Genome Technology

Best Biotech Places & Emerging Clusters

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The annual BIO International Convention lands in San Diego this month, and if history serves as any judge, the conference will be a festival of biotech clusters clamoring for attention. *Genome Technology* thought it was a good time to look at some of these regions to see which are pulling their weight.

The snapshots that follow highlight 11 established and nine emerging biotech regions — hotbeds of research that have sprung up naturally over the years, or through major funding initiatives in a relatively short period of time. This list is not meant to be comprehensive; in fact, you'll notice that there's no ranking of these regions, because they're simply too different to compare. The San Francisco Bay Area, for instance, has been growing its reputation in biotech since the '70s, while Florida — a powerhouse created largely by $1 billion in incentives offered to research institutions — has staked its claim in the last few years. Our guideline for choosing emerging clusters was to find areas that had very recently put significant effort into luring the biotech industry or encouraging biomedical research. India and China, for example, made our list thanks in part to measures the countries have taken to strengthen IP protection, thereby making themselves more to foreign companies.

In gathering data for this article, we consulted a number of sources, including Ernst & Young's Global Biotechnology Report from 2007; Battelle's "Growing the Nation's Bioscience Sector: A Regional Perspective"; the US Census; the Biotech Work Portal; and our sister publication, *BioRegion News*.

Established Biotech Regions

Boston/Cambridge

Population: 5.8 million in the Boston metro area

Funding stats: For its size, Massachusetts researchers took home a wildly disproportionate $2.2 billion in funding from NIH last year with more than 5,000 grants. Only California had a higher state total in NIH dollars.

Notable names: A quick stroll through Cambridge highlights some of the more prominent residents, including Harvard and MIT's Broad Institute, the Whitehead, Genzyme, Novartis, and Millennium Pharmaceuticals.

Profile: The area surrounded by Route 128 has been a biotech powerhouse since the industry was in its infancy. Its concentration of universities, along with available early-stage funding and incubator space, has led to a brain trust strong enough to lure major companies such as Pfizer to build research facilities there. More than 37,000 people in the metro area are employed in the biotech sector, and a recent statewide push to make a haven for stem cell researchers may bring even more.

Massachusetts is working to pass a bill to give $1 billion to biotech, much of which would be funneled to start a life sciences center based at the University of Massachusetts. According to Battelle statistics, nearly half of Boston's biotech industry revolves around research, testing, and medical laboratories; medical devices and equipment represent the next largest segment, with a relatively small proportion in drugs and pharmaceuticals.

San Francisco Bay Area

Population: 7 million

Funding stats: Ernst & Young reports that companies in the San Francisco Bay Area raised more than $4 billion in capital in 2006, and more than $600 million of that was in venture funding. The 69 public biotech companies in

the region reported $17.7 billion in revenue that year.

Notable names: Cetus, often considered to be the first biotech company, was founded in the area in 1971, and powerhouse Genentech set up shop in South San Francisco five years later. Major players have been calling the place home ever since.

Profile: With more than 68,000 biotech employees in the San Francisco/Silicon Valley region, it's almost impossible to walk down a street in the region without bumping into a scientist or a biomedical businessperson. Aside from the considerable industry presence in the region, the Bay Area claims a number of academic heavyweights, including Stanford, UC Berkeley, and UC San Francisco.

San Diego

Population: $2.9 million

Funding stats: Total capital raised in the region approached $2 billion in 2006, according to Ernst & Young, with nearly $400 million of that made up of venture capital.

Notable names: San Diego is home to a number of top-notch research institutes, including the Salk, Scripps Research, the University of California, San Diego, and Burnham. There are also several companies in the area, such as Nanogen, Diversa, and Vertex Pharmaceuticals.

Profile: While smaller than its northern California counterpart, San Diego is still a significant force in biotech clusters. In 2006, there were 39 public biotech companies in the region, and nonprofit institutions are a driver as well. In late 2006, leading research facilities in the area teamed up to create the San Diego Consortium for Regenerative Medicine to provide a haven for stem cell research free of any restrictions attached to federal funding. The joint venture aims to take advantage of California's $3 billion appropriation for stem cell research, funding which has already lured scientists from other states looking to expand their work without facing federal limitations.

Florida

Population: 18 million

Funding stats: Between state funding and local funding programs to match, Florida has committed close to $1 billion in its effort to attract the biotech industry to the state. This year, though, the state faces a $2 billion budget gap and the state legislature has proposed slashing the amount dedicated to biomedical research initiatives.

Notable names: A number of high-profile institutes — including Scripps, Max-Planck, Burnham, and Torrey Pines — have launched Florida-based research arms.

Profile: Florida came out swinging five years ago with a $500 million award to California's Scripps Research Institute for building a branch campus in the Sunshine State. Since then, the organizations that have taken advantage of the state's largesse have collectively promised to establish some 1,500 biotech jobs in the state — including nearly 300 at the Institute of Human Genomics at the University of Miami, which made its name when it poached dozens of faculty and staff members from Duke, the University of Michigan, Johns Hopkins, and other high-profile universities.

Washington, DC Metro Area

Population: 8 million

Funding stats: The mid-Atlantic region, spanning DC and parts of Maryland and Virginia, claimed 23 public biotech companies in 2006, with a combined market cap of more than $17 billion and $2 billion in reported revenue that year, according to Ernst & Young.

Notable names: By far the most famous resident of the DC area is the US National Institutes of Health, located in Bethesda, Md. The J. Craig Venter Institute is nearby in Rockville, Md., as are Human Genome Sciences, the University of Maryland, Johns Hopkins University, and the Howard Hughes Medical Institute.

Profile: The biotech industry in the DC corridor employs some 53,000 people (NIH alone employs 18,000), and the trend seems to be continuing. When HHMI went looking for a place to plant its new research experiment — what turned out to be Janelia Farm — it chose northern Virginia.

Singapore

Population: 4.6 million

Funding stats: In 2006, Singapore's National Research Foundation committed some $365 million to biomedical research.

Notable names: In 2001, the city-state lured Edison Liu, previously director of clinical sciences at the US National Cancer Institute, to head up its new genome institute.

Profile: Not so long ago, Singapore would've been lucky to make it to anyone's list of emerging biotech hotbeds. But with the launch of its biomedical research park complex, Biopolis, in 2003, the city-state began to carve out what is now a well-established niche in the field. The Genome Institute of Singapore, Bioinformatics Institute, and Institute of Molecular and Cell Biology are just a few residents of Biopolis. Industry has made its presence felt as well; in 2004, GlaxoSmithKline announced that it would base a new preclinical research center for neurodegenerative diseases in Singapore, and two years later, it followed that up with the news that it would locate a vaccine manufacturing plant there as well.

Wisconsin

Population: 5.6 million

Funding stats: Researchers in the state wrangled $370 million in NIH dollars through 999 grants last year.

Notable names: Companies such as EraGen Biosciences, Promega, and Third Wave Technologies are familiar to people in the biomedical field.

Profile: Madison, Wis., has made a biotech name for itself, largely in the medical device category, though other areas in the state — such as Milwaukee — are working to get in on the action. The University of Wisconsin at Madison adds significant research strength, and the school's tech transfer arm, the Wisconsin Alumni Research Foundation, is one of the best-known entities in the IP community. WARF has been in the news recently for the patents it holds in embryonic stem cells, which have been under attack from groups claiming that such patents should not have been granted.

Pennsylvania

Population: 12.4 million

Funding stats: In 2007, NIH awarded nearly 3,500 grants to researchers in Pennsylvania, for a total funding amount of about $1.4 billion.

Notable names: The Keystone State has a number of pharma residents, including GlaxoSmithKline and Wyeth, as well as research institutions like Windber, the University of Pennsylvania, and Penn State.

Profile: Pennsylvania was one of the early states to commit its tobacco settlement funds to attracting biotech organizations; it also has a good track record with programs such as Ben Franklin Partners and BioAdvance, which provide seed funding to early-stage companies. Philadelphia boasts a biotech workforce of some 29,000 employees, and across the state, Pittsburgh's no slouch with more than 10,000 biotech staff members. According to Battelle's study, the biotech sector in Philadelphia breaks down to 39 percent in research, testing, and medical labs; another 39 percent in drugs and pharmaceuticals; 3 percent in agricultural feedstock and chemicals; and the remaining 19 percent in medical devices and equipment.

New Jersey

Population: 8.7 million

Funding stats: The state won about $254 million in NIH funding last year, with a total of 672 grants.

Notable names: New Jersey has long been known as a pharma corridor, with bases for Johnson & Johnson, Bristol-Myers Squibb, Merck, Schering-Plough, and a number of others. Research institutions include Princeton, Rutgers, and the Coriell Institute.

Profile: Last year, New Jersey announced the results of a study indicating that biotech employment in the state had risen nearly 30 percent in the past few years, bringing the total to more than 10,000. Efforts continue in the state to attract earlier-stage biotech and biomedical research. In 2006, the state designated $270 million to build new stem cell research centers; but last year, NJ residents voted against a referendum that would've given $450 million to stem cell research.

Ontario

Population: 12.8 million

Funding stats: The Ontario Genomics Institute, which works with Genome Canada, oversees genomics and proteomics research projects worth about $500 million.

Notable names: The Ontario Institute for Cancer Research made news when it hired Tom Hudson as its president and scientific director.

Profile: Canada's Ontario province has more biotech companies than any other province, according to Ernst & Young, with nearly 120 private companies and 26 public ones. The Ontario Genomics Institute was one of six genome centers established by Genome Canada in its push to bring biomedical research to the country. Today, the institute is part of what's known as the MaRS Discovery District, a biotech-focused research and incubator zone in Toronto. The $130 million MaRS Centre opened its first building in 2005, and the next is scheduled to be complete by 2010.

Research Triangle, NC

Population: 1.6 million

Funding stats: All told, North Carolina scientists were awarded more than $930 million in grants from NIH in 2007.

Notable names: Major organizations based here include GlaxoSmithKline, Bayer, Monsanto, DuPont, Duke University, and the University of North Carolina.

Profile: With an estimated 19,000 people employed in the biotech sector, Research Triangle, the North Carolina area bounded by Raleigh, Durham, and Chapel Hill, has made its name as a longstanding biotech cluster. It includes Research Triangle Park, the largest research park in the US, which was created in 1959. Last month, the Biofuels Center of North Carolina had its grand opening. The area boasts a broad intellectual workforce, with 47 percent of adults in the area holding college degrees, according to the Research Triangle Regional Partnership.

Emerging Regions: Next Up on the Biotech Landscape

Texas

Researchers in the state won more than $1 billion in grants from NIH last year, and as the federal funding crunch worsens, scientists here breathed a sigh of relief when the public passed a $3 billion bond to fund cancer research in the state. Texas is home to a number of research heavyweights, including Baylor College of Medicine (and its Human Genome Sequencing Center) and MD Anderson Cancer Center. A number of cities in the state — such as Dallas, Houston, and Austin — are emerging as biotech centers in their own right.

Oslo

It's certainly not the biggest biotech cluster, but for its size, the efforts to cement a bioscience segment here in Norway are impressive. The Oslo Cancer Cluster, which received center of expertise status from the Norwegian government in 2006, comprises some 40 members, which as of last year had a combined 63 projects in the clinical pipeline, the cluster reports. Recently, the Research Council of Norway funded an academic-industry consortium in the city known as the Norwegian Center for Stem Cell Based Tumor Therapy. The Biotechnology Centre of Oslo, part of the University of Oslo, focuses on bioinformatics, molecular biology, and biotechnology.

Denver/Boulder

With some 10,000 people employed in biotech, the Denver/ Boulder corridor in Colorado got a major boost recently with the reassignment of the Fitzsimons Army Medical Center as a bioscience park. Located in the Denver metro area, the park teams research facilities for the University of Colorado Health Sciences Center and Hospital Complex with the Children's Hospital as well as dedicated incubator and office space. By 2010, planners expect employment at the Fitzsimons site to reach 19,000 people. In 2006, Amgen said it would fund a $150 million expansion of its manufacturing plant in Boulder.

Tennessee

With Oak Ridge National Laboratory, St. Jude's Children's Research Hospital, and Vanderbilt University, Tennessee may be one of the most overlooked regions when it comes to biotech — but one that the state insists has plenty to offer. Review panels seem to agree, as NIH awarded nearly $435 million in grant funding to scientists in the state last year. Life science entrepreneurs underwrote the Cool Springs Life Sciences Center, a 10-acre bioscience campus with three buildings expected to provide 140,000 square feet of lab and office space.

St. Louis/Kansas City

While its Center for Emerging Technologies has been a successful incubator for nearly a decade, St. Louis, Mo., has struggled to attract enough funding to establish a significant biotech sector. One major boon to its dreams: the Genome Center at Washington University, plus a corridor across the state that boasts more than 11,000 biotech employees. The Danforth Plant Science Center is a well-known research organization in the area, and Pfizer recently spent $200 million on a new R&D center in the area as well. Another newcomer is Cortex, a 185-acre research park. Meanwhile, NIH awarded some $20 million in grants to institutions in Kansas City, Mo., where one of the newer residents is the Stowers Institute for Medical Research.

Alabama

Rick Myers' move from Stanford to the HudsonAlpha Institute for Biotechnology in Huntsville, Ala., came as a surprise to many — but the move may presage a surge of interest in the state's budding biotech sector. HudsonAlpha is based in the second largest research park in the US. In Birmingham, the University of Alabama has more than $450 million in research funding, much of which goes to the life sciences, according to the state's biotech association. More than 90 biotech or bioscience companies have facilities in Alabama, including the Southern Research Institute. In 2007, NIH gave more than $233 million in grants to Alabama scientists.

China

China has worked to beef up IP protection in recent years, as the lack of a strong patent stance had long given companies pause before setting up shop in the country. In late 2006, Novartis said it would build a $100 million R&D center focusing on biotech in Shanghai; this year, Genzyme had a similar announcement, this one an R&D facility funded with $90 million to be based in Beijing. Government funding has increased significantly in recent years for biotech drug development, genetic disease screening, genetically modified crops, and other key bioscience components.

India

In recent years, the Indian government pledged to double its science budget to a total of 2 percent of its GDP. Meanwhile, the country amended its IP laws in an attempt to encourage innovation by strengthening patent protection. The Department of Biotechnology is supporting the development of several biotech parks aimed at fostering collaborations across companies, universities, and research institutes; as many as 15 such parks, like the one that created Genome Valley in Hyderabad, are expected to be launched by 2010.

New York

The state of New York won more than $1.9 billion in NIH funding last year, and has any number of major research institutes, including Cold Spring Harbor Laboratory, Rockefeller University, Memorial Sloan-Kettering, Cornell, Columbia University, and more. But some have argued that the state still hasn't managed to really establish itself as a biotech hub, a criticism that New York hopes to quell with the $600 million it appropriated this year for stem cell research. New York City is doing its part with a new 1.1 million-square-foot biotech office center, known as the East River Science Park, which is scheduled to be completed by next year.