From Lab to Fork

Will plant-based proteins brewed in bioreactors save the planet?

by Andrew Standen-Raz

To the late chef Anthony Bourdain, “Life without veal stock, pork fat, sausage, organ meat, demi-glace, or even stinky cheese is not a life worth living.”

Vegetarians, he wrote in Kitchen Confidential, “are the enemy of everything good and decent in the human spirit, an affront to all I stand for – the pure enjoyment of food.” Bourdain was no kinder toward vegans, calling them vegetarians’ “Hezbollah-like splinter-faction.”

In the ’90s, when a veggie plate meant soggy courgettes, it was easy for the red meat guys to laugh along to Denis Leary’s standup routine No Cure for Cancer. “Eggplant tastes like eggplant, but meat tastes like murder. And murder tastes pretty good.”

In the intervening years, ever-cheaper meat seemed worth the cognitive dissonance it required to ignore its torturous journey to the table. Almost 40 years later, with a new generation raised on recycling, electric cars and ethical consumerism, vegans may be having the last laugh: “Plant-based proteins” – vegan food for a new age – are the fastest growing food trend in the developed world since organic farming.

“We know from retailers like Spar that 80% of the veggie products are bought by meat-eaters who want variety,” confirms Felix Hnat, an environmental economist and chairman of the Vegan Society Austria (VGÖ). Plant-based familiar favorites are drawing in omnivorous “flexitarians” tempted by ice cream, fish and chips, fried chicken, scallops and even foie gras – all made with vegetable protein. Billionaires like Bill Gates and Richard Branson are investors in competing plant-based burger companies. Celebrities help, too. The increasingly popular “Veganuary” vegan month this year attracted Jay Z and Beyoncé, who lasted 22 days.

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“Should the methods we invented at the start of the Industrial Revolution always be the right answer to everything?” asks Hanni Rützler, Austrian food scientist and author of the 2019 Food Report from her Future Food Studio. “We can’t go back, but we can reinvent.” The continued success of plant-based proteins, and other alternatives such as in vitro meat and insects, depends not only on how we continue to produce real meat, but whether you believe farm animals have a future at all.

Rützler, who carefully sources her meat from independent farmers, views change as inevitable. “There’s a consciousness...
“To sustainably feed 10 billion people by 2050, we urgently need alternative proteins.”

Kurt Schmidinger, Austrian geophysicist & food scientist, founder of Future Food

Science reports shocking loss of biodiversity: 83% of wild mammals and half of plant varieties, most in the last 50 years. The journal Science concludes that even the most “extensively” farmed, sustainable, low-impact organic beef uses 36 times more land and produces six times more of the greenhouse gases that contribute to global warming than plant-based proteins, such as peas.

Politicians in Brussels believe the sustainability issues can be fixed. Olivier De Schutter, the co-chair of the 2018 EU Food and Farming Forum (EU3F) in Brussels, called on 200 key food experts gathered to co-create a new, sustainable Common Food Policy, to summon the spirit, if not the letter of the ’68 generation. “They asked for the impossible, we ask for strategy!”

Schutter reminded the delegates to also focus on the vast social inequalities created by our current food chain – decisions made in Europe affect the globe. For the working group on proteins, the prospect of real change veered from cautious to cautiously hopeful (a proud Tuscan farmer of the start of the Industrial Revolution echoing Brown’s statements on the inefficiency of cows: “The meat industry is a gigantic wasting game. The average livestock animal converts 7 plant calories into 5 calories of manure, 1 calorie of slaughterhouse waste and 1 joule for human consumption.”

Brown’s “Impossible Burger” packs almost identical good nutrients to beef, but is made with 95% less land use, 74% less water, 87% less greenhouse gas emissions, no antibiotics or hormones and zero animal cruelty. It’s the realization of the vegan’s dream of a future of hypocrisy-free, ethical eating. With over half a billion dollars in funding since last year, Impossible’s new 5,500m² factory will crank out a million pounds of plant-based meat every month.

The Impossible Burger, which struggled to get full FDA approval, is a more fundamental innovation than most. It’s designed to look, cook, smell and even bleed like real meat thanks to heme, a plant-derived blood-like molecule analogous to the hemoglobin that makes our blood red and meat pink. Top NYC chefs are impressed that it even develops a Malliard reaction crust, the browning that produces meat’s addictive flavors.

But the process is generic, done in a sterile lab. Brown’s biotech team chose not to extract heme from soy roots, which would take up a lot of land, but to grow it by inserting soy leghemoglobin genes into Pichia Pastoris yeast. It couldn’t be further from the happy “Farm to Fork!” ideal of the natural, organic farm movement.

SHAKING UP PROTEINS

A more radical, sustainable protein option is in vitro meat. At the IndieBio biotech accelerator in California, white-coated millennials grow proteins in petri dishes, using AI, and brewing them in bioreactors. Finless Foods calculates they can produce one metric tonne of meat from a single fish cell.

Rützler was invited by the food scientist Mark Post to the first tasting of his acorn-fed in vitro meat in London in 2013, funded by Facebook. Finless Foods calculates they can produce one metric tonne of meat from a single fish cell.

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Hanni Rützler, Austrian food scientist & author of the 2019 Food Report
Genetically produced salmon is already on sale. Memphis Meats, which just raised another $17 million, harvests cultured meat from cells instead of animals, so “you can feel good about how it’s made because we strive to make it better for you … and for the world.” Even fruit flies are being researched in the Israeli startup scene, according to Rützler. Sterile labs may be replacing earthy farms, but you no longer have to be a farmer to enjoy tasty proteins.

Despite chefs like Ferran Adrià reinventing cooking at the molecular level, it’s natural to view food through a prism of history and heritage. For all our 10,000 years of settled civilization, the best foods have brought us together in a Julia Child-level mess of smoky fats, unhealthy dairy creams and charred proteins. Codes and symbolism reflect centuries of recipes, significant moments with families, big deals and lovers. The hyper-efficiency of plant-based foods seems lifeless in comparison. So, what did Anthony Bourdain think of the Impossible Burger? “It doesn’t fill me up,” he replied dryly. “As somebody who spent 30 years as a chef, of course I’m going to be resistant to the notion that there’s any replacement for the texture and musculature and funk of real meat.”

Rützler points to the traditional Viennese café that now has fresh herbs on every table. “What will help is to focus more on quality and respect for animals,” she says, “to realize that historically we didn’t have meat so readily available, that what we pay for meat now has nothing to do with reality.”

“Although I cannot think of Vienna without meat,” she adds with a laugh, “there will be a Wiener Schnitzel from now until the end of time.”

Or a genetic facsimile.

**“McDonald’s could be having us eat insect burgers within two months.”**

Saoirse McHugh, geneticist & representative of Food Sovereignty Ireland at the EU3F

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**While the substance of Fleischlos sausages is made of mushrooms, it is held together by artificial sausage casing. The burger of California-based Impossible Foods, right, provokes meaty delights without the actual thing.**

Sergey Brin of Google. With Rützler’s own preference for traditional organic farming and classical French cuisine, it’s not surprising she wasn’t entirely bowled over with the flavour. “You really have to work through the thought that the meat you’re eating will never be a piece of meat. It hasn’t got any fat.”

A proponent of urban gardening, Rützler is more circumspect about the planet-saving claims of the plant-based food industry. “There are many available simple solutions, but it is amazing that we always discuss efficiency but not selection. There’s so much more to eat out there.”

Those worst affected by our global food chain already subsist on mostly meat-free diets, and consider human rights or access to clean water before the issues that drive Silicon Valley. Will plant-based food access to clean water before the issues that diets, and consider hunger, human rights or chain already subsist on mostly meat-free...