

Golden opportunity

According to some metrics, Indiana's life-sciences sector is among the nation's top performers. But there are financial and other challenges.

Karen Kaplan maps out the possibilities.

Indiana has been good to Mauricio Antunes. The Brazilian native, who earned his doctorate in molecular biology at Indiana's Purdue University in West Lafayette, seized on the chance to return from a postdoc position in Colorado to do another at Purdue last autumn. He liked the idea of returning to his alma mater, and the project itself — an effort to develop cellulosic biofuels that is part of the US Department of Energy's Energy Frontier Research Center, established last year at Purdue (see *Nature* 459, 285; 2009). The US\$15-million energy project is funded until 2014, and the university is supporting the work through its new Center for Direct Catalytic Conversion of Biomass to Biofuels (C3Bio). Antunes hopes that the project, a multidisciplinary venture he finds thrilling, will get additional funding after 2014 and that he can stay on.

Early-career scientists such as Antunes rarely put Indiana at the top of their short list when seeking their first faculty or industry position. The state's long-standing reputation as a metals and industrial-machinery manufacturer, combined with its midwestern location, do little to bolster its image as a centre for scientific innovation. But national rankings suggest that despite recession woes, Indiana warrants a look.

With little fanfare, this state of 6.2 million people has become a contender in the life-sciences sector and an emerging player in energy research. Indiana ranks fourth among top US regions for pharmaceutical research and development (R&D), production and manufacturing, according to a report by the non-profit Battelle Memorial Institute based in Columbus, Ohio. In terms of overall R&D, production and manufacturing in the biosciences, the state comes in ninth, the report finds. Although the state's universities and industrial sector are struggling with the recession's sting (both Purdue and Indiana University in Bloomington have slowed their hiring), technology parks, business incubators for start-up companies and other life-sciences ventures are all poised to start driving job growth, at least once the economy improves.

Helping start-up firms to launch is easier than it might otherwise be thanks to the ready support statewide, says David Brenner,

president and chief executive of Innovation Park, the University of Notre Dame research park in South Bend. For example, the state provides a spark to researchers through its federal Small Business Innovation Research or Small Business Technology Transfer matching grant. Funding is also available through BioCrossroads, a public-private collaboration focusing on regional economic development that administers two seed and two venture funds. Externally, the venture-capital community is also beginning to take notice of the state's start-ups, according to chemist Richard DiMarchi at Indiana University, who is also a biotech entrepreneur and a former executive of Indiana-based drug maker Eli Lilly.

The technology parks and business incubators hope to carry on a life-sciences industry tradition that began with the big-pharma powerhouse of Lilly, which was founded in 1876 in Indianapolis and remains headquartered there. The drug maker employs some 14,700 people statewide, or about a third of its global employee total, making it the state's sixth-largest employer, according to a June 2009 report by Indiana University's Kelley School of Business.

Lilly's presence spawned the establishment of some life-sciences manufacturers — which produce goods such as pharmaceutical preparations, lab supplies and surgical and medical instruments — across the state; life-sciences growth also stems from joint university and government efforts begun some 20 years ago. These include the creation of BioCrossroads and a database that catalogues research, intellectual property and technologies at the state's universities.

"There was a goal of getting to a critical mass," says Bruce Jaffee, an economist at the Kelley School. "You don't have to be a genius to see that heavy [machinery] manufacturing is not a future-growth area. The question was, where's our competitive advantage? And Lilly and the research universities were already here."

Even though new companies have formed, many are still in the virtual stage, says Tony Armstrong, president and chief executive of Indiana University Research and Technology Corporation in Indianapolis, the parent of the university's technology-transfer office



Chemist Richard DiMarchi.



and two incubators, one in Indianapolis and one Bloomington. Their virtual nature means that those fledgling companies are nowhere near ready to recruit, says Richard Kuhn, director of the Bindley Bioscience Center, part of Purdue's Discovery Park incubator in West Lafayette. "It remains to be seen whether Indiana can fulfil its potential as a biotech and pharma hub," says Kuhn.

Weathering the storm

The recession has battered Indiana's new start-ups and large, established businesses alike. Lilly announced last autumn that it will slash 5,500 jobs by 2011 and, although the company has not specified where those cuts will be made, Jaffee expects most to be at its Indianapolis site. The drug maker is still recruiting researchers and postdocs, according to Angela Sekston, Lilly's vice-president for external communications and corporate social responsibility. But she says that those new hires will be in small numbers, specifically in the fields of diabetes, oncology, neuroscience, autoimmune disorders, cardiovascular health, osteoporosis and musculoskeletal health.

There are opportunities, however, including those rooted in a legacy of agricultural research. Earlier this month, Dow AgroSciences in Indianapolis — a subsidiary of Dow Chemical in Midland, Michigan, that makes agricultural products such as seeds



The University of Notre Dame in South Bend, Indiana, is boosting its investments in life-sciences research.

lab at Purdue, where postdoc Antunes works, is also recruiting, albeit in small numbers. The centre is looking to fill three graduate fellowships with students in biology, chemistry and chemical engineering, and when the next year of funding for the biofuel project arrives this August from the energy department, the centre will recruit up to four postdocs or researchers. They should have backgrounds in plant science, chemistry, biology or chemical engineering, McCann says.

Meanwhile, Notre Dame — a Catholic university known for its golden dome and American-football tradition — has not restricted faculty hiring, according to Richard Taylor, associate dean of the college of science. In an unusual move, the university also recently invested \$80 million in science research, part of which came from a capital campaign that the school renews every ten years. Taylor says that the investment, a bold step given the state of the economy, reflects an expectation that the outlay will seed future R&D growth. With an eye towards promoting that growth, the university also established two incubators last year. None of the start-ups they house is mature enough to start hiring scientists. But Taylor says that the university itself is seeking up to ten researchers this year in chemistry, biochemistry and biology, including global health.

Even as the recession thaws, it continues to be a challenge to tempt high-quality researchers who may prefer to work in such established bioscience hubs as California or Boston. But the potential is there, says DiMarchi. “There are well-established, highly recognized institutions in a state that is relatively small in population,” he says. And the potential for translational research at the state’s growing incubator and research-park network should help with university recruiting, adds David Johnson, BioCrossroads president and chief executive. “For a university to be able to say, ‘If you end up with something you want to commercialize, we will help you,’ is huge,” he says.

The chief executive of one start-up firm is not shy about his optimistic forecast: “Call me crazy, but I see a billion-dollar company with thousands and thousands of employees as we grow,” predicts Paul Hall of Bioscience Vaccines in West Lafayette. In February, the company received \$400,000 in venture funds from BioCrossroads, and is negotiating with an outside venture fund for additional capital. Hall, a state native, remains an unabashed advocate for Indiana. “There is this huge support for biotech, and the cost of living is quite reasonable,” he says. “We could have done this anywhere else, but it would cost twice as much.” Recruiting success and economic recovery will determine whether Hall’s optimism is on the mark. ■

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and pesticides — recently said that it will hire more than 400 researchers by 2015 as part of an expansion strategy disclosed last year. Those positions will require expertise in molecular and cell biology, agronomy and plant breeding, according to company spokeswoman Kenda Friend. Dow is developing technologies to alter the genomes of maize (corn), soya bean, canola and cotton to boost yields and improve resistance to pests and other killers.

Dow researcher Daa AlAbed, a senior biologist, joined Dow AgroSciences last autumn. AlAbed, who earned his doctorate in maize genetics in 2007 at the University of Toledo in Ohio, had hoped to work for the company after meeting Dow scientists at industry conferences and reading that the state chamber of commerce had named the company as one of Indiana’s top ten places to work. “I’m very fortunate,” says AlAbed, a native Egyptian who says that he likes Indianapolis because of its diversity and cultural offerings, including museums and sports. “It’s important for a good scientist to have the technology and the atmosphere that will enhance his ideas, and the implementation of those ideas, and that’s why I feel this is the

right place for me.”

The state’s universities, however, have not emerged from the recession unscathed. Purdue, Indiana University and Notre Dame are all enduring economic woes. This presents further challenges for institutions that are relative newcomers to the life sciences. Purdue, a land-grant university, has long been best known for agricultural research, whereas in 2007, Indiana University completed its first new life-sciences research facility in decades. Only recently has Notre Dame begun to establish itself as a research institution and win grants from agencies such as the National Institutes of Health.



Maize geneticist Daa AlAbed.

Yet each offers some opportunities. Purdue, which last year cut 140 professional and clerical staff, is hiring faculty selectively, according

to university spokesman Chris Sigurdson, who adds that the university won a record \$342 million collectively — about \$10 million of which is stimulus funding — in external federal grants this year. The Bindley Bioscience Center has openings for ten researchers, says Kuhn, with skills in mass spectrometry, informatics, chemistry, bionanotechnology and biophysics. Maureen McCann’s C3Bio