Making Protein From Thin Air? Yes, Startups Are Doing It.

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Food & Drink

Protein powder created from carbon dioxide by Solar Foods SOLAR FOODS

As the population sets to explode to about 10 billion people on the planet by 2050, many are concerned we're moving into a situation where we cannot produce enough of the essential nutrients to feed our populous using traditional agriculture. Some claim we've already exceeded the carrying capacity of the earth—or the maximum population size of a species the environment can sustain indefinitely.

And core to human and animal nutrition has been protein, the polymer

chains of amino acids that are the building blocks of body tissue and provide necessary fuel to get us through our day.

Protein is consumed in many forms, from the meat of land animals and sea creatures, to plants like soy and yellow pea that now underpin a huge market shift in protein sources for human consumption. Traditional protein production, mainly from animals, consumes a large quantity of natural resources and puts our environment at risk as the world population grows.

Until now, plants were thought to be the best source of sustainable proteins out there. Plant-based protein has been considered a more efficient way to take the energy of the sun and nutrients in the soil and convert them into something people and animals want to eat. Plants have also proven to have a lower environmental footprint than our animal-based protein sources.

Recently, however, scientists have been developing microbial "factories," and even taking ingredients out of the air, to produce new forms of protein.

An example of a product using Solar Food's Solein protein SOLAR FOODS

This past month, Finnish startup Solar Foods came out of stealth to promote its new innovation, a protein derived through gas-based fermentation—or using enzymatic reactions to convert carbon dioxide, with a minimal amount of water, nutrients and electricity, into human-edible proteins. The new form of protein, dubbed Solein, will be produced in a powdered form to be used similar to flour in food production.

"Disconnecting from agriculture and fossil resources in food production is our key value and differentiator to all other [proteins]," says CEO and founder, Pasi Vainikka. While he says algae comes close, Pasi continues, "the [production of Solein] is the most environmentally friendly" of all protein development methods out there today.

And Solar Foods is not the only company using fermentation to develop proteins that can be consumed by humans or animals.

Recently, NovoNutrients also highlighted the use of gas-based fermentation to produce nutrients for fish feed, a commodity product that's a huge cost for scaling farm-raised fish production. With

Dr Pasi Vainikka, founder and CEO of Solar Foods. SOLAR FOODS

fermentation-derived proteins, NovoNutrients hopes to cut the cost and provide a better product to an aquaculture sector that needs to scale with the worldwide demand for more protein (and other essential nutrients) from the sea.

And at many other startups, entrepreneurs are working on fermentation-based protein development that looks more akin to our long history of brewing, bread-making and wine-making, the natural process of using organisms to convert one substance into another. In the case of wine, yeasts break down sugars into alcohol, giving us the magical elixir we so love.

Leveraging this ancient science, startups like Geltor and Perfect Day have grown collagen and dairy proteins respectively. (Full disclosure: My venture fund, FTW Ventures, is an investor in Geltor.) And Motif Ingredients, a well-funded spin off from Ginko Bioworks, has also announced they'll be using fermentation to "brew vital proteins and nutrients that power your body and please your palate."

These biotech startups have raised tens of millions of dollars to scale the production of their products in the last several years, and products from Geltor and Perfect Day, using their novel proteins, are just hitting markets this year.

Rob Rhinehart, the founder of Soylent and now an early-stage biotech investor through Mars Bio VC, highlights why investors are so interested

in this space: "We need to develop safer and more efficient forms of protein. The best way to do this is to use biological tools such as single-celled organisms that can be engineered much more quickly and precisely than a whole plant or animal and produce the same product or better."

Solar Foods is still early in their production and are working with food companies to make use of their protein "flour" in new food products. They will be raising more funding through 2019 to scale up production and bring first generation products to market.

Gas-based fermentation holds a lot of promise, given it is a method that consumes industrial waste, like carbon dioxide, which helps remove this pollutant from the atmosphere as a side-benefit of using this technique.

And as entrepreneurs, investors and food manufacturers get excited by fermentation (in general) as a method to create proteins, the world will gain more of this essential nutrient leveraging methods that will use less of our precious, natural resources. It can be a win-win-win for profit, people and planet.

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