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A NEWSLETTER TRACKING TRENDS IN BIOTECHNOLOGY

Addressing the Need for Manpower in Biotechnology

A report from the
National Center for the Biotechnology Workforce: A Biomanufacturing/Bioprocessing Training Panel Discussion
Winston-Salem, North Carolina / February 2, 2006

Winston-Salem - Spiraling into the sky, the curves of a triple-helix sculpture stand near an entranceway to the Piedmont Triad Research Park. With the remarkable biotechnological breakthroughs being made in the field—from advances in Alzheimer's disease to capabilities for growing new body organs—this shining sculpture also marks a gateway to the future. The National Center for the Biotechnology Workforce hosted a panel discussion here in Winston-Salem on February 2, 2006, where speakers communicated accomplishments and shared their visions, expressing the promise of biotechnology. Yet this meeting also was about making the connections and developing the cooperative teamwork required to overcome biotechnology's obstacles and challenges ahead.

Biotech leaders from around the United States, working in education, industry and economic development, gathered to address the most critical element affecting the bio-boom in the nation today: workforce training. By now, most people are aware of the tremendous potential the last 20 years of biotech research has produced through innovative strategies and novel discoveries. As a result of these breakthroughs, the world stands ready to cure and eliminate deadly diseases; improve our food supply; reduce starvation; bring clean-burning fuels to market; and improve nearly all our existing chemical processes. If such discoveries can be successfully brought out of the laboratory and into full-scale production, then science can help us enter a cleaner, greener and more profitable bio-based future. But training and re-retraining enough workers is crucial.

Cultivating the Synergy Between Community Colleges and Industry

To that end, the US Department of Labor awarded a $5 million grant that sponsors the National Center for the Biotechnology Work Force, a program designed to develop training for certain areas of this high-growth industry. The center comprises five community colleges with specific focuses of excellence/expertise in key geographic areas.

"Everyone agrees a lack of skilled workers is the greatest threat to realizing biotech's potential," stated Russ Read, Executive Director, National Center for the Biotechnology Work Force and organizer of the event. Bringing representatives of the center's community colleges from New Hampshire, Iowa and California together with accomplished North Carolina leaders generated insights and inspirational energy. It also reinforced links created by the center's national initiatives.

Viewpoint of a Life Sciences Economic Developer

"In many ways, the biotech future got to North Carolina a while ago," said panelist Gwyn Riddick, speaking from his 35 years of experience in life sciences and higher education. A microbiologist by training and former faculty member of North Carolina State University in Raleigh, Riddick also worked in industry, manufacturing and managing various vaccines, diagnostics and pharmaceuticals. Now he heads the Piedmont Triad Office of the North Carolina Biotechnology Center, a private, non-profit corporation created by the state to provide long-term economic and societal benefits through support of biotechnology research, business and education statewide. Riddick called to mind the major biotech accomplishments of his Tar Heel State, reminding listeners that North Carolina is third in the US in biotech development. He added that he looked forward to more discoveries. "Researchers are finding 'new' microbes that have been there all the time. We've identified 150 organisms in our bodies we didn't know were there before."

Workforce Training: The Critical Key

Not on the panel but listening attentively in the audience, Kathleen Kennedy, PhD, Vice President, Education and

Training Program, North Carolina Biotechnology Center, was pleased with the discussion and offered her own thoughts. "We've been studying the industry and employment trends since 1991. It became apparent we could be very well served by the community college network. Time has brought us growth in community and industry involvement."

Kennedy partners on education programs, develops biotechnology-related curriculum materials, advises colleges on biotechnology education and tracks biotechnology work force training needs. She stressed that it is never too early to start talking to young people. "I like to stay in touch with high schools and outreach," she indicated.

Taking the podium at the panel discussion, Susan Seymour, BioNetwork Director, North Carolina Community College System, concurred. "Access to the workforce is the number one need for companies wanting to grow," she emphasized. The BioNetwork is a statewide initiative connecting community colleges across North Carolina, providing specialized training, curricula and equipment to develop a world-class workforce for the biotechnology industry. Seymour foresees her state's $8 billion biotech industry that currently includes 150 companies employing more than 35,000 people will likely need 6,000 more workers over the next three years. She noted that short courses and specialized curricula easily accessible at community colleges across the state are helping people land well-paying jobs in the biotech industry today.

The changing nature of the industry—evolving from research into production and biomanufacturing—also requires more workers capable of carrying out routine, yet fairly well paid, round-the-clock technical shift work. Aware that "at least 67% of biomanufacturing employees will have less than a bachelor's degree," Seymour emphasized the positive benefits of community college training and certification. "BioNetwork decreases the companies' time required to train, increases productivity and profitability, plus provides a competitive advantage to North Carolina companies," she stated.

Meeting the Training Needs

Ric Matthews, Director, National Center for Expertise in Bioprocessing Training and Dean, MiraCosta Community College, Oceanside, California, offered a West Coast perspective on the same message and expressed a greater urgency to fill the growing void. "We have 500 biotech companies in our county alone and we need more new workers now, 24/7." The short courses the California college provides using its new training facility help students fill those positions.

Matthews recounted to the assembled group of about 30 attendees a success story about what can happen when a community college finds a supportive industry partner. The bioprocessing company Idec was set to build a new manufacturing plant near the college. Knowing the value a community college can bring, the company began supporting the college, including helping to fund a new biotechnology faculty professor. Idec was eventually acquired by the industry giant Genentech but the relationship with the college was fortunately maintained, with Idec continuing to donate in-kind service and equipment, as Matthews confirmed. He presented photographs of the MiraCosta project to "turn a pig's ear into a silk purse," showing the progress of transforming a rundown garage-style building on the college's campus into a brand-new biotechnology training laboratory.

Sonia Wallman, PhD, Director, National Center for Expertise in Biomanufacturing Training and Director, New Hampshire Community Technical College (NHCTC) Biotechnology Program, called New Hampshire "a small state at the top of biotechnology because we are so close to Cambridge/Boston." Wallman pointed out that New Hampshire has done an excellent job preparing for biomanufacturing, and consequently, he told the audience, the Granite State is presently in a good position as companies south of its border, formerly focused on research, become ready to roll out production. They will look for affordable locations nearby, preferably ones with trained workforces.

Wallman explained to the audience how the NHCTC grew in tandem with the arrival of Lonza Biologics to the Pease Tradeport in Portsmouth in 1994. Lonza helped build the state-of-the-art laboratory facilities on the college's campus that deliver learning in a "virtual workplace," hands-on community approach. Working with industry, her center designed and adapted protocols and procedures to train biotechnicians in the tools, processes and regulatory structures of the biotechnology industry.

Offering a research and discovery course as well as a biomanufacturing course, with certification and associate degree programs available, the NHCTC's short courses can bring long-term employment with good pay. Several of its former students have been employed in the biotech industry for more than three years. So far, the New Hampshire biotech program has graduated 237 students, with 109 of them working in biomanufacturing positions today.

The program is scaling up, attracting more students and offering apprenticeships—"we train well," explained Wallman. "Once a company calls for one of our students, the employers come back for more." Wallman anticipates the growing need for workers. "I just returned from a conference on industrial biotech that was held in Hawaii. We are moving into a bio-based world that can cross over into many different industries. We can get rid of toxic chemicals and switch to enzymes that are biodegradable," she affirmed.

Successful Outcomes

Janet Paulson, Director, National Center for Agricultural Bioprocessing and Renewable Fuels, Iowa Bioprocess

Training Center, Eddyville, Iowa, brought a midwestern viewpoint of the same situation, confirming that the need for trained workers is growing. As the number one producer (and growing consumer) of ethanol in the nation, Iowa's bio-industry is robust. "Training is so important for this industry," said Paulson. Graduates of the 21-credit-hour program find well-paying jobs (with annual salaries of $35,000 and up) with their Bioprocess Technology degrees. There is also a Process Control Certificate program available which allows flexible schedules and can be completed part-time in six to nine months. "Having strong industry partners is essential to success," stressed Paulson. She showed pictures of Indian Hills Community College where a new $2.5 million pilot facility was built on land donated by nearby Cargill, an international provider of food, agricultural and risk management products and services with 124,000 employees in 59 countries.

In addition to explaining some of the science and by-products of the bioprocessing carried out to make ethanol, the educator shared techniques the college uses to recruit young people. "We have a three-dimensional, virtual-reality experience of the process of fermentation that we bring around to fairs," Paulson told delegates. "It really gets people excited." (Bellevue Community College in Washington State, with expertise focused on Life Science Informatics, is the fifth community college in the Center.)

Book-ending the visiting speakers was Bill Woodruff, Director, Bio-Link South East Regional Center and Alamance Community College, Alamance County, North Carolina. Woodruff shared his experiences and enthusiasm for biotech education. He showed slides that simulate the experience of a student first using a bioreactor to grow 15 L of protein-producing bacteria, followed by purifying the protein in the laboratory using chromatography and, finally, verifying the purity of the protein by using high-pressure liquid chromatography. Purifying a sample in the lab through chromatography produces a visible phosphorescent green ring shining in a test tube. "You talk about it, discuss it and then—voilà!—you see it, right there in front of your eyes." Woodruff's demonstration of the process elicited an audible response from the audience.

The Power of Networking

North Carolina certainly leverages the expertise, experience and resources of Alamance Community College and Forsyth Technical Community College in practical ways, especially with their national roles in BioNetwork, Bio-Link and The National Center for the Biotechnology Workforce. For example, colleges partnering through BioNetwork can take what they learn in the national arena and readily deploy this knowledge anywhere in the state through BioNetwork, amplifying the impact of these growing collaborations.

National Center for the Biotechnology Workforce director Russ Read returned to the podium to conclude the evening's program. "We've taken a whirlwind tour across the country, but the one message we see again and again is that these short-course programs enable students to get good jobs that pay well, and they're happening now."

He invited everyone to return to North Carolina for the highly anticipated Biotech 2006 Conference: *Fusing Science, Technology and Industry Leadership,* the 15th annual event to be held in Winston-Salem, May 22-23, 2006. The Council for Entrepreneurial Development, in partnership with the North Carolina Biotechnology Center and the North Carolina Biosciences Organization, are presenting this event, which is expected to draw more than 800 participants to the city's downtown Benton Convention Center from across North Carolina and beyond.

The Role of Community Partnerships

Executing the program's mission to combine colleges and industry in partnerships, the participants and attendees walked across the street together to One Technology Place, past the soaring helix-shaped sculpture, to a reception sponsored by the Piedmont Triad Partnership, a business group devoted to marketing the 12 counties of the Piedmont area for business expansions and relocations.

"In our work to recruit new biotech business, the workforce is number one," said Greg Brownstein, Vice President of Marketing, Piedmont Triad Partnership. "You can match buildings, you can match real estate, you can even match tax breaks and incentives, but if your area has a skilled workforce, you have a distinct advantage over your competition."

Among the educators and business people enjoying the event and reception was J. Donald deBethizy, PhD, President and Chief Executive Officer, Targacept, a biopharmaceutical company engaged in the design, discovery and development of drugs to treat multiple nervous system disorders by selectively targeting a class of receptors known as neuronal nicotinic receptors. DeBethizy is a strong supporter of biotech training and Forsyth Technical Community College, the National Center college focused on research and development expertise. He revealed, "I am working on a capital campaign for Forsyth Tech to raise $13 million to build a new facility for training here in the Piedmont Triad Research Park."

The study of biotechnology inherently holds endless possibilities. The Piedmont Triad Community Research Center building the panel discussion was held in, and the One Technology Place building across the street that hosted the reception, are among the first facilities in an ambitious plan to develop a 200-acre, downtown "innovation community," one that will support the life sciences plus information technology research and

development. This plan is the largest such urban industrial park ever conceived.

Led by Wake Forest University Health Sciences and the Idealliance, a host of community stakeholders are involved in this research park plan. Among the dynamic businesses and organizations slated to participate are Salem College, one of the oldest women's colleges in the United States, as well as the two constituent institutions of the University of North Carolina system located in Winston-Salem: Winston-Salem State University, a historically black institution with a diverse enrollment; and The North Carolina School of the Arts, where a center for design and innovation is being planned that incorporates the possibilities of collaboration on new biotech molecules. This massive 21st-century project will complement other revitalization initiatives and support broader community goals for the downtown Winston-Salem area.

And in the middle of it will be Forsyth Technical Community College, linked with its National Center for the Biotechnology Workforce partners, helping to train people who will staff and run the new and ever-growing biotech enterprises.

"I am just so impressed by the breadth of the programs and the dedication of these educators," enthused deBethizy, explaining why he is working on the capital campaign. "I had no idea they were so coordinated and so linked. We need this combined effort to supply our workers and achieve our goals, as a region and as a nation." ❑

From left: Ric Matthews, Gwyn Riddick, Janet Paulson, Dr. Sonia Wallman, Susan Seymour, Bill Woodruff, Russ Read.

Trends in Workforce Training for the Biomanufacturing and Bioprocessing Sectors

A panel of industry and nationally acclaimed biotechnology training experts met to discuss innovative practices for the increasing demand of biotechnology workforce manufacturing/processing experts. Each panelist provided a quick "A,B,C," overview of what is biomanufacturing/processing and its training requirements.

Date: February 2, 2006

Time: 5:30 pm-6:30 pm

Location: The Piedmont Triad Research Park Auditorium, 116 S. Chestnut Street, Winston-Salem, NC 27101; reception following at One Technology Place

Panelists
Dr. Sonia Wallman, Director, National Center for Expertise in Biomanufacturing Training, New Hampshire Community Technical College, Portsmouth, NH*

Ric Matthews, Director, National Center of Expertise in Bioprocessing Training, MiraCosta Community College, Oceanside, CA*

Janet Paulson, Acting Director, National Center for Agricultural Bioprocessing and Renewable Fuels, Eddyville, IA*

Bill Woodruff, Director, South East Regional Center of Bio-Link, Alamance Community College, Alamance, NC

Susan Seymour, BioNetwork Director
North Carolina Community College System, Raleigh, NC

Industry View
Gwyn Riddick, Director, Piedmont Triad Office, Biotechnology Office, Winston-Salem, NC

Moderator
Russ Read, Executive Director, The National Center for the Biotechnology Workforce, Forsyth Technical Community College, Winston-Salem, NC

Committed Sponsors
Forsyth Technical Community College, National Center for the Biotechnology Workforce, Piedmont Triad Entrepreneurs Network, Winston-Salem Chamber Technology Council, Idealliance (Piedmont Triad Research Park), North Carolina Biotechnology Center (Regional Office). Reception sponsored by the Piedmont Triad Partnership.

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