medical and life sciences markets. According to Katherine Farina, the company "also markets business-to-business publications, such as 'In Vivo – The Business and Medicine Report' and 'Start Up,' a review of emerging medical ventures and produces healthcare related conferences." The firm markets strategic-level information to senior management and business development executives.

Bob Santy, President of **The Regional Growth Partnership**, represents New Haven and the surrounding 14 communities. Efforts focus on strategic economic development including land use and industry cluster development, including bioscience. Santy also promotes a Web-based initiative called TecHaven with the goal of presenting a unified presence for all that the area has to offer biotechnology companies considering relocation from a quality of life perspective.

Also, it was announced that another bioscience-oriented company is moving to Connecticut at the show. **Earth BioSciences Inc.** announced its plans to locate its North American office in New Haven, Connecticut. The decision followed consultation with State officials and the successful conclusion of a Research Cooperation Agreement with the Connecticut Agricultural Experiment Station. The Station is currently engaged in field trials to demonstrate the efficacy of Tick-Ex™, a new product for the control of ticks, based upon technology licensed to Earth

BioSciences by Bayer AG. “We welcome the opportunity to collaborate with the State of Connecticut to demonstrate the capability of Tick-Ex in protecting Connecticut residents from tick-borne diseases, like Lyme disease,” commented Dr. Edgar Butts, Founder and CEO in a statement. Company President Ernst Bachofner added, “Using natural products to control pests like ticks will be preferred by customers over the continued use of conventional chemical pesticide.” Earth BioSciences sees a market among the 32 states in the USA that are at risk for tick exposure, according to the Center for Disease Control.

Other Connecticut Pavilion State Attendees:

In addition to the State office of Bioscience, a central figure at the conference and in the state’s industry is **CURE, Connecticut United for Research Excellence.** Headed by Debra Pasquale, the organization has a mission to establish Connecticut as an internationally recognized center for bioscience research and development. Cure is an information source for biomedical research in Connecticut, providing policy leaders, journalists, teachers, students, and the general public with information on issues related to bioscience research and biotechnology in the state.

CURE represents nearly 110 members in its efforts to create partnerships and build a critical mass of bioscience companies that collaborate and compete, to make the economic development Cluster self perpetuating and self-sustaining by overseeing the efforts of the bioscience cluster strategy of the State of Connecticut. The BioScience Cluster launched formally in October 1998 with $300,000 in State seed money and $700,000 from industry contributions.

One example of CURE’s work is the BioBus, headed up by Gary Wilson, Ph.D., CURE Managing Director, Scientific Programs and formerly Director of Science and Technology for the North American Pharmaceutical Division of Bayer Corporation. The on-board experiments are aimed at developing an entrepreneurial, skilled, and innovative workforce in the state. Cure is also trying to help enact state and national policies and programs that advance BioScience in Connecticut.

Connecticut Innovations is the state’s investment arm in high technology. Carolyn Kahn, CI Managing Director, Bioscience, said, “Connecticut has three investment funds focused on the biotech industry -- the Eli Whitney Fund, which includes bioscience companies in its technology portfolio, and two funds that focus specifically on biotech, the Connecticut BioSeed Fund and the BioScience Facilities Fund.

The Eli Whitney Fund is Connecticut Innovations' primary investment fund, aimed at strengthening Connecticut’s high-technology sector by providing entrepreneurs with capital and strategic guidance. The Fund focuses primarily on technology sectors that present the greatest potential for economic growth in the state -- information technology, bioscience, photonics (applied optics), and energy and environmental systems. Investments, which typically range from $500,000 to $2 million on the initial round, are made in early-stage Connecticut companies that meet established criteria.

The Connecticut BioSeed Fund was established to help accelerate the growth of early-stage biotech enterprises in Connecticut. The $5 million fund expands the resources available to start-up bioscience companies in the state and provides seed capital to address the initial financial needs of young Connecticut companies. The goal of the bioscience fund is to sustain firms until they are able to attract a lead institutional biotech investor for a “Series A” round of financing – “at which time the Eli Whitney Fund may decide to participate in a follow-on investment,” said Kahn. Initial investments will range up to $500,000 and are based on criteria that include the

strength and depth of the intellectual property, track record of the company's scientific and business leaders, and the potential of the business opportunity.

Connecticut Innovations promotes the growth of Connecticut's bioscience industry through the state's BioScience Facilities Fund. Through this $60 million fund, CI provides financial solutions to qualified biotechnology companies for the construction of wet laboratory and related space. Biotech companies must have access to adequate lab space in order to grow and demand is increasing rapidly. Since the fund was launched in 1998 it has helped to create more than 340,000 square feet of laboratory and related space.

Frank Marco with Gladys Rivera of Connecticut Innovations. Mr. Marco, a member in Mintz-Levin's New Haven office. He is a Director and past Chairman of the Connecticut Venture Group. He was a co-founder of the Connecticut Technology Council and is secretary and an executive committee member, and is secretary and a co-founder of the MIT Enterprise Forum of Connecticut. He is Chairman of "Crossroads," a regional venture fair, for 2000 and 2001.

CERC, The Connecticut Economic Resource Center, is a nonprofit corporation specializing in economic development and marketing for local, regional, state and utility economic development entities. Funded by 11 of the state's utility and telecommunications companies in partnership with state government, CERC also markets the state as a competitive business location.

Notably absent from the Connecticut presence was the bioinformatics sector of the market, possibly reflecting the double-whammy of the market-bust conditions in the biotechnology and information technology markets. Despite the absence, spending on IT products and services by companies in the life sciences market will grow at a CAGR (compound annual growth rate) of 24 percent from US$18 billion in 2001 to $38 billion in 2006, according to figures from market analyst International Data Corp (IDC).

Rationale for Connecticut's Bioscience Cluster

Why is CT such a hotbed of Biotech? The list of resources in the state making for distinct biotech industry competitive advantage looks like this:

- Five big pharmaceutical companies
- Knowledgeable investors and capital
- Bio-focused academic research institutions
- Bio-savvy employees
- Local industry support groups
- Coordinated governmental affairs
- Available real estate and specialized facilities
- Quality of life

Biotechnology companies, in their site-selection process, have ranked access to a highly educated workforce, proximity to major research universities, adequate laboratory space and access to venture capital as the four most important selection factors

Carolyn Kahn, CI Managing Director, Bioscience and Arthur H. Diedrick, chairman of the board of Connecticut Innovations and Chairman of Development for the Office of the Governor discussing the merits of Connecticut's business environment for Biotechnology firms at the Connecticut Pavilion's "Hot Spot" Café, where BIO2002 attendees could stop for a cup of coffee and a juice.

USA Federal Perspective

US Secretary of Health and Human Services, Tommy Thompson spoke to the opening session on the issues facing his department. In a 15-minute keynote speech, he outlined his priorities for US policy on issues ranging from FDA policy evaluation, stem cells, the cost prescription drugs, and the modernization of Medicare.

Regarding stem cells, in a policy speech on the subject, President Bush's announced approval for research on 72 permitted stem cell lines and researchers are "beginning to realize the tremendous promise of stem cells," Thompson said. “Progress is being made today in the areas of Parkinson's disease, multiple sclerosis and various cancers. Stem cells have been transplanted into rats and monkeys with Parkinson’s disease and the results have shown significantly improved motor skills in this experimental work,” he noted.

Thompson said that a risk-assessment program would be integrated into all the FDA centers to change the focus of the organization. You will not recognize the FDA a year from now," Thompson told the crowd.

Thompson also said he is not at all in favor of mandatory labeling of genetically engineered foods, saying it would be "costly to both the industry and consumers. Mandatory labeling would only alarm consumers. It seems to imply bio-engineered foods are unsafe."

Regarding the high cost of prescription drugs, Thompson said: "President Bush is committed to comprehensive modernization of Medicare," adding that the Bush administration is dedicated to "providing seniors with affordable drugs." Thompson said that pharmaceutical companies "have to do more to bring down the pricing of drugs" or the governments of the world will step in to do so for them, he implied.

US Secretary of Health and Human Services, Tommy Thompson spoke to the opening session on the issues facing his department. He outlined priorities for US policy on issues ranging from FDA policy evaluation, stem cells, the cost prescription drugs, and the modernization of Medicare.

The Financial Cloud Overhanging The Industry

While the presence was strong, this year has been especially punishing to biotech companies. The Nasdaq Biotechnology Index (NBI) is off almost 50% for the year. NBI is made up of the largest and most actively traded Nasdaq biotechnology stocks primarily engaged in biomedical research for the discovery or development of treatments and cures for human disease.

Furthermore, the NBI is off nearly 70% since the highs experienced in early 2000.

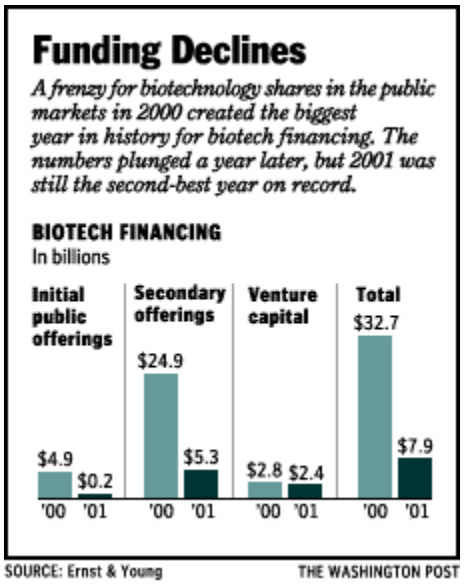
The result is that a number of biotech companies are trading at or near cash value. Despite downturn, 2001 was still second best year on record, according to Ernst & Young.

Ceasar Anquillare, Chairman of Winchester Capital and recently appointed Honorary Commercial Ambassador for the State of CT, noted the financial markets for biotechnology have shifted drastically in the last two years: "Of the 380 publicly traded biotech companies, 200 now have market capitalization of less than $200 million. Venture capital is not so inclined to invest in the promising ideas, but rather is seeking to fortify their portfolio companies that have therapeutic products in the pipeline and experienced management at the helm."

According to Anquillare "The current global economy and decline in technology values in capital markets presents an exceptional challenge to the leaders of Connecticut's publicly traded biocluster companies to demonstrate how their management will recreate and restore value, expectantly by acceleration of technologies into revenue generating products or services." He added, "If this cannot be achieved in the near term, then these companies may find the continuing capital required to finance their research and development to be at an unjustifiable cost to existing shareholders, who have already sustained decreases in value."

Nationally, biotech funding in 2001 was also off from the levels of 2000, though 2001 was still the second best year on record. Connecticut biotech companies have a recent track record of raising capital and creating new businesses despite the almost two year industry slump. According to Michelle Bowman of PriceWaterhouseCoopers in Hartford and President of the Connecticut Venture Group, "Connecticut companies have fared pretty well over the last 12-18 months considering industry dynamics.

Examples of CT biotech firms that have raised money in the state during this time period include Achillion, Agilix(sp), Cellular Genomics, Sopherion, Protometrics, Rib-x and Molecular Staging. These companies, while all still privately held, have generally shown themselves to have strong management teams and solid science. They have all attracted prestigious venture Capitalists and that in turn, opens up a host of resources to them. To get these companies off the ground, there has been a focused and concerted effort by many constituencies such as CURE, Connecticut Innovations and the State itself through the R&D Investment Tax Credit," said Bowman.

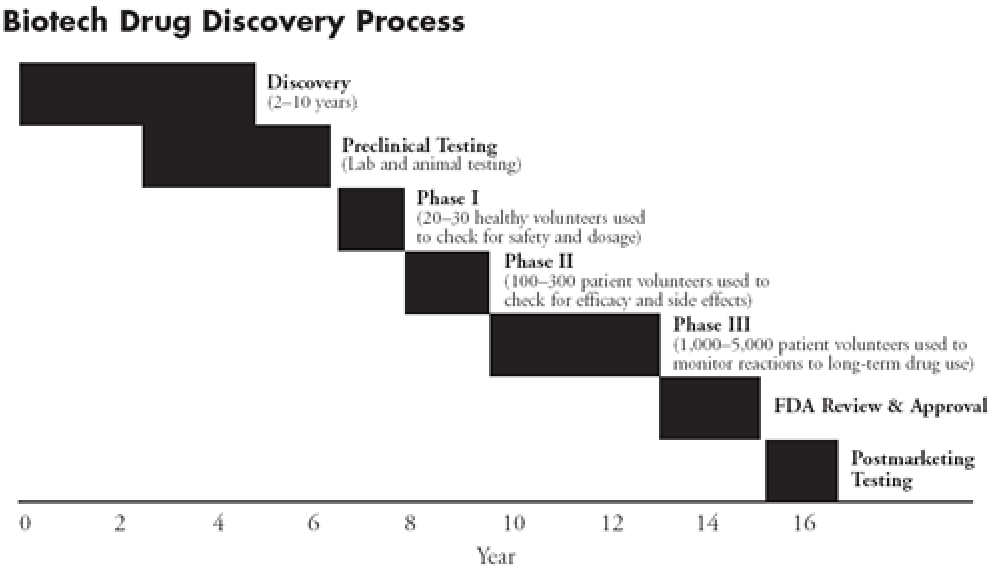


A Monday conference session focused on finance centered on creative ways to find to attract capital during a volatile market. Financing alternatives, such as private equity or an equity line of credit, could be a solution. Or a company could pair up technology assets a company with cash through a merger or acquisition. Other alternatives included real estate financings, equipment leases, state tax benefits or the acquisition of companies with cash, as well as asset sales. The ultimate message was to employ available assets and resources to bring in required cash, but be careful not to lose control of your company due to an ill-constructed partnership.

Misfortune of the biotechnology sector provided by the capital markets also offers potential opportunity to investors as the valuations are way down. From an investor's perspective the game is not the same as with most "brick and mortar" industries where revenues, profits and cash flow are easily identifiable. Instead, an investor is trying to assess whether a company will have the next blockbuster drug or other breakthrough in a scientific area few people understand. It is hard enough to assess the technology, let alone the management, valuation and other variables such as regulatory environment and capital markets.

Debra K. Pasquale, the president of CURE - Connecticut's BioScience Cluster, explains the financial state of affairs "is what it is." Smaller companies are having a harder time right now and the focus has shifted from new innovation to preserving existing investments. Those companies in existence have to make difficult decisions, as boards and investors demand more prudent corporate governance. "It is not the first difficult time for the industry," notes Pasquale who has headed up CURE for almost twelve years. "1992 to 1995 was a difficult period from a financial standpoint. Back then there were more pharmaceutical companies and less biotechs in the state. The reverse is true today."

Seasoned investors know that there is this is a long-term investment process. For a new drug to come to market, regardless of the vagrancies of the capital markets, the whole development pipeline -- including clinical trials -- can take 10 to 15 years. A drug must pass a series of successively higher hurdles required by national regulatory agencies. Biotech investors typically lose sleep over Phase I, II and III clinical trials, where the federal government plays the roll of gatekeeper between the consuming public and the drug purveyor.



Source: Ernst & Young LLP, *Biotechnology Industry Report: Convergence*, 2000

"You have to go into this with open eyes as an investor because timeframes are very different than, say, Information Technology and the level of risk is high," concludes Pasquale. In spite of all the risk and market turmoil, the science is clearly moving forward as evidenced by the companies turning out at the conference.

Absence Of Controversy This Year

"Remember Freon? Remember Thalidomide?" those concerned about the effects of biotechnology ask. There was very little demonstration or protest evident in Toronto this year. Gone this year was the controversy that surrounded the event the last two years as several thousand demonstrators with signs and costumes descended on San Diego and Boston.

Though some people in Toronto spoke of the tension between those who believe in the promise of the technology and those who are afraid of the law of unintended consequences, there was little organized demonstration. There was one peaceful demonstration at Grange Park in downtown Toronto, reported in the press to have drawn several hundred people that focused on genetically engineered foods on the opening day.

By and large, even the skeptical Canadian press placed its emphasis on the potential benefits to Canada's economy and the once inconceivable results being achieved by application of biotech discovery's to human problems.

Some speculate the efforts by the BIO industry association to both increase the focus on security and engage reasonable people with concerns during the past two years may have helped to keep things quieter. Most of the security was inconspicuous, though the Canadian Mounted Police were visible thorough out the convention. Others thought the location in Canada might have played a role. Next year the conference is to be held in Washington DC and should provide an indication if the later is correct.

It is also a possible that growing acceptance of the science, as the benefits become more widely known have helped to keep this years even incident free. Greenpeace founder Patrick Moore, an activist turned biotechnology booster, defended the industry as he publicly stated that he believes the campaign of fear being waged against genetically modified foods "is based mostly on fantasy."

In an interview at the conference, Pasquale said, "This is an industry of life, health and well being. You have to weigh the risk/benefit ratio of the science." In the old days of pharmaceuticals research, single drugs were released to a general population that was actually made up of groups and individuals that have drastically different genetic make-ups. Now we are on the verge of personalized medicine, with firms like Gennaisance Pharmaceuticals, where the science is getting much less invasive and doctors and their patients can make decisions in a much more informed manner.

Furthermore, life is an inalienable right that people cling to every day when facing a health related problem like cancer. "In the healthcare arena, what people will tolerate to live beyond disease is staggering", said Pasquale. The notion of risk has to be put in perspective. Many people are willing to go beyond conventional therapies if it is their last option and the reality of this business is if you don't do it people die. Drugs like Alpha Interferon have helped hundreds of millions of Hepatitis B victims survive. There are many more such solutions in the pipeline and the regulation of the industry is advancing on a global basis.

It is a question of the quality of life you want and we see time and again from biotechnology solutions people whose lives are extended for years with an acceptable quality of life.

As the “will-to-live” instinct and the advancement of science manifest in the aggregate of society as a marketplace, we ultimately have to depend on our social organizations to help manage the process of innovation. Connecticut residents ultimately live under the protection of the FDA, which is used as a model for the rest of the world. The USA has the best, most prudent and most mature system of industry regulation for moving the process of drug discovery and development along.

What is Biotech, Anyway?

Generally, biotechnology is the use of an organism, or the product of a living organism to accomplish some kind of practical task that is useful to mankind and has been practiced for nearly 10,000 years. Approximately 8,000BC humans domesticated crops and livestock as a way of producing a steady supply of food and clothing. Potatoes were some of the first foods to be cultivated for food. Between 4,000BC and 2,000BC, in places like Egypt and Mesopotamia, Sumeria and China, people first used yeast to leaven bread and ferment beer and wine. About 150 years ago, Gregor Mendel figured out how plants passed hereditary traits from parent to offspring that led to the manipulation of plant lines to yield better crops. Modern biology continues to use Mendal’s laws of heredity though now we apply them with far greater precision and speed – scientists can now transfer a single gene for a specific trait.

In recent years, biotechnology has grown to encompass use of the cellular and molecular processes to solve problems or make products. Today, Biotechnology uses this "gene splicing" and other techniques to fight disease or to manipulate the traits of living organisms for agricultural and other purposes.

Two scientists named Watson and Crick described the double helix structure of DNA in 1953. In the 1960s and '70s, small parts of organisms and their cells were employed in biotechnology in addition to using whole organisms to improve the health and well being of mankind. Molecules were only occasionally used. Through the 1980’s and 1990’s scientists increasingly understood the biological molecules most often used in today’s biotechnology solutions. These molecules, called nucleic acids, make up the double helix DNA, which encodes the information to make proteins. Proteins combine to make genes. The resulting understanding of these basic components has given us the concept of the human genome – which essentially provides a map of the genetic makeup of the human species.

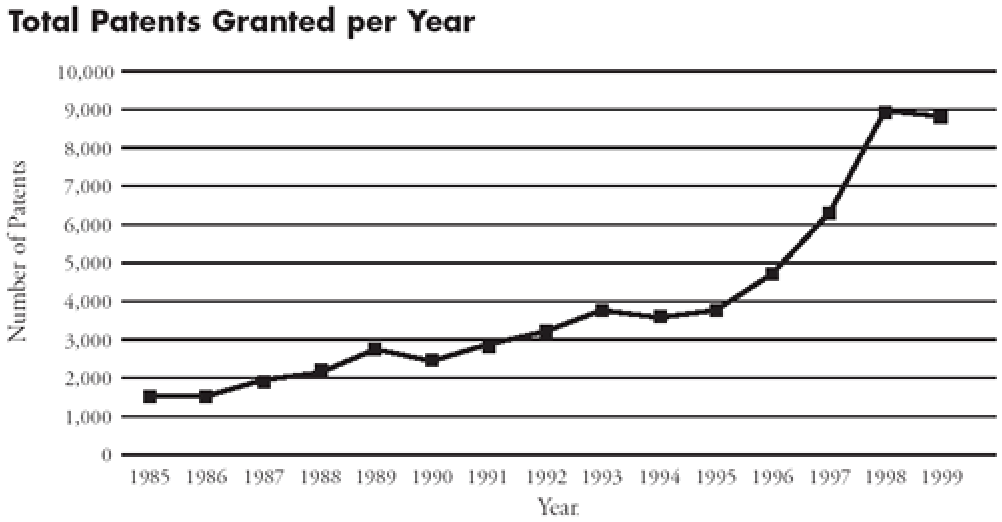
In June of 2000 Celera Genomics and the Human Genome Project (HGP) jointly announced at the White House the first complete assembly of the human genome. Assembly of the 3.12 billion base pairs of DNA represented the most extensive computation ever undertaken in biology, requiring some 500 million trillion-sequence comparisons.

According to the Web site of Celera Genomics, a Maryland company owned by Connecticut-based PE Corp: "The HGP reported at the announcement that it had finished a "working draft" of the genome, stating that the project had fully sequenced 85 percent of the genome. Five major institutions in the United States and Great Britain performed the bulk of sequencing, together with contributions from institutes in China, France, and Germany."

Though a quarter-century old, the industry remains relatively small in comparison to the traditional pharmaceutical industry that has based its approach to drug development on chemistry as opposed to genetics.

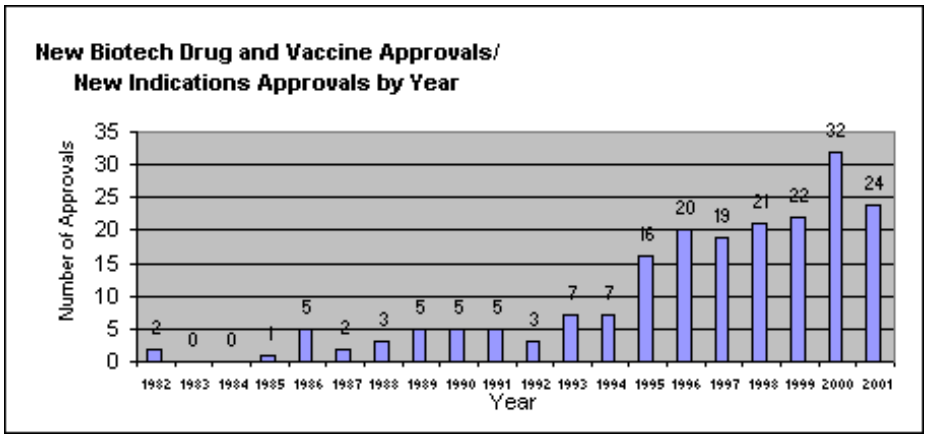
Looking To The Future In Connecticut

The major success factor of the US biotech industry has been its dominant position on biotech patents.



Source: U.S. Patent and Trademark Office, *Technology Profile Report*, Patent Examining Technology Center, Groups 1630–1650, Biotechnology 1/1977–1/1999, April 2000

This strength in US intellectual has also manifested itself in many other ways in the biotechnology industry. Products continue be released at a steady pace, though revenues and profits are elusive.



Source: BIO

Industry Statistics: 1992–2000 (Source: BIO)

Year	2000	1999	1998	1997	1996	1995	1994	1993	1992
Sales*	18.1	16.1	14.5	13	10.8	9.3	7.7	7	5.9
Revenues*	25.0	22.3	20.2	17.4	14.6	12.7	11.2	10	8.1
R&D Expense*	13.8	10.7	10.6	9	7.9	7.7	7	5.7	4.9
Net Loss*	5.8	5.6	4.4	4.1	4.5	4.6	4.1	3.6	3.4
Number of Public Companies	339	300	316	317	294	260	265	235	225
Number of Companies	1,379	1,273	1,311	1,274	1,287	1,308	1,311	1,272	1,231
Employees	174,000	162,000	155,000	141,000	118,000	108,000	103,000	97,000	79,000

It is expected that growth will continue for the industry because it has really only just gotten started. The question is whether Connecticut and the USA can continue the leadership pace that has been set as the original innovator in the industry.

Connecticut has developed its leadership position as the industry has taken shape primarily due to the science and personnel coming out of Yale University. The trends toward productization and internationalization of the market for biotechnology will have significant implications for the State of Connecticut. Connecticut, as a leader, must lead the change. As industry continues to grow and mature, extracting itself from a deflated financial market, it will have to move from scientific innovation and discovery to advanced levels of production and marketing in order to generate revenues and profits for investors. That shift has implications for the State, as it portends a different focus on investment strategy, plant and equipment, in addition to needed human resources.

Cesar Anquillare added: “On a global basis, Connecticut should maximize the value of its location, proven ability to accommodate multinational healthcare companies and highly skilled labor force to recruit mid-sized foreign corporations for USA establishment. This will require a broadening of the mandates to state sponsored investment groups such as CII and DECD so that they may invest in larger companies which may potentially offer more job creation and higher economic multipliers, as has been the case with models employed by the Irish Development Authority and other European agencies who have utilized their investment capability to target and attract revenue producing or near revenue generating companies.”

Certainly, the coordinated efforts by a variety of industry participants at BIO2002 show that Connecticut has made a significant attempt to coordinate the many industry players and align the needed resources to foster this discussion going forward.

Stop by the Connecticut pavilion next year to see how things have progressed. BIO 2003 will take place June 22-25, in Washington, D.C.