

Its partner in the venture, Boston-based Ginkgo Bioworks, uses synthetic DNA to design and mass-produce custom microbes for anything from fragrances to food. The company's software systems and 31 robots automate and scale the process of organism engineering, making big endeavors like Bayer's microbe project possible, says Jason Kelly, CEO of Ginkgo. Every stage of the process of engineering organisms—from printing new DNA to evaluation of the performance of new strains, is automated in some way, says Kelly. Robots handle plates, tubes and liquids, all in high-throughput, while software handles bioinformatics, logistics and data analysis. The company produces about 40 million synthetic DNA base pairs a month, and buys more through contracts with companies such as San Francisco-based Twist Bioscience. Ginkgo announced in October that Twist would supply one billion base pairs of synthetic DNA, in part to support the new venture with Bayer.

The engineering approach is new for Bayer. The company's crop science division typically

approaches biologicals using conventional selection and optimization, Miille says. The first target for its venture with Ginkgo is nitrogen fixation. Soybeans, peas and other legumes naturally pair with nitrogen-fixing microbes that associate with plant roots and uptake nitrogen from the soil and make it available to the plant. But most other crops don't have this relationship with microbes, forcing farmers to fertilize. Bayer hopes to come up with microbes that can do the job. The company is well aware that it is a long shot. "People have tried to find solutions for 30 to 40 years" without success, says Miille. Bayer is taking that risk by funding the venture through its strategic innovation unit: the Bayer Lifescience Center, launched in 2015, which is dedicated to investigating potentially breakthrough technologies that the company's other divisions can't pursue. Miille admits nitrogen-fixing microbes is a long shot. "We're not 100% certain we're going to solve the nitrogen-fixation challenge. But we are very confident that we're going to develop a platform" that can be

used to develop other microbial solutions, he says.

If Bayer and Ginkgo succeed in finding nitrogen-fixing microbes to replace a third of fertilizer use, as they intend, it would have a dramatic effect on agricultural practices. "I don't dispute that's it's a difficult technical challenge," says Kelly at Ginkgo. "But with the modern tools for designing microbes it enters the realm of possible and it's worth giving it shot."

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“I will say, Mr. Chairman, that someone, somewhere, some nation will set the ethical boundaries for this conversation going forward and it certainly would be helpful for the United States of America to establish those boundaries to a large extent.” US Senator Tim Scott (R-SC) urges the US Senate Committee on Health, Education, Labor, and Pensions Chairman Senator Lamar Alexander (R-TN) to establish ethical controls on CRISPR work during the Committee's November 14 hearing on CRISPR genome editing. (GenomeWeb 15 November 2017)

Around the world in a month

**UNITED KINGDOM**  
The UK Department of Health introduces its Accelerated Access Review, which will speed patient access to highly innovative products by up to four years. Starting next spring a collaborative, made up of representatives from the National Institute for Health Research, NICE and NHS England, among others, will select about five new candidates to receive a breakthrough product designation each year.

**BANGLADESH**  
The Ministry of Agriculture will provide seeds and fertilizers to 2,000 farmers in 64 districts next season as incentives to grow more Bt brinjal, a staple vegetable in Bangladesh and across South Asia. Each farmer will receive 20 grams of seed and 15 kilograms of DAP and MoP fertilizer.

**AUSTRALIA & NEW ZEALAND**  
Food Standards Australia New Zealand agrees to allow the import of foods derived from 60 GM crops including corn, potatoes, rice, soybeans and sugar beets, but local growers are limited to growing only one GM food crop—canola. Victorian Farmers Federation president David Jochinke said the fact that consumers were eating imported GM foods showed the need to reduce regulatory hurdles.

**COSTA RICA**  
KLM Royal Dutch Airlines and the Costa Rican government agree to research the possibilities of using bio-based jet fuel to combat carbon dioxide emissions, the first agreement of its kind between an airline and a country. KLM will share its knowledge and expertise with the government in close cooperation with its partner SkyNRG.

**INDIA**  
The Indian Council of Medical Research releases new guidelines for clinical stem cell research, including a ban on the commercial use of stem cells as elements of therapy and restrictions on clinical use. Chennai-based stem cell bank LifeCell openly criticizes the guidelines, noting that the ICMR's decision is inconsistent and that it disregards global practices.

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