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BIOTECH BOUND: FOR BLUE-COLLAR APPRENTICES, BIOMANUFACTURING CAN BE A TICKET TO THE MIDDLE CLASS

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An industry shift is creating opportunity for a new generation of workers



Dennis Pacheco found himself working in the shadow of the biotech industry shortly after coming to the United States in 2012. He tended bar at a tapas restaurant in Cambridge's Kendall Square, pouring beer and mixing drinks for employees from nearby drug discovery labs.

"I had no idea what they did," Pacheco said. "All I knew was they were always having drinks and big parties. And they didn't have money problems."

A decade later, Pacheco, a 42-year-old Brazilian immigrant who'd yearned for a piece of that prosperity, is getting his shot. He's signed on as a biomanufacturing apprentice, joining dozens of low-wage workers in the Boston area training for opportunities in a growing field.



Apprentice Dennis Pacheco prepared to enter a clean room at the Thermo Fisher Scientific biomanufacturing plant in Lexington on Oct. 5. He and his team would be preparing nutrients to feed cells growing in a bioreactor. CRAIG F. WALKER/GLOBE STAFF

Among them are Alicia Raymond, 26, a longtime coffee barista, Connor Zhong, 21, who waited tables at a Vietnamese restaurant, and 31-year-old Josh Wilkerson, who gave Breathalyzer tests at a halfway house. All are from families of modest means. And all hope to punch their tickets to the middle class in an industry where the rewards of mastering the work are great, but the stakes of failing to do so are daunting.

“It’s time to move on to a career, not just a job,” said Wilkerson.

Their chance comes as the Massachusetts biotech boom enters a new phase that will require not only scientists and entrepreneurs but also more production technicians. Drug makers are boosting manufacturing capacity in the state. At least 10 plants have recently opened, expanded, or are under construction, and several more are planned, creating thousands of well-paying production and support jobs.

Biotechs that long outsourced drug-making, or built plants in lower-cost locales down South or overseas, are reassessing that strategy. As new gene therapies and targeted cancer drugs make biomanufacturing more complex, many local companies want their production lines to be close enough to Boston for their scientists to keep watch.



Alicia Raymond listened to Lab Manager Luis Viskatis at Northeastern University's Biopharmaceutical Analysis and Training Laboratory in Burlington. (CRAIG F. WALKER/GLOBE STAFF)



Viskatis taught a MassBioEd class at Northeastern University's lab. (CRAIG F. WALKER/GLOBE STAFF)

Even as many labs have shed workers, the manufacturing of prescription medicines in the state is growing. The number of employees at drug plants climbed 6.3 percent last year, to 10,500, the Massachusetts Biotechnology Council, a trade group, reported in September. And most of those workers aren't scientists.

Industry and state officials are struggling to keep up with demand for hiring at those plants. They're offering programs to train technicians, who on average earn nearly \$60,000 annually in Massachusetts, well above the national average and far more than the wages in retail or food service.

Gowning up for biotech training

About a dozen workers, many without four-year college degrees, gathered at Northeastern University's campus in Burlington for a four-month training program sponsored by the nonprofit Massachusetts Biotechnology Education Foundation, or MassBioEd.

In a field better known for brainy PhDs peering into microscopes, they were a class of eager novices.

Most had bounced from one dead-end job to another. Their common dilemma was how to save money, buy a house, or raise a family in a state where the promise of a stable life — the life an older generation of blue-collar employees took for granted — seems out of reach for many low-wage workers.

The biotech industry offers a 21st-century version of the ladder manufacturing provided previous generations. After completing 16 weeks of training in the spring and summer, each worker would be placed as an apprentice for 12 months in a biomanufacturing plant.



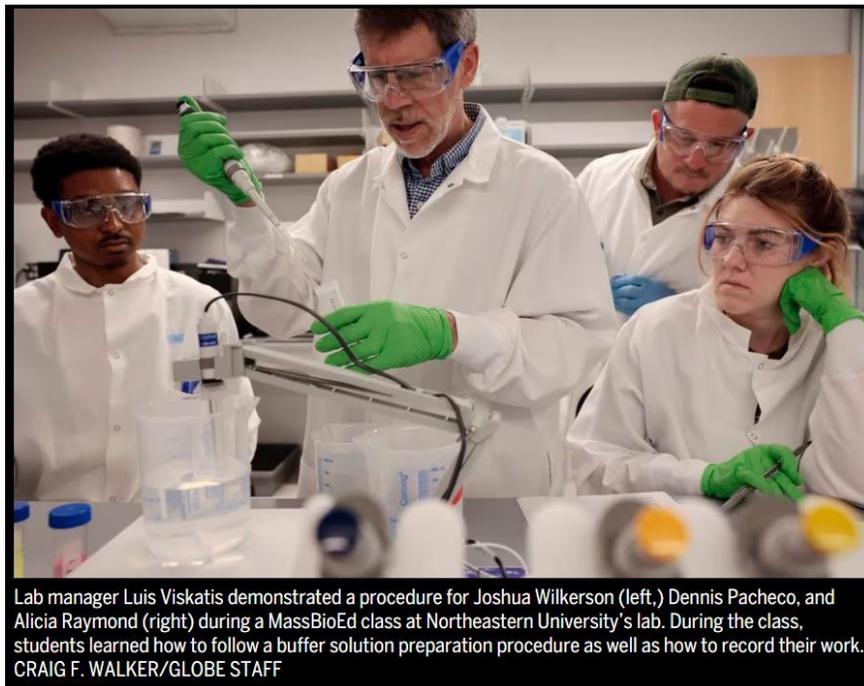
So they donned white gowns, split into teams, and huddled over instruments — weighing scales, pH meters, stirrers — arrayed on the counters of a model laboratory. It was the closest thing to what they would see on the job when they entered a plant.

Lab manager Luis Viskatis, their meticulous instructor, introduced them to the processes they'd need to master. He stressed the most important principle in any production environment and especially biomanufacturing: the need to get it right every time.

Wilkerson held a vial of salt-like granules at shoulder height. "Here comes the sodium nitrate," he proclaimed with fanfare.

The task was preparing buffer solution, the kind used in manufacturing plants to purify the cell-based drugs that brewed for hours in giant stainless steel tanks called bioreactors. Raymond took the vial from Wilkerson and poured the preservative into a beaker.

"That's 1.4 grams," she said, as Wilkerson jotted the weight on a notepad.



A single mistake could slow production, a cardinal sin in manufacturing. In the worst case, it could contaminate a lifesaving therapy.

"This is a small part of the process," Viskatis said, his voice rising, "but you must remember there's a patient at the end of this."

Training programs are sprouting up across the state to prepare workers for jobs with such titles as cell engineer and formulation technician. The biotech council, known as MassBIO, next month will open Bioersity in Dorchester, an eight-week training program

for residents with a high-school degree. Other programs are run by groups such as LabCentral and Year Up and even regional organizations.

Greg Verdine, a biologist and serial entrepreneur, cofounded one of those programs, Gloucester Biotechnology Academy, to help provide the workers and technical skills that biomanufacturing needs to grow.

“We’re democratizing science,” said Verdine, who has started 10 companies. “If you’re trying to hire just people with advanced degrees, we have a limited supply of them.”

The outsiders looking in

It seemed natural that Pacheco, an upbeat trainee who often wears a baseball cap backwards, would eventually wind up in biotech.

His bartending job in Kendall Square gave him his first glimpse. More recently, his wife, Jessica, landed a job at a Bristol Myers biomanufacturing plant at the old Army base in Devens. And at his last work gig, as a temporary laborer grinding metal and hauling building materials, Pacheco was part of a crew building a plant for the biotech Ultragenex at an industrial park in Bedford.

He enrolled in MassBioEd’s program, to be followed by a year of on-the-job training with a company making drugs in Massachusetts. Apprentices who proved to be adept would be offered full-time positions. After years as an outsider looking in, he stood ready to be welcomed into the fold.



Biomanufacturing apprentice Dennis Pacheco entertained his daughter, Gianna, after picking her up at day care in Stoughton in September. CRAIG F. WALKER/GLOBE STAFF

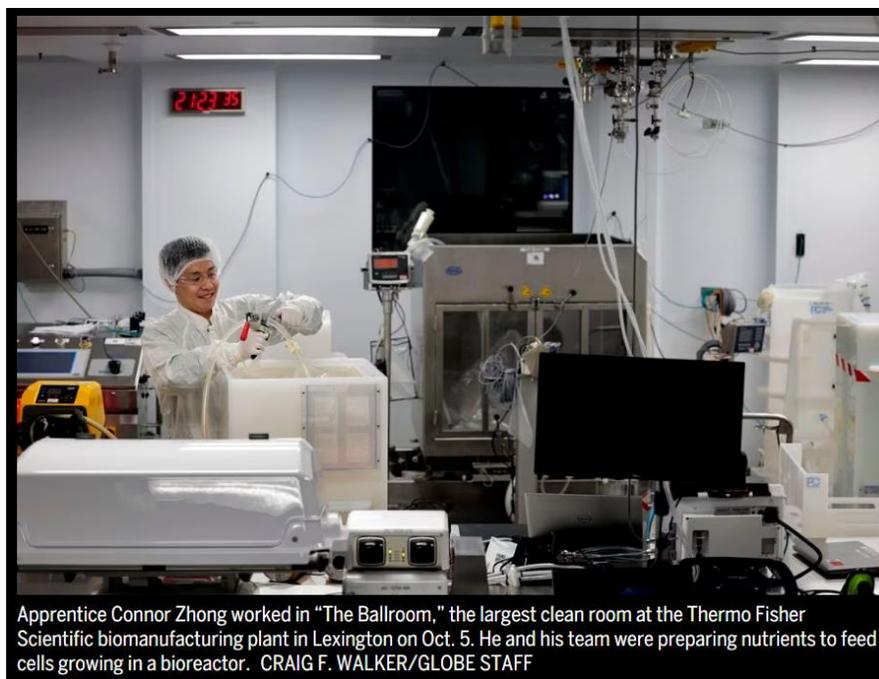
“If it pays good, I’ll learn,” Pacheco said. “I have a feeling I can grow. And my whole family can live on biomanufacturing for a while.”

Other trainees in his class had their own stories, and quests.

Raymond, the former barista, sported a tattoo of Rosie the Riveter and another of an arrow poised to launch. She went to an agricultural high school in Walpole, hoping to be a veterinarian, but never made it to college. She has a young son and daughter and is pregnant with her third child.

With a job in biomanufacturing, she said, “I know I’ll be able to support myself and my kids. And there’s room for growth.”

Zhong, who grew up in public housing in Brighton, graduated from the O’Bryant School of Mathematics and Science, but dropped out of the University of Massachusetts Boston after two years when he ran out of money.



He was living with his parents, both Chinese immigrants, and working at a Vietnamese restaurant when a friend took a job in biomanufacturing. Zhong began watching YouTube videos to learn about it.

“Boston is the biggest hub in the world for biotechnology,” he said. “It’s a career I believe I could really thrive in.”

A new work-and-sleep schedule

Like several of his colleagues from the MassBioEd training program, Pacheco was assigned to a 12-hour overnight shift at a cavernous Thermo Fisher plant in Lexington. In early fall, weeks after starting his apprenticeship, he was still adjusting to his new schedule.

Waking up in midafternoon, after sleeping four or five hours, Pacheco had a few hours to run errands and pack his dinner. Then it would be time to pick up his 16-month-old daughter, Gianna, at her day care, down the street from the family's modest starter home in Stoughton.

"I had to adapt my internal time zone," said Pacheco, who drank at least four cups of coffee a day to help with his work-and-sleep transition. "The first week and a half I felt like I could be falling asleep at work."



A few hours later, after Pacheco flipped through picture books with Gianna, his wife returned home from her dayside job. Then came what they jokingly called the "changing of the guard." Pacheco grabbed his laptop and his dinner, kissed his wife and daughter, and headed for the door for Lexington and a shift that ran from 7 p.m. to 7 a.m.

"Tomorrow I'm off," he told them. "Tomorrow we'll have dinner."

Reporting to the Thermo Fisher plant, Pacheco crowded into a small room for a team huddle with fellow apprentice Zhong and other night-shift workers. Supervisors reviewed their progress in producing the plant's specialty, "viral vectors," the secret sauce used to deliver genetic materials into human cells during gene therapy procedures.

On the way to the locker room, where they would gown up for their first task of the night, Pacheco and Zhong compared notes.

"There's not too many people out there who can handle the challenge of a 12-hour night shift," said a well-caffeinated Pacheco.

"It's manageable," said Zhong, who kept late hours before he started working overnight. "For me, it's an easy adjustment."

Soon they were in a clean room, outfitted in their gowns, preparing the nutrients they called "media" used to feed cells growing in doughnut-shaped iCELLis machines stationed in a nearby production suite.

Under the watchful eye of night manager John Makumbi, who helps apprentices get qualified on the machines they use, the apprentices stored plastic jugs of red liquid — the all-important nutrients — in refrigerator-like boxes called incubators before their use. Zhong wielded a scanner to record the bar codes. Pacheco tapped a flat-panel gauge to check the temperature and humidity of the incubators.

"The first few times, we had to learn," Pacheco said. "We had to understand everything. Now it's kind of automatic."

At a vaccine plant, 'connecting the dots'

Thirty miles north, at a sprawling Pfizer plant in Andover, another MassBioEd apprentice, Crystal Langone, was clamping hoses together to install transfer lines between bioreactors, a kind of high-tech plumbing drill.

"A lot of gaskets in there," said Langone, 38, who worked the day shift. "My fingers are worn."

The tanks in her production suite were growing bacteria to make the active ingredient for a Pfizer vaccine to fend off the pneumococcal virus. At another site on the company's campus off Interstate 93, workers were manufacturing key ingredients for the COVID vaccine.



Chanalo Hunde, Hem KC, Crystal Langone and Terrence Serres calibrated the PH Meter while working on a buffer solution preparation exercise during a MassBioEd class at Northeastern's lab. (CRAIG F. WALKER/GLOBE STAFF)



(Left to right) Joshua Wilkerson, Dennis Pacheco, Connor Zhong and Crystal Langone departed class in Burlington. (CRAIG F. WALKER/GLOBE STAFF)

Langone had worked for years in hospitals. Most recently, at Beth Israel Lahey, she administered vaccine shots, giving little thought to how they were made. Now she was playing a role in it.

“You just never think about being on this side of the fence,” she said. “I love figuring out how everything works, connecting the dots.”

‘You come and prove yourself’

Kelvin Manu, an immigrant from Ghana, completed the MassBioEd training program in 2022. Before that, Manu, 45, had toiled at odd jobs — on an oil rig, in a warehouse, behind a Dunkin’ cash register — always looking for something better.

He found it on a winter evening while driving for Lyft. Manu picked up a passenger, Germaine Palmer, in Allston. By the time he crossed the Charles River to drop her off at her home about 20 minutes later, his sights were set on biomanufacturing.



As they made conversation, Palmer told Manu that she worked as a recruiter for the life sciences apprenticeship program and asked if he knew anyone who might be interested.

“Yes,” he said. “Me.”

Manu, who earned a two-year associate degree at Bunker Hill Community College, knew little about the cutting-edge therapies emerging from Massachusetts biotechs. But he remembered feeling helpless when his grandmother, who raised him, died of cancer.

“I couldn’t help her,” he said. “I wanted to give other people the help I wasn’t able to give her. This sounded like a place I wanted to be.”

Nineteen months later, after graduating from the MassBioEd training program and completing his apprenticeship, Manu in September accepted a full-time job as a formulation technician at the Thermo Fisher biomanufacturing plant in Cambridge.

“You come in and prove yourself and there’s opportunities,” he said, during a potluck dinner with colleagues in the plant’s break room. “I’m looking out two years now. I might be able to buy a house.”



Lab manager Luis Viskatis took a group photo of a class after teaching the gowning procedure for entering a clean room during a MassBioEd class at Northeastern University's lab in Burlington. CRAIG F. WALKER/GLOBE STAFF