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Why You Should Make Friends With Bacteria...Especially In Your Food

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Florence Ogendi and her family have no refrigerator. They live in a tiny village in Kenya near Lake Victoria (and near Barack Obama's step-grandmother, his Granny Sarah), but over 40 miles from the nearest city. They've got six dairy cows to provide them with milk and no refrigerator to keep milk fresh.

That's not a problem. They place any excess milk in a hollowed-out gourd and let it sit for a few days at room temperature. Once it ferments, they drink it. "Gourd milk" is a delicacy and a treat. They also ferment millet to make a porridge called *uji* and a dish made with traditional Kenyan vegetables and milk. In the latter case, adding milk and fermenting the dish turns unpalatably bitter veggies into a delicious meal.

Sandor Katz, author of *Wild Fermentation* and *The Art of Fermentation*, is hardly surprised by Ogendi's use of fermentation—the chemical breakdown of food by microorganisms like yeast or bacteria—in storing and preparing food.

"The context for fermentation in any kind of a society is that it's a strategy for making the best use for the food resources they have available to them," he says. "So they are using fermentation to create the magical sacred substance of alcohol, they are using fermentation to make a highly perishable food more stable. They are making something that is not so digestible more digestible. They are making something with a really plain flavor more flavorful. But in any kind of a geographic context, people—before they could name fermentation as fermentation—were just figuring out how to best work with the food resources they have available to them."

Whereas, in many countries, fermenting foods at home is a normal part of cooking, that's not so in the U.S. Katz disagrees that fermentation is newly sexy in America ("fermentation is always sexy," he says), pointing out that Americans have always loved fermented foods like bread, wine,

beer, coffee, cheese, and chocolate whether or not they realize the foods are fermented. But, he says, “there’s a new consciousness or awareness” of fermentation. Maybe you’re no more likely to drink beer or eat yogurt than you were a decade ago, but you might be more inclined to try making it yourself at home.

Even if you aren’t busy chopping cabbage to make your own sauerkraut, perhaps you consciously add fermented foods to your diet to obtain health benefits [3] from them. After years of bombardment with antibacterial soaps, cleaners and hand sanitizers, bacteria have arrived in a new era where they are now celebrated by big names like author Michael Pollan, who declared, “Some of my best friends are germs [4].”

Pollan calls the 100 trillion or so bacteria in his own body “a vast, largely uncharted interior wilderness that scientists are just beginning to map.” The data is not all in yet. That said, there are plenty basic facts we already know, and scientists have made several amazing discoveries about friendly bacteria and fermented foods in recent years.

First of all, fermentation can make a food more digestible or nutritious. For example, grains naturally contain phytic acid, an “antinutrient” that blocks the absorption of nutrients. When Kenyans ferment millet or sorghum to make *uji*, they reduce the amount of phytic acid in the grains [5], and thus increase the availability of iron, manganese, and calcium. Closer to home, we find traditions of making sourdough bread and soaking oats overnight before making oatmeal, also methods of fermenting grains and breaking down phytic acid. Fermenting grains also increases protein quality and B vitamins.

Two other ideas to chew on are probiotics and prebiotics. Probiotics are foods or supplements consumed because they contain beneficial microbes. Therefore, fermented foods where the microbes are killed off (like bread) are not probiotics, but fermented foods with live cultures like yogurt and sauerkraut are. The benefits of probiotics are perhaps best summed up by the abstract of a 2006 Journal of Applied Microbiology article [6], which lists benefits as “(i) improving intestinal tract health; (ii) enhancing the immune system, synthesizing and enhancing the bioavailability of nutrients; (iii) reducing symptoms of lactose intolerance, decreasing the prevalence of allergy in susceptible individuals; and (iv) reducing risk of certain cancers.”

So that’s old news, right? It’s from 2006. But the next sentence states, “The mechanisms by which probiotics exert their effects are largely unknown.” In other words, probiotics are great, but we don’t actually know how they work. Or we didn’t in 2006, anyway. As Pollan details in his piece, and in his most recent book, *Cooked*, scientists are working to unravel the mysteries of our magical gut microbes and how the probiotics we eat impact them.

Prebiotics, on the other hand, are a simple idea. You eat foods that feed your gut bacteria. More specifically, prebiotics [7] are carbohydrates your gut bacteria can digest but you can’t. They are found in healthy, whole foods you already (or should) eat. The example Pollan uses are compounds in breast milk that is not digestible for the newborn babies who drink it. Turns out, those compounds are meant to nourish the newborns’ gut bacteria and not the babies themselves.

No doubt you aren’t snacking on breast milk, but you can consume prebiotics too, because they are often found in fermented foods, like yogurt and kefir.

Like Pollan, Katz is eagerly following the latest scientific discoveries about how a healthy community of gut bacteria makes for a healthy human. “There's such a huge amount of new information about microbial communities and all the ways in which bacteria are so, so important to us,” he says. “There's lots of exciting new information about how so much our immune function, our immune responses involve the gut bacteria.

“Last year there was amazing new research demonstrating not yet in human beings but in mice that the regulation of serotonin is performed by gut bacteria. So all these aspects of physiology that we haven't known about are tied into our bacteria. They are not a peripheral part of us. They are really a central part of us. And that's really incredibly exciting. And until about 10 years ago we really didn't have a way to study this. We knew about organisms that can be cultured, but there's a limited number of organisms that can be cultured in a petri dish.”

Of course, nobody knew about microbiology when they first discovered how to make yogurt, beer, kimchi, or any other fermented creation. For most of history, fermentation was more like it is today in the Ogendi home in rural Kenya.

If you’re reading this in America, it’s likely that fermenting milk in a hollowed gourd isn’t what happens your kitchen. But, as Anne Mendelson says in *Milk: The Surprising Story of Milk Through the Ages*, “the usual American ways with milk and dairy products are only a narrow, anomalous sidetrack from something immensely larger, richer, and more ancient.” That is to say, throughout most of history, milk was consumed soured—fermented by friendly bacteria—simply because that's what happens to milk if you leave it out at room temperature.

What’s more, historically, fermentation was not done by purchasing a tiny packet of freeze-dried cultures of a specific bacteria strain, sterilizing the milk with heat, and then introducing the cultures at the right temperature. Without microbiologists and laboratories to help out, one usually has only two choices: allow “wild fermentation” to occur spontaneously when microorganisms find the food on their own or introduce a bit of a mature batch of the fermented product (say, yogurt) into the next batch you wish to ferment.

The exception to these options is in the case of a few fermented foods like kombucha or kefir, in which the organisms responsible for fermentation have “evolved into macro physical forms that we can see and hold,” as Katz puts it. In the case of kefir, one keeps “kefir grains,” which are actually symbiotic communities of microorganisms that live together in a form that resembles a grain. Place kefir grains in milk, leave it out for about a day, and voila! You have kefir.

Katz makes fermentation exciting, accessible and easy with the recipes and instructions he provides in his books, and once one gives it a try, it’s obvious that his book titles were not chosen randomly. *Wild Fermentation* might sound like it’s just a catchy name, but—as noted above—it refers to allowing wild microbes to find your food and spontaneously turn it into the fermented creation you desire rather than introducing a single strain of bacteria that was cultured in a lab.

This may sound scary if you’re not used to letting food sit out and encouraging microbes to devour it before you do, and it’s true that fermentation can go horribly wrong. When it does, your nose will tell you so. Thus, the title of Katz’s more recent book, *The Art of Fermentation*. Yes, it’s an art. Follow the same recipe each time and you probably won’t get the same result each time. You’ll have to adapt and respond when temperatures change, because fermentation occurs

faster in warmer weather.

If you want to add fermented foods to your diet, be a judicious shopper and choose foods like sour pickles, kimchi, sauerkraut, miso, or yogurt with live cultures, not ones that were sterilized to kill the cultures.

If you feel brave enough to try fermentation yourself, pick up one of Katz's books or another book with recipes and instructions and give it a go. Talk to friends, family, maybe even your grandmother, to get tips. If your family emigrated from another country, you might find a recipe for a really exciting fermented food your relatives know how to make. Don't be discouraged if it doesn't go well the first time, although do look online or ask around to find out what you did wrong before trying again.

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