Opportunities in the Eastern U.S. Life Sciences Clusters

For scientists pursuing careers in biotech, clusters of life science-related companies and research institutions in the eastern United States may be a promising place to look for jobs. These so-called bioclusters have a 30-year history in the region and, in recent years, have seen an uptick in active support from academic institutions and state and local governments. We focus on three leaders in the region, the bioclusters in Massachusetts, Maryland/Washington, DC, and North Carolina. By Shawna Williams

Bioclusters have their roots in a pair of 1980 government decisions, explains Peter Abair, head of economic development and global affairs at the Massachusetts Biotechnology Council, an industry group. One of these, the Bayh-Dole Act, for the first time allowed discoveries made with federal dollars to be licensed for commercial purposes. The other was a Supreme Court decision that DNA could be patented. “These two federal decisions really created the biotech business, made it a viable business,” Abair says. But research institutions making potentially translatable discoveries aren’t enough to make a successful biocluster. “Workforce and access to capital are the two most important things,” he says. “And then proximity to other resources like hospitals,” which can collaborate with companies on research, such as with clinical trials. “Not every [biocluster] in the world has the combination of all of those things,” he says. Early biotech companies clustered in the San Francisco Bay Area and in Massachusetts, Abair says, because these regions boasted a combination of top research universities, a qualified workforce, and investors who saw promise in biotech.

Matt Jackson, a managing director at the financial and professional services firm Jones Lang LaSalle, says that Massachusetts remains the standout among the eastern U.S. bioclusters because its life sciences infrastructure and high quality of life enable it to bring in world-class talent. Jackson is the co-author of a recent report that ranked Massachusetts first among the nation’s bioclusters based on factors such as number of science and engineering students and amount of National Institutes of Health (NIH) and venture capital funding. New York/New Jersey, Maryland/Washington, DC, Philadelphia, and Raleigh-Durham were all in the report’s top 10, while Florida and Atlanta, ranked 14th and 15th respectively, were classed as “emerging” bioclusters.

MASSACHUSETTS: THE GIANT

The seeds of the Massachusetts biocluster were planted in 1981, when Biogen (now Biogen Idec), a biotech company founded in 1978 in Switzerland, moved to Cambridge. More biotech companies sprang up in Cambridge over time, as well as in other parts of Massachusetts. Biogen Idec, which still does its R&D in Cambridge, reaps the benefits of being located in a cluster, says Naomi Aoki, the company’s director of public affairs. continued>
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Bioclusters: Eastern U.S.

“Clearly we think that the cluster around Cambridge is special; there’s a critical mass and a density that does foster collaboration and thereby breed innovation,” she explains. In addition to fostering research collaborations, that critical mass means it’s easy to find supporting industries, such as law or finance firms, that understand the needs of the biotech field, she says.

As competition from other bioclusters has increased, the state government has looked for ways to make Massachusetts even more attractive for biotech; the governor announced in 2007 that the state would invest $1 billion over 10 years in life sciences. Shortly afterward the state launched the Massachusetts Life Sciences Center (MLSC), which promotes biotech in the state in various ways, notably by giving grants and loans to companies at a critical stage. These funds aim to bridge the so-called valley of death between basic research funded by NIH and evidence of commercial applicability strong enough to attract private capital. As Sankaran Thayumanavan, a chemistry professor at the University of Massachusetts, Amherst, explains, academics are often only interested in—or only funded for—solving basic research questions, while corporations like to see that a drug or device works in animals before stepping in. “Our goal is to de-risk these companies by helping them achieve some milestones,” so that the state funds serve as “a magnet for other capital,” says Susan Windham-Bannister, president and CEO of the MLSC.

Massachusetts’ colleges and universities are also increasingly embracing their role as educators of the biotech workforce. The improved economy has led to an uptick in industry hiring in the state, which is good news for life sciences grad, says J. Lynn Griesemer, associate vice president for economic development at the University of Massachusetts and executive director of the UMass Donahue Institute. But Massachusetts’s colleges and universities have had an eye on industry for more than a decade, Griesemer says, citing the addition of bioinformatics to computer science programs and clinical trials training to medical school curriculums as early examples. Since then, new education opportunities have ranged from internship programs, to community college instructors working with industry to update their curriculums, to a new Master’s degree in professional science, which encompasses both scientific principles and management techniques, offered at UMass-Lowell and Northeastern University. “It is really an attempt by higher education institutions to fit this growing market and this growing area of great promise for Massachusetts,” Griesemer says. As for the industry, she sees companies beginning to do not only research and development, but also manufacturing, in the state. “What that does is open up for the industry the ability to hire people who are not just at the bachelor’s and above, but people with seriously good technical training coming out of vocational schools, high schools, and community colleges,” she explains.

Another trend affecting the industry in Massachusetts and elsewhere is the surge in popularity of personalized medicine, says Peter Abair of the Massachusetts Biotechnology Council. “It’s smaller plants that are using different technologies that are more agile and can shift from developing one medicine to another, it’s the development of companion diagnostic technologies that will help identify the people that this particular drug will work best for,” he says, predicting that personalized medicine will create a “different dynamic in terms of how the industry is funded and how medicines are manufactured in the future.” Indeed, according to a report last year by the research and management organization Battelle, “In 2010 alone, the human genome sequencing projects and associated genomics research and industry activity directly and indirectly generated $67 billion in U.S. economic output and supported 310,000 jobs that produced $20 billion in personal income.”

MARYLAND/WASHINGTON, DC: THE BELTWAY ADVANTAGE

Even in states whose clusters have not achieved Massachusetts’s top-tier status, biotech can give a much-needed boost to the economy. Between 2002 and 2010, life sciences accounted for one-third of the job growth in Maryland, according to the Maryland Biotechnology Center, a state-run organization.

Judy Britz, the center’s executive director, says that a distinguishing feature of Maryland’s biocluster is its proximity to government agencies and laboratories. “Thirty years ago many companies were based on offering products and services to support the federal labs,” she explains. Over time, many of those early companies have grown into other areas; Britz gives the example of Martek Biosciences, which produces fatty acid additives found in almost all infant formulas in the United States. The company, which uses algae and fungus to produce the acids, grew out of research at the defense and aerospace contractor Martin Marietta in the 1980s that aimed to develop algae into food products that could be used during long-term space flight.

Proximity to Washington also gives even small companies opportunities to meet lawmakers and affect policymaking, says Peter Greenleaf, president of MedImmune, which for 25 years has been based in Gaithersburg, Maryland, a Washington suburb. When it comes time to apply for regulatory approval, companies in the area can also draw on a local talent pool of former agency employees, he says. continued>
As in Massachusetts, biotech companies in Maryland can also get direct help from the state government. In 2009, the governor announced a planned $1.3 billion, 10-year life sciences investment. The two-year-old Maryland Biotechnology Center is part of that initiative; it aims to be a one-stop shop for life science companies moving to or already in the state, providing everything from free libraries with subscriptions to specialized and expensive information resources, to programs to train a skilled workforce, to expert advice. The center also awards about 10 small grants per year to “drive projects from bench to bedside,” says Britz.

The region’s academic institutions have also begun to more actively foster industry collaborations of various kinds. Baltimore’s Johns Hopkins University School of Medicine, not content with its proximity to the established biocluster in the Maryland suburbs of Washington, DC, even launched a research park next to the school. Planning for the biopark began over a decade ago, and the first research building opened in 2008. So far, the 278,000 square-foot building’s tenants lean toward neuroscience, says Helen Montag, senior director of corporate relations at the School of Medicine. They include the Hopkins Brain Science Institute, the non-profit Lieber Institute for Brain Development, and Siemens Medical (which focuses on magnetic resonance imaging) as well as non-brain-related groups. There are plans for another 600,000 square feet of lab and office space in the park. Meanwhile, across town, the University of Maryland is also building its own park, which now has two commercial buildings with a total of 470,000 square feet, and plans to reach 1.8 million square feet.

Greenleaf says his company has hired talented graduates of local institutions such as the University of Maryland, Baltimore (where he sits on the board), Hopkins, and George Washington University. MedImmune also participates in curriculum development and career day activities at community colleges and schools in its home county, he said. The head of human resources at Qian gen’s U.S. headquarters in Germantown, Maryland, Paula Green, cites Montgomery College, the University of Maryland, Hopkins, and Georgetown University as local institutions that do a particularly good job of preparing students for careers in biotech.

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NORTH CAROLINA: A TRADITION OF INNOVATION
The history of North Carolina’s biocluster is older than that of biotech itself. In 1959, in an effort to help the state economy and promote high-tech industry, a public-private coalition created Research Triangle Park (RTP, so named because it lies within the triangle formed by Duke University in Durham, North Carolina State University in Raleigh, and the University of North Carolina at Chapel Hill). Today more than a third of RTP’s 170 companies are biotech, says Bob Geolas, president and CEO of the RTP Foundation, which runs the park. The biotech companies sit alongside neighbors as varied as IBM, Bank of America, and the Centers for Disease Control and Prevention’s Center for Health Statistics.

The mix of companies at RTP isn’t the only thing that’s changed over time. “I think initially there wasn’t so much thinking about collaboration,” Geolas says. “Probably in the ‘80s and ‘90s in particular, it was a brand, it was an address.” Now, however, companies both inside and outside the park are increasingly looking for ways to collaborate not only with research universities, but also each other, he says. This need for collaboration figures prominently in the RTP Foundation’s plan to revamp the physical look and feel of the park. “If you came to RTP [now] you’d see big corporate buildings surrounded by a lot of green space,” Geolas explains. But plans for the next several years include “common courtyards, common plazas, more parking, more coffee shops, more sandwich shops—more places where people can share ideas and run into each other,” he says. “A research park is different from a business park or an office park, because it should be an environment that is all about innovation.”

**Featured Participants**

| Biogen Idec | www.biogenidec.com |
| Biomanufacturing Training and Education Center, North Carolina State University | www.btec.ncsu.edu |
| GlaxoSmithKline | www.gsk.com |
| Johns Hopkins University School of Medicine | www.hopkinsmedicine.org/som |
| Maryland Biotechnology Center | www.marylandbiocenter.org |
| Massachusetts Biotechnology Council | www.massbio.org |
| Massachusetts Life Sciences Center | www.masslifesciences.com |
| MedImmune | www.medimmune.com |
| North Carolina Biotechnology Center | www.ncbiotech.org |
| Qiagen | www.qiagen.com |
| RTP Foundation | www.rtp.org |
| University of Massachusetts, Amherst | www.umass.edu |
| University of Massachusetts Donahue Institute | www.donahue.umassp.edu |
hosts a kind of open house where graduate students can learn about the company and what it takes to pursue a career there, Feldman says.

But North Carolina biotech companies are at a disadvantage when it comes to attracting private funding. According to Jones Lang LaSalle’s Matt Jackson, Massachusetts boasts the highest concentration of venture capital (VC) firms among established eastern U.S. bioclusters, with more than 70 in the New England area. The Washington, DC area has about half that, Philadelphia has about 25, and “from there it really drops off,” he says. Without local venture capital firms—particularly firms that know biotech—it can be difficult for startups to get off the ground. In hopes of persuading investment firms to open offices in the area, NC Biotech last year rounded up representatives from seven Research Triangle-area companies to travel to Silicon Valley to meet with investors. Though Peter Ginsberg, NC Biotech’s vice president of business and technology development, admits that no VCs have so far announced plans to move to the state, “A number of the companies that took part have had significant follow-up discussions with the participating VCs, and one of the companies has made two follow-up visits to the Bay Area to meet with the VCs,” he says, adding that a similar event is planned for Boston this spring.

Asked what advice he would offer someone considering a career in biotech, Jones Lang LaSalle’s Jackson says that generally, established bioclusters, such as those in Massachusetts, Philadelphia, Maryland/Washington, DC, and North Carolina, are the safest bet. “You’re starting to see a lot of consolidation of R&D activities into areas of core competencies,” he says, as operations are moved from other areas into clusters. Overall, he says, “The long term outlook for the industry is very good.”

RTP isn’t alone in trying to create a favorable environment for technological innovation; North Carolina was a pioneer in investing public money in the biotech industry. Its state-funded North Carolina Biotechnology Center (NC Biotech), started 28 years ago, now pours about $100,000 each year into the biotech sector. To Norris Tolson, president and CEO of NC Biotech, it’s clear that this investment is paying off. “During the downturn, biotech services was the only part of our economy that didn’t have negative job growth,” he says. “In a state of 9.3 million people, roughly 225,000 earn their living either directly or indirectly from the biotech industry.”

As in Massachusetts and Maryland/Washington, DC, higher education institutions in North Carolina have taken notice of these opportunities. In the state’s community colleges, there are now about 4,000 students receiving training in skills needed to work in the industry, says Tolson. NC Biotech itself runs a summer research program for undergraduates, a two-year postdoctoral program for Ph.D.’s considering a career in industry, and even a series of workshops on biotech-related science for junior high and high school teachers. North Carolina State University’s Centennial Campus includes a facility, the Biomanufacturing Training and Education Center (BTEC), that includes an actual manufacturing plant like that used to produce vaccines, monoclonal antibodies, fusion proteins, and other drugs. The state-funded facility came about because of feedback from biotech companies who wanted to avoid raiding each other’s talent pools, explains Bill Welsh, BTEC’s associate director of strategic support.

Companies can also mentor prospective employees more directly. At GlaxoSmithKline, which bases some of its U.S. operations inside RTP, researchers interact closely with the triangle’s big three research universities, says Paul Feldman, a senior vice president at the company. For example, at the 10-year-old University of North Carolina Center of Excellence in Pharmacoepidemiology and Public Health, initiated through a grant from GlaxoSmithKline, the company’s researchers serve as guest lecturers, advise graduate students, and receive training themselves in new research methods. GlaxoSmithKline also