

Arizona

Phoenix Rising

by Cheryl Scott

Talking about the economic history of Arizona, locals refer to the “five Cs”: cattle (ranching), copper (mining), citrus and cotton (farming), and climate (tourism). Led by visionaries at Arizona State University in Phoenix, a new generation of desert dwellers is looking to the future — and betting on biotechnology. They have identified four strategies to build a lasting foundation for life sciences industry in the valley of the sun (1): develop a research infrastructure, build a critical mass of companies, enhance business development, and prepare a work force by educating the citizenry.



Valley of the sun PHOTO BY DEREK DAMMANN (WWW.ISTOCKPHOTO.COM)

RESEARCH

On 14 December 2004, the Biodesign Institute (www.biodesign.org) opened the doors of its main building on the ASU campus. The four-story, 170,000-ft² building cost \$69 million to provide a home for the Institute’s 10 research centers, which focus on nanobioscience and optical nanotechnology, sensors and bioelectronics, environmental biotech, evolutionary functional genomics, infectious disease and vaccinology, neural interfaces, single-molecule biophysics, rehabilitation neuroscience and engineering, and protein and peptide therapeutics. Under the leadership of director George Poste (formerly with New York’s Columbia University), the institute’s purpose is not only to house a systems approach to biotechnology research at ASU, but also to foster the kind of entrepreneurship in scientists that has birthed biotech industry clusters throughout the world. Ultimately an 800,000-ft² multibuilding facility is planned, with a \$73-million second phase of construction under way already.

Michigan

A Tradition in Life Sciences

by Rosalee Billingslea Rush

For decades, Michigan has been an intellectual haven for life sciences research and development. In fact, life sciences were part of the Michigan economy before the automobile. Before the first car rolled out of a local factory, Detroit was home to one of the most important pharmaceutical companies in America. Parke-Davis (founded in 1866 and purchased by Warner-Lambert in 1970, now a division of Pfizer following their acquisition of Warner-Lambert in 2000) introduced new methods for producing drugs (including a technique for standardizing doses) and discovering medicines that included the first treatments for diphtheria and epilepsy.

Today that innovative legacy continues to grow. Michigan is home to more than 500 life-science companies, ranging from large pharmaceutical corporations to small biotech companies as well as world-renowned research institutes and laboratories. From the Karmanos Cancer Research Institute (Detroit), Pfizer R&D Laboratories (Ann Arbor), Van Andel Institute (Grand Rapids), and the Southwest Michigan Innovation Center (Kalamazoo), the synergy of science, business, and technology is spurring life-changing research and collaboration as well as profitable and beneficial business startups.

THE MICHIGAN ADVANTAGE

Michigan has committed \$1 billion over the next 20 years to expanding its life sciences industry: focusing on pharmaceuticals, medical devices, instrumentation, diagnostics, and research and ancillary services. Statewide initiatives such as the Technology Tri-Corridor (formerly the Michigan Life Sciences Corridor) have been implemented to foster growth and entrepreneurship. The state has made a concerted effort to ensure that all Michigan-based researchers and companies have access to leading technologies. The Core Technology Alliance and Michigan SmartZones enhance collaboration among universities, private research institutions, and life-science companies. As a result, new companies are being formed, most clustered around Michigan’s major research universities and institutes.

In downtown Phoenix, the Translational Genomics Research Institute (www.tgen.org) just finished building and moving into its own new facility. Founded in 2002 for research on the genetic changes in human disease, the institute is studying cancer, diabetes (through work with local native Americans, who suffer a disproportionately high incidence), and Alzheimer's and Parkinson's diseases. It develops diagnostic tests and partners with industry to get them to market. And it is serving as an accelerator to move discoveries into the clinic through its spin-offs: one involved in preclinical testing (the Center for Translational Drug Development) and two involved in genetic-based diagnostic tests (the Molecular Profiling Institute and Nanobiomics, Inc.).

Meanwhile, some 1.3 million ft² of research space is being constructed or converted in various cities throughout the valley, from Chandler to Tempe to Phoenix to Scottsdale. As money dried up in microelectronics, cleanroom space became available for development of the "wet" laboratories used in bioscience research. Amersham Biosciences (now GE Healthcare) took over a former Motorola plant in Chandler, where it hopes to form the basis of a biotech "minicluster." The 60-acre ASU Research Park in Phoenix is home to several high-technology companies and actively courting biotech. A Mayo Clinic R&D facility is under way in Scottsdale, which is also home to the University of Arizona's cancer center and a 60,000-ft² biomedical campus owned by the Pima-Maricopa Indian Community (which also contributed \$5 million to TGen's diabetes research). Also in Scottsdale is the International Genomics Consortium (www.intgen.org), a nonprofit research organization founded in 2001, and a research arm of Canada-based Isotechnika Inc., which develops drugs and diagnostics for autoimmune diseases and transplant rejection.

DEVELOPMENT

Of course, for-profit businesses are what the biotech industry is all about. Most burgeoning companies in Arizona's nascent community are anything but immature in their approach. Since its founding in 1997, Intrinsic Bioprobes Inc. (www.intrinsicbio.com) in Tempe has been successful mainly by staying small and focusing on its purpose: rapid and sensitive proteome analysis. The company provides high-throughput, high-content protein analysis and characterization services to research institutions and biopharmaceutical companies, mainly in California.

Phoenix-based Ribomed Biotechnologies, Inc. (www.ribomed.com) was formed in 1999 by company president Michelle Hanna to develop her research into a technology for rapid isothermal detection and characterization of RNA, DNA, and protein targets. Recently awarded a DARPA grant for the creation of a bioterrorism agent field test, the company has purchased and begun to set up its own 2.1-acre downtown Phoenix biotech incubator space.



Detroit at dusk PHOTO BY BRIAN KELLY (WWW.ISTOCKPHOTO.COM)

Michigan companies and research institutes invest more than \$2 billion in life sciences research and development annually, including more than \$600 million from the state's leading universities. Michigan ranks second in the nation for total R&D investment, over \$18 billion annually. And the state has the sixth largest life sciences cluster and the fastest-growing life sciences industry in the nation.

SmartZones: Many of Michigan's biotech startups are located in one of 10 designated SmartZones throughout the state. These provide recognized clusters of technology businesses, research universities, and resources to create the perfect high-tech growth environment. SmartZones and business accelerators assist emerging businesses with needed services and resources, including equipment. That allows startups to maximize research efforts while minimizing costs associated with equipment and facilities.

Funding is essential to biotech R&D efforts. Michigan's Technology Tri-Corridor provided \$24 million in 2004 to grow high-technology business sectors in the state. In addition, the Technology Tri-Corridor Emerging Business Fund offers \$1 million in Small Business Innovation Research matching grants to support startup companies. Additional funding is accessible through the newly created \$150 million venture capital fund.

BIOTECH COMPANIES IN MICHIGAN

Ann Arbor-based **Pfizer** (launched in 1849, with official certificate of incorporation filed in New Jersey in 1900; www.pfizer.com) is one of the world's leading healthcare companies, providing human and animal pharmaceuticals as well as consumer products. The company has made industry-leading investments in people and resources. Pfizer scientists continue to produce breakthroughs in a wide range of research areas. Today, the company is taking on some of the world's most intractable diseases, including cancer, arthritis, osteoporosis, and stroke.

Pfizer's search for new treatments spans more than 300 research projects across 19 major disease groups, making it a leader in biomedical research. The company continues to invest in Michigan scientists. In February 2004, Pfizer acquired Esperion Therapeutics, a Michigan life science company focused on discovering and developing therapies for the treatment of cardiovascular and metabolic diseases.

Ribomed's technology presents an alternative to polymerase chain reaction (PCR) methods for viral-load testing, tumor-cell profiling, and genetic profiling.

Cynexus Corporation (www.cynexus.com) appeared in 2004, a spinoff from ASU with carbohydrate-based antiinflammatory technology currently aimed at the ophthalmic market. The molecule's highly specific and persistent functioning pathway should lead to far fewer side effects than are seen with most antiinflammatory drugs. Cynexus founders credit their advisory board (which includes experienced industry consultants and insiders) and friends at the Arizona BioIndustry Association (www.azbioindustry.com) for helping them get going while avoiding many start-up pitfalls.

DIRECTION

According to a December *Business Journal* article, "Phoenix's efforts to enter the high-tech race are being described as just baby steps" (2). Most Arizona developers see San Diego as their model — and not only because it's just a five-hour drive away. After roughly a quarter century of increasingly focused growth, it's among the top biotech cities in the world. Phoenix is about 20 years behind it — with eyes toward a sunny future and something more substantial than just a few short-lived tax incentives to make it happen.

As for those four strategies, Arizonans are taking them one step at a time. A research infrastructure is most important — given the right conditions, a biotech industry is bound to arise from well-supported "purely academic" research. And the students participating in today's research may become the entrepreneurs of tomorrow — or at least, they could end up working for them. A "critical mass" of companies grew naturally out of the Scripps-Torrey Pines research powerhouse in San Diego, and the same thing could happen in Phoenix thanks to the Biodesign Institute and TGen. Locally focused investment funds and bioindustry organizations are working toward creating a business environment that should make that inevitable. Lastly, two active organizations — the Flinn Foundation (<http://flinn.org>) and the Arizona Consortium for Medicine, Society, and Values (a partnership of ASU, Flinn, Mayo Clinic Scottsdale, TGen, and the UA College of Medicine) — are working toward the final, most elusive piece of the puzzle: public support.

REFERENCES

- 1 Flinn Foundation. Biotech Progress Report. *The Business Journal Phoenix*, 17 December 2004: 28; <http://phoenix.bizjournals.com>.
- 2 Padgett M. Biotech Takes Baby Steps, Ready for Boom. *The Business Journal Phoenix*, 17 December 2004: 34; <http://phoenix.bizjournals.com>.

Cheryl Scott is senior technical editor of BioProcess International, cscott@bioprocessintl.com

Esperion CEO and cofounder Roger Newton was a researcher behind Lipitor, which had sales of \$9.2 billion in 2003 (1).

Detroit-based ApoLife (www.apolife.com) was one of the first recipients of funding from the Michigan Life Sciences Corridor. ApoLife makes proteins and antibodies using yeast fermentation. The company is at the forefront of research into cost-effective systems for producing monoclonal antibodies to attack cancerous cells. Although this technology is not new, producing antibodies cost-effectively has been a major problem. ApoLife's promising technology attracted two biotechnology senior managers from the east coast to join the company's management team in Michigan.

An award of nearly \$80,000 from the state of Michigan and additional funding from the National Cancer Institute helped scientists at ApoLife develop novel technologies that shorten the time and lower the cost for producing antibodies — and ultimately help reduce healthcare costs. The company is also developing glucose oxidase-based immunotoxins for applications in cancer therapy.

WHAT'S AHEAD?

Michigan's high-tech industry continues to flourish, drawing in more talented professionals — from both in and out of state — who are attracted to the unlimited opportunities and excellent quality of life that the state offers. Despite a sluggish nationwide economy, Michigan landed 23 new life sciences companies in 2004. From 2000-2004, the state witnessed the birth of 97 new life science companies creating more than 450 new jobs and more than \$34 million in private investment. These companies are innovating in a host of areas from researching DNA to developing drugs for kidney diseases.



WWW.AVTECHLABS.COM

REFERENCES

- 1 Johnsen, M. Extending a Powerful Statin Franchise, Pfizer Readies Dual-Use Marketing Plan. *Drug Store News*, 8, 1 March 2004, <http://archives.lf.com/preview.cfm?ID=2004061669633&SC=Pfizer>.

Rosalee Billingslea Rush is communications specialist in the office of Business Development Marketing at the Michigan Economic Development Corporation, 300 N. Washington Square, Lansing, MI 48913, 1-517-241-3090, fax 1-517-241-0882, billingslear1@michigan.org, www.michigan.org