



BOD__BAC__CHE

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Cheese is an everyday artifact of microbial artistry. Cheesemaking cultivates complex cultures of bacteria and fungi to protect milk from dangerous bacterial spoilage, a practice that developed long before bacteria had been discovered. In a biological world completely surrounded by rich communities of microorganisms, but a cultural world that often emphasizes antisepsis, cheeses and other microbe-rich foods lie at the heart of a post-Pasteurian debate over the positive impact of microbes on our health and happiness.

With rising antibacterial resistance and appreciation for how bacteria maintain our digestive and immune health, attempting to strike a balance between cultivating helpful bacteria and keeping dangerous bacterial infections at bay is more important than ever. Biotechnology and synthetic biology will likely play a role in developing healthy bacterial communities, with designer bacterial ecosystems engineered to improve human and environmental health. However, before we can have the domesticated biotechnology that scientists like Freeman Dyson predict, we must first re-domesticate the microbes that have evolved with us over many thousands of years.

Cheesemaking, microbial ecosystems, and biotechnology each present examples of complex mixed cultures. All bring diverse groups of lifeforms together into intricate ecologies of competition and collaboration, impacting our culture and our environment. Heather Paxson, an anthropologist who studies the microbial politics of artisanal cheesemaking writes on the interactions between human cultures and microbes. “To speak doubly of cheese cultures—bacterial and human—is thus no idle pun.” What can these different cultures offer each other? Can scientists and biological engineers learn from human cultures as readily as they do from microbial cultures? Indeed, can those oft-battling “two cultures” of the arts and sciences work together through something as simple as cheese to ease the friction at the interface of human and bacterial cultures?

Synthetic Aesthetics is a program created to bridge the gap between art and science, to bring artists and designers together with biologists and engineers to explore the design of biological systems. Six pairs of residents combine unique perspectives on art and science to create a diverse range of collaborative projects. Our project originated out of our interests in odors and microbial communities, bringing us to consider cheese and the human microbiome. We began to realize the remarkable similarities between some of the most powerful smelling cheeses and the microbiota of the human skin; the bacteria that provide the characteristic smell of Swiss cheese are common inhabitants of the human armpit, while Limburger cheese’s characteristic smell comes from the same bacteria that provide the smell of human feet.

Inspired by the connections between our bodies and our food, we created our own cheeses with starter cultures isolated from our bodies. Each swab created a unique cheese with startlingly different odors. These cheeses provide us with an opportunity to study the diversity of microbes on our skin, to begin to understand how combinations of microbial species create complex odors, and to ask new questions for synthetic biology: will cheese or the way we eat it change as we learn more about microbial communities and can better engineer them? Will our relation to our food and our bodies change with an increased appreciation for the millions of non-human cells that make up our personal ecosystem? Can we design biology better with an appreciation for all the mixed cultures involved, both human and microbial?

