

Food scientists aim to make plant-based protein tastier and healthier

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David Julian McClements is a Distinguished Professor of Food Science at UMass Amherst. Credit: UMass Amherst

As meat-eating continues to increase around the world, food scientists are focusing on ways to create healthier, better-tasting and more

sustainable plant-based protein products that mimic meat, fish, milk, cheese and eggs.

It's no simple task, says renowned [food](#) scientist David Julian McClements, University of Massachusetts Amherst Distinguished Professor and lead author of a paper in the new Nature journal, *Science of Food*, that explores the topic.

"With Beyond Meat and Impossible Foods and other products coming on the market, there's a huge interest in plant-based foods for improved sustainability, health and ethical reasons," says McClements, a leading expert in food design and nanotechnology, and author of *Future Foods: How Modern Science Is Transforming the Way We Eat*.

In 2019, the plant-based food market in the U.S. alone was valued at nearly \$5 billion, with 40.5% of sales in the milk category and 18.9% in plant-based [meat products](#), the paper notes. That represented a market value growth of 29% from 2017.

"A lot of academics are starting to work in this area and are not familiar with the complexity of animal products and the physicochemical principles you need in order to assemble plant-based ingredients into these products, each with their own physical, functional, nutritional and sensory attributes," McClements says.

With funding from the USDA's National Institute of Food and Agriculture and the Good Food Institute, McClements leads a multidisciplinary team at UMass Amherst that is exploring the science behind designing better plant-based protein. Co-author Lutz Grossmann, who recently joined the UMass Amherst food science team as an assistant professor, has expertise in alternative protein sources, McClements notes.

"Our research has pivoted toward this topic," McClements says. "There's a huge amount of innovation and investment in this area, and I get contacted frequently by different startup companies who are trying to make plant-based fish or eggs or cheese, but who often don't have a background in the science of foods."

While the plant-based food sector is expanding to meet consumer demand, McClements notes in the paper that "a plant-based diet is not necessarily better than an omnivore diet from a nutritional perspective."

Plant-based products need to be fortified with micronutrients that are naturally present in animal meat, milk and eggs, including vitamin D, calcium and zinc. They also have to be digestible and provide the full complement of essential amino acids.

McClements says that many of the current generation of highly processed, plant-based meat products are unhealthy because they're full of saturated fat, salt and sugar. But he adds that ultra-processed food does not have to be unhealthy.

"We're trying to make processed food healthier," McClements says. "We aim to design them to have all the vitamins and minerals you need and have health-promoting components like dietary fiber and phytochemicals so that they taste good and they're convenient and they're cheap and you can easily incorporate them into your life. That's the goal in the future, but we're not there yet for most products."

For this reason, McClements says, the UMass Amherst team of scientists is taking a holistic, multidisciplinary approach to tackle this complex problem.

More information: David Julian McClements et al, A brief review of the science behind the design of healthy and sustainable plant-based

foods, *npj Science of Food* (2021). [DOI: 10.1038/s41538-021-00099-y](https://doi.org/10.1038/s41538-021-00099-y)

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