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Introduction to Fermentology

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Progress can be illusory, even when it comes to our collective knowledge. We know more than we did a decade ago and much more than we did a thousand years ago and yet there are also things that we used to know that we no longer do. This is as true with regard to fermented foods as it is in any field, perhaps especially true.

It is not yet known when our ancestors began to ferment foods. The oldest documented fermented foods are fish that were fermented in Sweden, in huge quantities in a semi-permanent facility meant to convert many tons of fish a year into a form that was more readily stored and, in all likelihood, more rich in flavors and perhaps even nutrition. Here were hunter gatherers from a time long before agriculture (at least agriculture in Sweden) engaged in a sophisticated manipulation of the microbial world. But that Swedish settlement, first studied in detail by Adam Boethius at Lund University, does not represent the first human foray into fermentation. For one, it was large scale and relatively sophisticated. The first fermentations must have been simpler. For another, the people that moved into this part of Sweden did so just after the retreat of glaciers. They were bringing to this place something they'd already done elsewhere. But there is also something else. The genes in human bodies bear the marks (as Katie Amato will discuss later in this project) of the ingestion of fermented foods earlier, far earlier, perhaps along with the very origin of the human genus, *Homo*, nearly two million years ago.

Suffice it to say, humans have been engaged in a dance with the bubble and stink of fermentation for a very long time. In those years, humans, we humans, have learned many things about how to control the microbes involved in fermentation so as to produce “better” foods, by whatever metric better might have taken in the many contexts in which the dance played out. Different cultures learned different things, fermented different things and came to love different features of what they fermented. Collectively, humanity could ferment thousands of species of plants, animals, and animal products in ways that yielded foods as diverse as sourdough bread, fish paste, slimy natto and oh so much more.

Unfortunately, as cultural knowledge and languages have been lost around the world, so too was a great deal of knowledge about fermentation. In some ways, this loss is similar to the loss that occurred with other kinds of traditional knowledge, but with fermentation the loss was heightened. It was heightened in part because as the “Western” scientific study of fermentation emerged, it did so in light of a transition precipitated by Pasteur and other microbiologists, the transition from fermentations that employed many kinds of microbes, gardened according to traditional knowledge, to the fermentation of handful of microbes gardened by industry. These industrial microbes, chief among them *Saccharomyces cerevisiae*, could be wonderful. They were often sufficient to produce extraordinarily delicious foods (though also quite a few terrible foods). And, to industry's liking, they could be controlled at large-scales that would ultimately allow production of traditional fermented foods to be industrialized. Food science programs in most countries then, when they focused on fermentation, tended to focus on this fermentation, the fermentation being carried out at scale. The result was a science of fermentation that was biased toward a small number of organisms in a set of unusual (or at least new)

conditions. As this was happening, much of the traditional knowledge associated with fermentation was either lost or ignored, regarded as unimportant.

Times have changed. There is a resurgence of interest in fermentation, including (and perhaps especially) fermentation involving microbes other than *S. cerevisiae*. This resurgence has spurred a need for science as carried out by scientists in laboratories to reconnect with traditional science as carried out by cooks, bakers and chefs in kitchens. It is my observation that this reconnection happens best when also associated with the insights of other fields, because whereas the traditional science of the kitchen is necessarily holistic (it is embedded in the personal history of the cook, the culture of the cook, the architecture of the home, the ecology of the surrounding landscape and much more), the science of the laboratory is often not. So to fully reconnect the science of the laboratory with the traditional knowledge of the kitchen we also need the insights of historians, writers, film makers, and experts from many different fields. This reconnection is beginning to happen. I have had the good fortune to observe some of it in person, in big experiments in a bakery in Belgium involving a dozen bakers, a couple of scientists and an anthropologist, in field experiments in Denmark involving the rotting leg of a deer, and in a palace in Portugal among some of the world leaders in fermentation. As I've watched (or taken part) in these events, it has become clear that they are most useful and make the most sense when they create the opportunity not just for the advancement of knowledge, but instead for three things to happen simultaneously, the advancement of knowledge, the sharing of food, and the sharing of knowledge.

But how do we best scale this up and create a community bigger than what might fit in a Belgian bakery? Fermentology is our attempt. Fermentology began as a series of talks and has grown into much more than that. It has grown into a kind of book, but not an ordinary book. This book is, first and foremost, digital. And it isn't quite a book. It isn't quite a book as we tend to think of books, but let's for a moment, forget what a book is supposed to be. Let's forget about bindings and page numbers. Let's at least do that for long enough that I can give a description of what you are about to encounter herein. This book is arranged into sections (Ha! That is just like a book, nothing radical here). Those sections then have subsections (one might even call them chapters). A section might be about, for example (and this is a good example, because it is actually the first section), sourdough bread. Within sourdough bread, there are then subsections. But here is where things get a little different. One of the subsections of each section is a series of videos, videos that are available online (for free) by chefs, bakers, scientists, historians, etc... about some aspect of the topic of the section. Each section then also has a summary chapter that makes sense of the videos and how they relate to each other. Each section has one or more interviews. And each section has art. Why art? In my experience, when one is working at a new task, it is necessary to be a little transgressive, to blur boundaries enough to cause some serious reflection. Science can do that blurring, but not terribly well. Art takes on transgression more readily. In some cases, the art will be photograph, simple depictive art about life in one of the world's top bakeries. In other cases, it will be musical (bakers together, singing a song about baking). In other cases, it will be the evidence left over from a performance (the art associated with a performance by Joana Ricou in which she engaged people to talk to the microbes on their bodies that might be co-opted into fermented food). Finally, each chapter also includes

stories, represented in different ways, of our community, and here we mean the big community, the community of people around the world interested in fermented food.

With that, you can go ahead and begin to “read” the contents of this project. But oh, I need to say three more things. First, I need to define fermentation. It is a little late given that I’m almost done with the introduction, but not too late. Rot is the conversion of some once living piece of material into a different form by microbes. Fermentation is the conversion of some once living piece of material into a different form by microbes in such a way that yields a food (or a new kind of food). Fermentology is the study of fermentation (also called zymology). But fermentation is also something else in English, it is a state of excitement. So what I hope this book is is a view into the study of the heightened excitement associated with using microbes to make new kinds of foods. Now the third thing. This introduction is by one person, me, Rob Dunn. But this book is a collective effort. It is the work of a community, including a twelve-person team that has helped to pull it all together, a twelve-person team composed of the people listed below, a global team that represents the diversity of the field we consider here.... OK, now you can go ahead and read.

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