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Out of This World Innovations - But at What Cost? Innovations in Synthetic Biology Disrupt Billion-Dollar Industries

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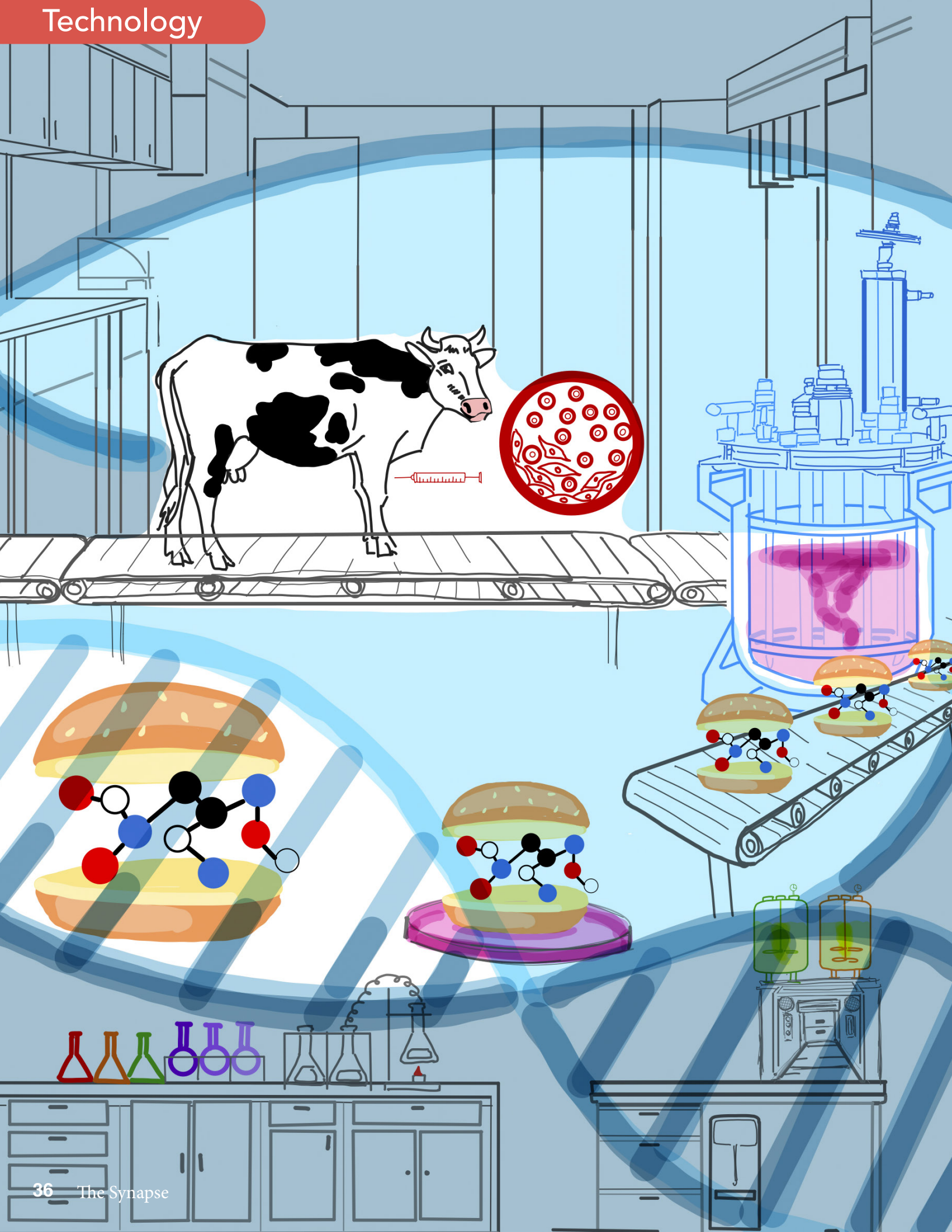

Out of This World Innovations - But at What Cost?

Innovations in Synthetic Biology Disrupt Billion-Dollar Industries

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For years, affordable and cruelty-free lab-grown meat has been just out of reach of most companies. With their recent Food and Drug Administration (FDA) approval of their "slaughter-free" chicken, Upside Foods may have made this dream a reality. Soon, consumers may see their products on supermarket shelves next to tofu and other meat substitutes. Companies in the business of lab-grown meat belong to a larger cutting-edge industry known as biodesign. This multi-billion dollar industry seeks to combine elements of biology, technology, engineering, and design to solve global problems relevant to consumers. This up-and-coming industry includes companies working to reduce dependence on animals and their environmental impact. However, these projects also raise concerns about the ethics of genetic modification and force consumers to consider what it truly means for products to be "cruelty-free."

Geltor, a Bay Area startup, claims that their biodesigned proteins can eliminate the beauty and food industry's reliance on bovine and marine collagen. Collagen is found in the bones of animals and is a common ingredient in cosmetic products. Currently, collagen primarily comes from cows and pigs. Raising cattle releases large amounts of methane, a gas that contributes to global warming. Geltor's product, HumaColl21, is sourced from microorganisms and has a lighter environmental footprint than its animal-dependent counterparts. In 2019, Geltor developed HumaColl21 using "precision fermentation." According to the Good Food Institute, precision fermentation is a method that

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"uses microbial hosts as 'cell factories' for producing specific functional ingredients."

Geltor has since created three additional products. One product, Elastapure, is similar to human elastin, a stretchy protein in your skin and ligaments. Geltor's synthetic version is said to have anti-aging and antioxidant benefits for the skin. Another product, PrimaColl, is synthetic collagen for the food industry and potentially an ingredient in future supplements. According to Geltor, their products speak to current consumer demand for "sustainable, ethically sourced, and effective protein ingredients created simply and quickly."

Just north of Geltor in Emeryville, CA, MycoWorks uses Mycelium, a fungi component, to disrupt the fashion industry's current avenue for producing textiles. Today, the fashion industry contributes up to 10 percent of global carbon dioxide emissions. Their solution, if widely adopted, could significantly reduce the 11.3 million tons of textiles that end up in landfills. The company uses their patented Fine Mycelium product to form a synthetic leather textile called Reishi that can be used in clothing or accessories. The product is made by feeding specific fungi species sawdust and controlling its growing environment. Instead of sprouting mushrooms, the fungi grow into large, densely intertwined, fibrous sheets. These sheets can then be treated to have the properties of animal leather. The company claims their product is more durable and better for the Earth than traditional leather and most plastic-based vegan leathers. The company has raised over $187 million in funding and collaborated with the luxury fashion brand Hermès in 2021. While Reishi is not yet accessible to the average consumer, increases in crowdfunding aim to lower prices and attract buyers with hopes of reducing fashion's reliance on animal products.

With every new advancement in biotechnology, ethicists must ask important questions about the true costs of this technology. Novel lab-grown meat innovations have recently sparked questions about what it means for a product to be "cruelty-free." In production, muscle tissue is harvested from live animals, where it is then cultured in a laboratory. Since the tissue comes from live animals, many vegans and vegetarians do not believe that lab-grown meat should be considered "cruelty free." While innovations like Geltor's and MycoWorks' claim to reduce harm to animals and the environment, their methods of manipulating organisms have the potential for harm in the form of intentional bioterrorism or the unintentional extinction of native species. The same technology that Geltor uses to edit yeasts' genomes and then culture large amounts of the organism could theoretically also be used to transform a harmless microbe into a lethal pathogen on a massive scale. Furthermore, genetically altered organisms, like those produced by MycoWorks, could end up in the wild as an invasive species that causes harm to native species. While there certainly are many positive outcomes of these biodesigned innovations, unrestricted synthetic biology may open Pandora's box and welcome technology that, in the wrong hands, could cause great destruction to our world.