



Tori Barron used community college to make a transition to a biotech career.

BIOTECH, THE COMMUNITY WAY

Researchers at US drug and biotechnology companies are nervous about their job prospects. So are students hoping to work in industry. But the dozen or so students about to graduate with an associate's degree from Mount Wachusett Community College in Devens, Massachusetts, are likely to have their pick of well-paying jobs in biomanufacturing — across the street, at Bristol-Myers Squibb's new US\$750-million cell-culture facility.

"These graduates will be highly sought after," predicts Richard Elmer, the company's manager of learning and development. "There's going to be a talent war with other industry in the local area."

That's good news for the graduates of the two-year course, especially with US biotech companies shedding jobs and research institute endowments falling (see 'Good bet'). "These students will be able to jump into jobs from day one," says Lara Dowland, chair of the new biotechnology and biomanufacturing programme at Mount Wachusett, near Boston.

There are about 1,200 US community and technical colleges granting two-year degrees. They enrol nearly 12 million students, almost half of all undergraduates in the United States. Once seen as learning centres for underperforming students hoping to get any career foothold, these bargain-priced schools have become popular as fees at four-year colleges soar. Fledgling scientists are among those who have taken interest.

Symbiosis at work

The relationship between Bristol-Myers Squibb and Mount Wachusett was crafted from the ground up two years ago — the planning even covered the location of buildings. The company provided specialists in good

Community-college programmes in the United States can be a quick, cheap route into the pharmaceutical industry. **Ted Agres** talks to scientists making the grade.



Genentech's Hank Stern.

manufacturing practices and other areas so the school could shape its curriculum to match the firm's needs. The result is a range of courses on biotech basics, the use and calibration of standard lab instruments, hands-on production of human proteins from bacteria, mammalian and yeast cells, and protocols for DNA isolation, gene mapping, expression and regulation.

The company offered advice on layout, and donated computers, meters, scales and high-performance liquid chromatographs. On top of that, Mount Wachusett last year won a \$1.6-million grant from the Department of Labor to finish outfitting the labs with state-of-the-art equipment, provide scholarships and hire training faculty. "It's really a win-win situation," Elmer says.

Bristol-Myers Squibb has hired some 120 full-time employees and expects to fill 350 positions, including 200 for community-college graduates, by the time the cell-culture facility begins commercial production in 2011. "We are qualifying, validating and commissioning equipment right now," Elmer says. "The new graduates will have practical, hands-on experience so they can quickly transition into our labs."

The collaboration between Bristol-Myers Squibb and Mount Wachusett is typical of a growing number of symbiotic relationships between community colleges and biotech and biomanufacturing companies. From 1998 to 2007, the number of active biotech and pharmaceutical programmes at two-year colleges soared from 49 to more than 90. Nearly all are tailored to meet the needs of nearby companies.

"These programmes don't exist at every community college, and they probably shouldn't. They are very specific and require lots of equipment," says Elaine Johnson, director of Bio-Link, a national educational centre based at the City College of San Francisco that

supports high-tech employment through a grant from the National Science Foundation.

In addition to offering core classes in biology, chemistry, mathematics and communications, US community and technical colleges provide education and training customized to their region's specialist areas. That includes biomanufacturing in the northeast, agricultural bioprocessing in the midwest, medical devices and bioinformatics in the Pacific northwest, and clinical trials and regulatory affairs in the southeast. Stem-cell programmes are also prevalent in California and Wisconsin, where state support or university research is strong.

At an average age of 29, community-college students tend to have more experience than their four-year counterparts. "There is a common misperception that community colleges serve mostly students right out of high school," Johnson says. "Although we do serve those students, there are also a huge number of people seeking new skills, including those with bachelor's and master's degrees seeking to change careers."

Tori Barron, 42, with a degree in psychology, decided to re-enter the workforce after staying at home for seven years to see her three children off to pre-school. In 2002 she enrolled in a post-baccalaureate certificate programme in biotech at Madison Area Technical College in Wisconsin. "The college was very much a springboard for my entry to the biotech workforce," Barron says. She went on to earn a master's degree in biotech from the University of Wisconsin-Madison in 2005. She is now a senior research specialist at the WiCell Research Institute, working on comparative genomic hybridization of human embryonic stem cells. The community-college approach, she says, "is a bargain and offers hands-on training in a cutting-edge field by outstanding faculty".

Holders of two-year degrees as an associate of science or of applied science have a range of options, including microbiologist and analytical chemistry lab technician, specialist in instrumentation and calibration, and posts in validation and quality assurance or environmental health and safety. Graduates can also specialize in areas such as marketing, customer relations, and legal and regulatory compliance.

"Technicians are doing things in labs today that only PhDs did 15 to 20 years ago," says Russ Read, executive director of the National Center for the Biotechnology Workforce at Forsyth Technical Community College in

Winston-Salem, North Carolina.

Hank Stern, associate director for manufacturing collaborations at Genentech in South San Francisco, agrees. "These are not trivial jobs by any means," he says. At his company, community-college-trained technicians are operating 25,000-litre cell-culture fermenters producing drugs worth tens of millions of dollars. "A single mistake has a huge impact both in terms of the product we supply to our patients and to the finances of the company," Stern says.

Never too late

Most biotech programmes encourage students to do an internship at a local life-sciences company or lab. Jim

Crawford, a graduate of Forsyth Tech, took an unpaid internship at Anthony Atala's lab at the Wake Forest Institute for Regenerative Medicine in Winston-Salem. After the internship, he was offered a full-time job expanding and differentiating stem cells. Two months later, he became a tissue- and cell-culture technologist, managing five rooms used by 90 researchers and with purchasing responsibility for more than \$1.5 million in materials annually. Crawford, 58, went to community college after being laid off three times from the textile and electronics industries. "It was the perfect vehicle to both update my credentials and allow me to pursue my goals sought over 30 years ago," he says.

His associate's degree let him start contributing at once. "I was able to walk in and start culturing cells. I was training PhDs and postdocs who had never had that experience," Crawford says. Management skills acquired over 30 years make him well suited for his next step: managing Wake

Forest's new manufacturing facility once it is constructed. "It's a big honour and I owe it to the associate's degree programme," he says.

Community colleges also offer short courses and certificate programmes in areas such as immunoassay and Western blotting — and provide networking opportunities. "This is often how students get a toe in the door, which is probably the biggest challenge in finding a job," says Jo-Anne Hongo, a biotech instructor at City College of San Francisco and scientific research manager in the department of antibody engineering at Genentech. "I write a lot of letters of reference," Hongo says. "It's extremely rewarding to see our students get jobs in this highly competitive market."

Ted Agres is a freelance writer based in Laurel, Maryland.



Class act: Bristol-Myers Squibb's Richard Elmer and local college educator Lara Dowland.

GOOD BET

Biomanufacturing is one field that continues to have jobs potential, despite the downturn. "A company manufacturing a drug that has taken 15 years and \$1 billion to get approved is not going to stop operations simply because the economy gets a little weak," says Sonia Wallman, director of the Northeast Biomanufacturing Center and Collaborative, a group

funded by the US National Science Foundation that works with drug and biomanufacturing companies in the region.

Salaries for biomanufacturing technicians are 28% higher than those in other manufacturing industries. They range from the mid-\$30,000s to nearly \$60,000, depending on the region, availability of jobs, and whether the

employer is a university, research institute or for-profit company. This isn't bad compared with many US postdocs, who often earn less than \$45,000 in their first year at work.

About 14,000 biological and chemical technicians were employed at more than 2,500 drug and medicine manufacturing facilities around the country

in 2006 (the most recent year available). They represent nearly 5% of the biomanufacturing workforce.

Demand for these positions is expected to grow 26% by 2016, according to the US Bureau of Labor Statistics — although that projection was made before the current global economic downturn.

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