Omics Tools Firms See Opportunities in Burgeoning Synthetic Biology Industry

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NEW YORK – Purveyors of genomics research tools were lining up at last week's SynBioBeta conference in San Francisco, to sell materials and assays used to engineer and analyze microbes that could produce goods and materials in a number of global markets.

Agilent, Illumina, Thermo Fisher Scientific, and Twist Bioscience were among the largest firms at this year's event, looking to engage with existing and potential customers who are trying to engineer biology — mainly microbes — to create new products in energy, materials, and agriculture.

In other words, synthetic biology is another California gold rush and genomics companies have seen the opportunity to sell picks and shovels. According to the SynBioBeta conference organizers, the industry, also called engineering biology by some practitioners, raised more than $3.5 billion in 2018 and is on pace for approximately that much in 2019. About half that is expected to land in the state of California.

Companies in this space need tools for both the front and back ends of this engineering process. On the front end, synthetic DNA removes the time-consuming work of cloning and affords the ability to engineer biology that may not yet exist in nature. Twist Biosciences, Thermo Fisher Scientific, Integrated DNA Technologies, SGI DNA, GenScript, as well as several startups working on enzymatic processes had a presence at SynBioBeta, either as a sponsor or exhibitor.

And on the back end, genotyping and phenotyping assays are necessary for validation and quality control. Agilent, New England Biolabs, Labcyte, SeqWell, and Zymo Research all had booths in the exhibition space. Firms with representatives that presented at some point included Illumina and Waters. Other tools providers, including 10x Genomics, sent people as attendees.

Some companies have been attending for many years. "We've been participating in the SynBio moment since we launched the first gene fragment product, gBlocks, in 2012," said IDT President Trey Martin, who was making his first personal appearance at SynBioBeta. He noted that this year, the firm was promoting its new oPools oligo pools. And Agilent said it has been attending the conference every year since 2014.

So what is synbio? This is a question the conference organizers frown upon, as several panel moderators noted. But many industry leaders offered up answers to it. "Synthetic biology is anything that makes engineering biology easier," John Cumbers, SynBioBeta CEO and Founder told conference goers. The application of engineering principles, especially software engineering, to biology is a dominant theme. "It's the systematic approach to biology," said Twist CEO Emily Leproust. Products, services, and ideas to compress the design-build-test cycle were everywhere.

It's a removal of human intervention in the microbial world and an insertion of that world into the human one. It also demands automation to reduce human error in designing microbes that might change the way people make clothes or food in the future.

And it's the application of biology at "scale." This concept was embodied by the headline sponsor, Inscripta, which debuted its Onyx Digital Genome Engineering platform at the conference. Led by CEO Kevin Ness, a cofounder of both 10x Genomics and QuantaLife, the firm intends to give customers a way to edit millions of microbes at a time, generating thousands of phenotypes at a time, to "help accelerate the use of biology as a major technology force in a majority of global market segments," Ness said. "To engineer biology for many markets, you need to have better tools and ones that give you genome-scale access."

Ness noted that while Inscripta had designed some of its own genotyping assays for use with Illumina's next-generation sequencers, phenotyping could be done by any number of technologies, including RNA sequencing, flow cytometry, high-performance liquid chromatography, or mass spectrometry.

Agilent is one of the firms Inscripta has worked with on these readouts, Ness said. At several talks discussing how Inscripta used its platform to engineer 14,000-fold production increases in lysine production using microbes, Inscripta scientists noted that they had used Agilent's RapidFire high-throughput mass spectrometry to measure phenotype.

"Our interest is to continue to hear what the synthetic biology community is interested in doing tomorrow and working with them to create the technologies and products they will want to use in the future," Caroline Tsou, Agilent's global marketing director for molecular and synthetic biology, said in a post-meeting email. She noted that the firm had a large portfolio of genome engineering products for this community, including its chemically modified CRISPR guide RNAs, as well as DNA oligo libraries, among other reagents.

The opportunities were often difficult to get one's head around. At the beginning of the conference, Ginkgo Bioworks announced a $150 million collaboration with Berkley Lights, which makes a cell selection platform, on the heels of Ginkgo's $290 million Series E financing round. At the close of the conference, John Stuelpnagle, founder and former CEO of Illumina and now chairman of Inscripta's board of directors, told the audience, "What I think is different in synthetic biology is we're going to make products," which would be "highly valued."

He said the difference in market capitalizations of a diagnostics firm like LabCorp, compared to a pharmaceutically focused company like Roche, showed that "there's a lot of value that can be created by creating products. That's the opportunity ahead of us in synthetic biology."

Sometimes it was hard to tell what hyperbole and what wasn't. The $1,500 Moon Parka, made by The North Face with spun protein fibers inspired by spider silk from conference sponsor Spiber, could at least be touched, if not tried on. Next year, SynBioBeta plans to convene people in the middle of the Mojave desert to test, or at least discuss, whether synthetic biology can help people survive in a barren world. Early-bird tickets for the 2020 event would be available soon, Cumbers, the SynBioBeta CEO, announced, as would tickets for a similar event, a decade later. On the moon.

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