

Is Lab-Grown Meat Ready for Dinner?

Startups are cultivating cuts of chicken, beef and duck from clusters of animal cells. The tech is impressive. But how does it taste?



A dish of lab-grown duck from the startup Memphis Meats (all fruits and vegetables grown naturally). **PHOTO:** COLE WILSON FOR THE WALL STREET JOURNAL. **PROP STYLING** BY BRYSON GILL AT AUBRI BALK; **FOOD STYLING** BY ALEXA HYMAN AT AUBRI BALK

By John Birdsall

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With his beard, backward ball cap and bar towel dangling from the waist tie of a fine-looking bib apron, Thomas Bowman could be expediting at a trendy San Francisco restaurant. But today, in an old industrial space at the edge of the city's Mission District, he's frying a small mass of terra-

cotta-colored chicken in a nonstick pan. The mass is as unruly as loose oatmeal—a decidedly unpoultry-like texture. After a few dabs with a spatula, Bowman, a veteran of several Michelin-starred kitchens, tamps it back into shape.

“As you can see, we’re starting to get some Maillard on that,” he says.

Bowman, the research-and-development chef at the alternative-protein startup Just, is referring to the Maillard reaction—the browning that occurs when meat’s amino acids and sugars are exposed to heat. If this were ordinary poultry, the effect wouldn’t rate a mention. But the chicken in Bowman’s pan was grown in a bioreactor, not butchered from a bird. To make it, a cluster of animal cells was dispersed in a protein-rich liquid that delivers nutrients in the same way that blood feeds the tissue in living animals. The fact that it browns like conventional chicken is a point of pride for the chef.

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I’m here to taste Just’s chicken chorizo (iteration No. 8), a loose hash flavored with onion, spices and ground raisins. Bowman serves it on a warm corn tortilla with a sliver of avocado, a strand of pickled shallot and a smear of Just’s plant-based sour cream. The chorizo is delicious—sweet, aromatic and subtly spicy. I can’t quite taste the chicken under the seasoning. I wonder if that was the point.

Up next: a cell-based chicken nugget. Bowman begins with “a wet cell paste,” to which he adds texturizers, “some of the same things that they use to make McDonald’s nuggets.” The interior is as mushy and bland as fried tofu. But a small triangle

of Just’s fried-chicken skin is fascinating—crisp and shattery like an Indian papadum, with the concentrated flavor of a chicken bouillon cube. “There’s nothing added to that,” Bowman says. “The bioreactors did all the work.”

The process of growing meat in a bioreactor is known as cellular agriculture, and the results were once called “clean meat.” But at a recent conference in Berkeley, Calif., a collective of cellular-agriculture startups decided to call the product category “cell-based meat” instead. Just hopes to have a cell-based product—most likely chicken—on the market by the end of the year.

In Berkeley, I meet Uma Valeti, the CEO and co-founder of the three-year-old cellular-agriculture startup Memphis Meats. Investors include Bill Gates, Richard Branson and the venture capital arm of Tyson Foods. I’m served two thumb-size pieces of Memphis Meats’ cell-based duck,



Thomas Bowman, R&D chef at Just, cooks up cell-based 'chicken' at the company's headquarters. PHOTO: KATIE THOMPSON FOR THE WALL STREET JOURNAL

seasoned with salt and pepper and pan-fried to a deep brown in vegetable oil. “We know we’re in the early stages of this,” Valeti says. “The magical moment for us has been when people who are well-calibrated meat eaters immediately recognize this as meat: the way it looks and feels, the way the fibers tear apart.” I break apart a cell-based nugget of duck and discover a mass of muscle fibers running in multiple directions, like strands in a rubber-band ball. The meat is pale and tastes faintly like poultry. But apart from salt, the most noticeable flavor is the browning.

In this new world of cell-based meat, a Maillard reaction is considered a triumph, and performance in the pan seems to be prized over taste. Eric Schulze, Memphis Meats’ vice president of product and regulation, says the company will eventually be able to adjust the look, texture and taste of its products—to deepen the color or gamey flavor or even to replicate a specific terroir. (I have a fantasy of the company’s scientists engineering the buttery flavor of a grain-fed duck from Sonoma or the gaminess of a farmyard mallard from Périgord.) Memphis



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Meats originally planned to launch a consumer product by 2021, but the company says its progress has accelerated so much, it'll likely happen before then.

Proponents of cellular agriculture see the technology as a sustainable way to satisfy humanity's insatiable hunger for meat. The environmental toll of raising 70 billion animals a year for slaughter is severe, and consumption is steadily growing throughout the world. A sustainable facsimile of animal protein could be the answer. The startup Impossible Foods has earned rave reviews for its vegan, plant-based burger that bleeds and tastes like meat. It seems like only a matter of time before bioreactors produce something that looks and tastes pasture raised.

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Corrections & Amplifications

Katie Thompson photographed Thomas Bowman at Just's headquarters. An earlier version of this article incorrectly stated the credit. (10/18/2018)