

Fermenting Futures: Food Fermentation as an ‘Art of Noticing’

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Abstract

In this paper I explore the material and metaphoric affordances of fermentation as an “art of noticing” (Tsing, 2015) as embodied through a collaborative practice of making with migrant women of colour in the kitchen. In doing so, I make visible some of the ways in which our microbial entanglements make us part of our environments, and the ways in which these have the potential to connect us to planetary metabolic ecologies. Through this practice, I further work to disrupt the exclusion of marginalised people from the category of human by challenging the basis of individualism and the idea of human as a discrete category. I do so by utilising food fermentation to consider the ‘cross-cultural’/ multispecies ethics at play as a heuristic for a mode of participation that can account for diverse modes of knowledge and agency. By working with and valuing the disparate knowledge, stories and cultural practices of women from formerly colonised nations, I create space for joy, experimentation and play in what Villalba (2019) calls temporary “bubbles... in which to cultivate the future.

Keywords: Fermentation; food; art; multispecies; participation

Contains culture

I am a container
I am a plastic tub
I am the ice cream tub that my baa uses
To store achar, biscuits, sewing supplies

I contain culture
I contain more than culture
I am microbial
I am magical
I am ecological
(I am practical)

I am not the hero of this story
I will not give you botulism
But I can hold space
For your stories
And my stories

Which together (given time)

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Might contaminate each other
Transforming each other
Becoming something new
(If we let it)

Something microbial, magical, ecological (practical)
That can adapt to fit
That transforms, as it is transformed
That is liquid

I am liquid
I am earth
And when I die, I will become ash and earth
I will become nutrients, nitrogen, carbon

I am in and of the world,
contaminated, impure
I change, I adapt to fit
Into the spaces I am afforded

Yet I remain,
Bubbling
Creating space
Containing space
Becoming culture.

Introduction: Fermentation as material and metaphor

In the midst of ruins, we must maintain enough curiosity to notice the strange and wonderful as well as the terrible and terrifying. Natural history and ethnographic attentiveness – themselves products of modern projects – offer starting points for such curiosity, along with vernacular and Indigenous knowledge practices. Such curiosity also means working against singular notions of modernity. How can we repurpose the tools of modernity against the terrors of Progress to make visible the other worlds it has ignored and damaged? Living in a time of planetary catastrophe thus begins with a practice at once humble and difficult: noticing the world around us. (Tsing et al., 2017, M7)

Microbial cultures are essential to life's processes, such as digestion and immunity. We humans are in a symbiotic relationship with these single-cell life-forms. Microflora, as they are often called, digest food into nutrients our bodies can absorb, protect us from potentially dangerous organisms, and teach our immune systems how to function... Microorganisms are our ancestors and our allies... (Katz, 2003, xviii)

In my research, I mobilise the concept and practice of fermentation as an “art of noticing” (Tsing, 2015) to investigate the microbial organisms with whom we share our planet and our bodies, and without whom we could not live in this world. Conceptually, this allows me to explore the questions that fermentation raises about the agency of our microbial partners as a useful heuristic to think



through participation. I have found that this process echoes similar problematics to those raised in collaborative work involving other humans. I wish to problematise and reclaim the space between human and dehumanised, and in doing so, highlight the fact that, even when the participants are human, there is not an equal agency of collaborators.

As a practice that has been used to purify, enhance the flavour and extend the life of foods and drinks for millennia, fermentation and its outcomes are familiar to human beings from many cultures and geographies (Drain, 2020; Hey, 2020; Katz, 2012, 2016; Mintz, 2011; Steinkraus, 1997; Wood, 2012). While home fermentation has declined since the industrial age, food and drink fermentation practices are currently enjoying a revival among many different groups of people in the Global North: chefs and restaurateurs for its use as a tool to reduce food waste and to create new flavours and novel dishes (McMaster, 2019; Redzepi & Zilber, 2018); the wellbeing crowd for its impressive list of benefits for individual health (Gulin & Scott, 2015; Hey, 2020; Katz, 2012; Rawlings, 2013; Steinkraus, 1997); and artisanal producers of fermented foods and drinks interested in creating sustainable products that support locally-grounded economies and regional biodiversity (Paxson, 2008, 2014).

Artists, writers and researchers are revisiting microbial fermentation practices as a conceptual framework through which to navigate the political, cultural and social moment which we are presently living in. They do so in order to draw out complex relationalities and entanglements with our ecological and cultural communities (Fournier, 2020; Fournier et al., 2017; Katz, 2020; Kelley, 2016; Paxson, 2014; Sloan, 2019). Microbial collaborations are increasingly being used by designers to grow new sustainable materials for clothes and shoes, and, more recently, surgical face masks (Bridges & Benisch, 2020; Sloan, 2019). Engineers and architects are even exploring these symbiotic processes as biotechnologies for creating living buildings with metabolic environments that respond to our bodies (Armstrong et al., 2019).

After decades of neoliberal and capitalist rhetoric on competition and individualism rooted in a very particular type of social Darwinism, the (pre-existing) notion that we might be part of a larger network of life in which we already collaborate with each other, and with other organisms, offers a compelling alternative (Gilbert, 2017; Margulis & Sagan, 1997; McFall-Ngai, 2017; Tsing et al., 2017; Yong, 2016). This emphasis on interconnection and interdependency is grounded in a feminist ethics that overturns the tendency within modern industrialised societies to give prime value to individual agency over “dependency” (de La Bellacasa, 2017). As an existing practice that is familiar to many people in cultures from all over the world, fermentation offers useful material modes through which to engage people from diverse cultural and geographical origins.

At the same time, the microbial collaborations at the heart of the fermentation process offer a set of concepts which we can use to discursively engage with urgent political questions around democracy, diversity and participation (Fournier, 2020). As a practice of sustainability and survival, fermentation also offers us a relational paradigm through which to understand our own position as participants within an ecology. It seems that despite what we may have historically thought, life is symbiosis “all-the-way down” (Gilbert, 2017). It is these symbiotic entanglements that construct us, as much as, if not more than, we construct our environments (Gilbert, 2017; Haraway, 2008; Margulis & Sagan, 1997; McFall-Ngai, 2017; Tsing, 2015; Yong, 2016).

Multispecies gastronomy and “Arts of Noticing”

Could an attentiveness to the multiple appetites and lively interactions inherent in the act of producing food reshape the material and conceptual ways in which we share the world with others? In posing this question, I do not seek to displace human interests entirely but rather to decentre human agency in gastronomic discourse and practice... In doing so, I wish to suggest that multispecies gastronomy might offer more productive ways of imagining these entanglements and more generous conceptualisations of how we as omnivorous animals could eat and live better with others. (Donati, 2014, 2)

According to philosopher of science Donna Haraway, human beings are constructed through their entanglements with other living beings. These “multispecies relations” blur species boundaries in ways that make humans accountable to all of the species in their world (Haraway, 2008). For Haraway, humans and other organisms “become with” each other, “in hot compost piles”, in kinship and complicity, or not at all (Haraway, 2016). If they don’t become with at all, how can humans be made accountable to all species in the world? In eating, we are the “most inside the differential relationalities that make us who and what we are” (Haraway, 2008, 295). Eating as a practice of worlding connects us to each other, through our social and natural/cultural worlds. When we eat, we are explicitly and implicitly imbricated within the webs of life and death that make up our food system; from the microbes that grow our soil to the insects that pollinate our plants, from the animals that graze the land to the ones that provide our eggs, milk and meat. There is no way to eat that is innocent, or completely free from harm – when it comes to food, multispecies human and nonhuman ways of living and dying are at stake.

In one of her papers, anthropologist and ethnographer in food and agriculture Donati (2014) uses Haraway’s work as a theoretical springboard to ask how we might develop an ethical gastronomy that accounts for the “others” in our food systems (Donati, 2014). Donati posits the dining table as a site of possibility for convivial interactions with our food web, where conviviality is a question of how we live and eat better across species. She suggests that, in order for us to imagine a different, more ethical, food system, we must be willing to acknowledge our entanglements with others through our everyday gastronomic practices. She asks: “Could an attentiveness to the multiple appetites and lively interactions inherent in the act of producing food reshape the material and conceptual ways in which we share the world with others?” (Donati, 2014, 128).

According to Donati (2014), we are more able to incorporate “charismatic” animals such as factory-farmed cows into our ethical frameworks than we are the soil bacteria or fungi that perform important functions within our ecosystem. Multispecies gastronomy is a means to make visible the invisible (or less visible) non-human elements in our food web. By doing so, it accounts for an ethics of eating that can contend with the messy entanglement of living beings, such as fungi, plants and microbes, that form an essential part of our food system. In eating, we share something that geographer John Law and anthropologist Annemarie Mol refer to as metabolic intimacy between humans and the animals we eat or who form part of our food web (Law & Mol, 2008). By foregrounding these entanglements, Donati (2014) looks to challenge the human exceptionalism present in current framings of our food system, an idea that positions humans both outside of ecology, and at the top of the food chain.

While Donati’s (2014) argument is compelling, I would also ask, in what ways do our current ethical frameworks account for the diverse cultural experiences and perspectives of other humans that form an essential part of our food system, and with whom we might also share metabolic intimacy?



In what ways do we incorporate the Brazilian slaughterhouse worker, the Congolese cocoa farmer or the Bangladeshi food packer, or even a migrant fruit picker in the UK (if at all)? If there is one thing we all share, it is a symbiotic relationship with the microbes in our bodies, on our foods and in our environments. Positing microbial fermentation as an inter- and intra-species gastronomy, I ask if it can draw attention to the ways in which our “companion species” (Haraway, 2008) can mean microbes *and* other animals (including other humans).

In this paper I explore fermentation as a practice of what anthropologist Anna Tsing calls an “art of noticing” (Tsing, 2015; Tsing et al., 2017), a practice that can account for the lively agencies and collaborative entanglements of other-than-humans *and* other-humans. Researcher and writer Mercedes Vilalba (2019) suggests that noticing fermentation affords us an “attunement to the microscopic networks of bacteria, fungi, lichens and roots that make matter opaque” (p. 27). This follows philosopher Alexis Shotwell’s argument that attunement is a recognition or ethical regard of organisms in their own right: “Naming and noticing might be a way to care humanly, but not instrumentally, to recognize and value the facts that [organisms]... have their own life that we are just tuning into” (Shotwell, 2016, 99).

I mobilise the material practice of fermenting as a way to notice the multispecies relations in our food systems, as an attunement with the microbes in our foods, our bodies and our environments. It also becomes a way to notice the people who make up our food chain, who contribute to the microbial diversity of our foods and environments, but who also have their own cultural lives that we might be tuning into, thereby framing non-instrumental care as complicity and kinship. By non-instrumental care, I mean care that is framed through Maria Puig de la Bellacasa’s (2017) formulation of care as political ontology, as “affective, ethical, and hands-on agencies of practical and material consequence,” which another critical dimension is the interweaving of webs of life. which are rooted in feminist materialist ethics of interconnection and interdependency (p. 4). Using fermentation, we might notice the webs of dependency that form the basis for species relationships that live in our kitchens, cellars, gardens and pantries (but might often be overlooked) as important scientific and ethical knowledge. Like the matsutake mushroom that Tsing (2015) and Tsing et al. (2017) uses to explore the concept of “noticing,” fermentation is lively, collaborative, and entangled within multiple cultures, peoples and practices from all over the world.

By working through a collaborative practice of food preservation and microbial fermentation with my participants, I utilise concepts such as symbiosis, collaboration and adaptation that live at the heart of the fermentation process as a way to think through experiences of migration, colonisation and culture, and the food practices, land traditions and climate cosmologies that inform them. In fermenting or eating a fermented food, much like in foraging or eating a matsutake mushroom, we are imbricated within webs of entangled species relations that are as much about humans as the other organisms with whom we share our worlds.

Working in this manner, I explored worldly microbial food preservation practices as a mode of noticing that can connect us to other-human and other-than-human ecologies. Using pre-/de-colonial ecological knowledge in order to recover existing forms of microbial preservation, and to develop new hybrid practices that build on these, I addressed food waste on a practical level. By drawing connections between migrant recipes and between recipes and the ecological concerns of specific places and social, geographical, ecological and economic contexts, I invited participants to respond to one of Tsing’s propositions. Specifically, I asked them to imagine new conditions for life without the promise of stability, and to notice/think through what this flourishing might look like when it is situated, historically placed, and contingent (Shotwell, 2016; Tsing, 2015).

In comprehending our responsibilities and complicities with animals and technology, microbes and fungi, with medicine and science, we might begin to know what it means to be ethically human in more-than-human worlds. However, the rationalist, scientific, and Eurocentric category of the human has often, in the name of science, been denied to the large majority of the human population, in particular those of us who live within gendered, racialised, disabled, and/or economically disenfranchised bodies or geographies (Braidotti, 2013; Fournier, 2020; Fournier et al., 2017; Haraway, 2008; McKittrick, 2015). In learning to think through both other-than-human and other-human perspectives, in collaboration with the people who are already engaged in living through them, we might find new ways to live ethically and collaboratively in a world that we share with multiple species, including other(ed) humans.

Fermentation as cultural symbiosis

Fermented foods are substrates that are invaded or overgrown by edible microorganisms whose enzymes, particularly amylases, protease and lipases, hydrolyze the polysaccharides, proteins and lipids to non-toxic products with flavors, aromas and textures pleasant and attractive to the human consumer.” Steinkraus (1997, 311).

Fermented foods are estimated to make up almost one-third of total global food intake, the majority being in the form of condiments, pickles and sauces (Mintz, 2011; Steinkraus, 1997). Archaeological and ethnographic evidence shows that humans have always experimented with food preservation, and that it is a key part of what allowed human beings to create settlements and become agrarian (Mintz, 2011). Fermentation is a process that has been present in nature since before humans, and, as such, is a natural process that occurs without human intervention. That said, there is evidence to show that it is a process that humans have been deliberately engaging in as far back as nine millennia ago in China (McGovern, 2019; Mintz, 2011). Fermentation is a cellular process, but the word can also mean to agitate, excite or bubble (Katz, 2020).

Humans have been engaging with fermentation as a process since before our species evolved, yet we have been explicitly aware of bacteria for much less time than that. We have been collaborating with bacteria, yeast, microbes, microorganisms long before we knew how prevalent they were. Antonie van Leeuwenhoek used his ground glass lenses to “discover” the animalcules in our environment and in our bodies less than 400 years ago (Yong, 2016). Unfortunately, since this beginning, our understanding of bacteria and of other microorganisms has been intimately tied into the discovery that they cause disease in the body. Many scientists have suspected for rather a long time that our relationships with bacteria might be more complicated than simply that they cause disease. However, it is only recently that the mainstream scientific establishment has become interested in exploring the ways our bodies and societies are reliant on microbial interactions in order to not only survive, but to flourish (Gilbert, 2017; Margulis, 1981; Margulis & Sagan, 1997; McFall-Ngai, 2017; Yong, 2016). I argue that fermentation is an existing practice of microbial collaboration that might offer us a way to resolve this contradiction. As a process that is a part of many of our food cultures, it might highlight complex modes of collaboration with our environment that we are already engaged in as ways to imagine other forms of relationality.

According to Steinkraus (1997), there are seven distinguishable but overlapping categories of fermented foods. The most commonly known in the Global North are lactic ferments that produce pickles such as sauerkraut, achar and kimchee, dairy ferments such as yogurt and cheese, as well as forming the basis for leavened bread and pancakes. Others include legume/cereal mixtures that



produce meat protein replacements, alcohol ferments, and alkaline ferments². The fact that each of these create different flavours is a happy accident that is as much down to the microbes in our environment as the climate we live in and the ingredients that are available to us. Sauerkraut is common in the parts of Europe where cabbage is abundant in summer, and temperatures are low enough to store jars over winter. Similarly, kimchee is common in parts of East Asia where availability of Chinese leaf cabbage, chillies, glutinous rice, fermented soybeans, salt and the conditions to make gochujang, as well as cold winters for slow fermenting, make it possible (Katz, 2012).

In colder climates, these types of lactic ferments (so named because of where the bacteria were first noticed, rather than any dairy ingredients) rely on brining. However, in parts of India, they are made using oils and they usually contain mustard oils and extra spices, which might slow down the fermenting process. In fact, a key part of the pickling process in India is sun drying, as even a small amount of water in the pickles can cause them to spoil. In Sudan, there are over eighty fermented foods, which include meat ferments such as muscle, offal, bones, fat, gallbladder, hooves, hides and skins (which would usually be discarded in Europe), as well as fermented sorghum crepes, and soured milk (kisra) (Dirar, 1993). In the US, artisanal producers work with goats, cows and local microorganisms in order to produce raw cheeses that support local biodiversity, craft and economies (Paxson, 2008, 2014).

Each of these practices is specific to a region, and many have become synonymous with the culture of that region. These are forms of cultural symbiosis that are reflective of the geographies, environments, and cultural specificities that make up a place. So, what happens when the practices are displaced from their regions of origin? It is often important for migrant communities to hold onto their food cultures, but these are often adapted to reflect the resources of the regions to which they move, or to reflect the changing palates of the people of that region (often including later generations of the communities of origin). Food studies scholar M. J. Weismantel (1998) has argued that while the maintenance and recovery of traditional practices can constitute political resistance (through forms that may not always be seen as such by outsiders), it is equally important not to reify these without the material practices that underpin them.

At the same time, we know that the microbial communities we are collaborating with change as we migrate, as do the microbes in and on our own bodies. In what ways does this disrupt notions of authenticity and origins when it comes to cultural practice relating to food? Is it possible that an expanded formulation of multispecies gastronomy can account for the situated nature of food practices as contextual and political? Can we enact this material practice through fermentation as an art of noticing?

Microbiopolitics, post-pasteurianism and the politics of purity

Being against purity means that there is no primordial state we might wish to get back to, no Eden we have desecrated, no pretoxic body we might uncover through enough chia seeds and kombucha. There is not a preracial state we could access, erasing histories of slavery, forced labor on railroads, colonialism, genocide, and their concomitant responsibilities and requirements. There is no food we can eat, clothing we can buy, or

² See Steinkraus (1997, 312) for more information about these categories.

energy we can use without deepening our ties to complex webs of suffering. So, what happens if we start from there? (Shotwell, 2016, 4)

Cultural anthropologist Heather Paxson has been working with raw cheese makers in the US for almost two decades. In 2008, she introduced the notion of “microbiopolitics” in a paper intended to call attention to the fact that dissent about how humans should live with microorganisms often reflects disagreements over how we ought to live with each other (Paxson, 2008, 2014). As a concept, microbiopolitics builds on Foucauldian biopolitics as the categorisation of humans via management of the conditions of life for a population. Further incorporating Bruno Latour’s work on Pasteurianism, which looks at the ways in which microbial agents were constructed through policy as “pure” social relations so that human polities might be better cultivated (Latour, 1993), she theorises a politics of post-Pasteurianism (Paxson, 2008, 2014). For Paxson, post-pasteurianism is a collaborative practice through which we might understand living with microbes beyond the disease and anti-microbial resistance binary.

Embodying post-Pasteurian politics, artisanal raw cheesemakers in rural parts of the US represent an investment in what Paxson (2008) calls “the potentialities of collaborative human and microbial cultural practices” (p. 17), thus embracing any “life with other species – bacteria particularly – that involves pleasure and risk, nourishment and discomfort, labor and reward” (Noel et al., 2014, p 163). Which is not to say that post-Pasteurianism advocates for an unthinking, uncritical consideration of microbes as universally beneficial. Our microbial kin are as likely to cause us illness as they are to keep us well. Our bodies are in a continuous and delicate balancing act with our co-species organisms, and Paxson (2014) is particularly sceptical of the adoption of her theories by so-called ‘post-Pasteurians’ who would suggest that microbes are universally beneficial³.

The idea of fermentation as a purity practice rooted in what philosopher Alexis Shotwell (2016) calls “individual healthism” does a disservice to the microbial others with whom we collaborate, to the cultural history of fermentation as a technology continuously adapting to its context, as well as to the diversity of people who practice it. Fermentation as a kitchen practice flourishes through contamination, encounter, and intergenerational knowledge. And microbial history is the history of surviving adversity via collaboration. All fermentation practices are survival practices; they were ways in which communities preserved and transformed the resources they had available in order to purify water or store foods. As fermentation researcher Maya Hey (2020) has argued, present-day fermentation tends to position the practice as a gesture of health, care and distinction by imposing moralistic and anthropocentric binaries onto a much richer history. Fermentation makes visible our hidden relations; we are literally composed and decomposed by microbial life daily in that microbes transform our food, our bodies and our environments (Hey, 2020). As such, fermentation is as much about decay, about thriving in the ruins, as it is about life.

Thinking about fermentation as a multispecies cross-cultural cultivation equips us with a material metaphor to think about our bodies and our socio-political selves as part of ecological systems. This, in turn, allows us to consider the organisms with which we share bacteria and the processes in which

³ In her interlude to Kirksey’s edited book, Paxson (2014) relates her discomfort at discovering for sale on the internet T-shirts, bumper stickers, maternity shirts and bibs “emblazoned with a smiling microbe and the legend ‘I’m a Post Pasteurian’, and the descriptive text ‘What is a Post Pasteurian? A really smart person who understands that pasteurization kills all (yes, ALL) the good in food’” (p. 119). Paxson (2014) further describes this position as not only incorrect, but putatively pitting a “beneficent ‘nature’ supernaturally enlivened by micro-organisms against a power-greedy ‘culture’ embodied by regulatory overreach.” She argues that, in reality, cheesemaking operates from a natural-cultural reality of “multispecies muddles” that resists such simplistic parsing (p. 119).



we are all collaborators (which is not to suggest there is equal agency for every participant in the fermentation process). If we follow Paxson's (2008, 2014) formulation of microbiopolitics, in order to flourish in this post-Pasteurian world, we must learn to live with, and invest in the potentialities of collaborative human and microbial cultural practices on their own terms.

Multispecies conviviality and the agency of others

To acknowledge nonhuman materialities as participants in a political ecology is not to claim that everything is always a participant, or that all participants are alike. Persons, worms, leaves, bacteria, metals, and hurricanes have different types and degrees of power, just as different persons have different types and degrees of power, different worms have different types and degrees of power, and so on, depending on the time, place, compositions and density of the formation. (Bennett, 2010, 286)

What makes an organism symbiotic? Biologist Lynn Margulis (1981) was the first to imagine that symbiosis, far from being unusual or remarkable, was in fact the basis of life within our universe (see also Swanson et al., 2017). Ninety percent of the DNA in our bodies belongs to microbial entities (Donati, 2014; Yong, 2016), and our bodies contain marginally more microbial cells than human ones (Yong, 2016). Humans share microbes with each other, and with other species in their environment (Song et al., 2013). The worlds of microbes impact us metabolically, in terms of “the behavior, development, ecology, and evolution of the much larger world of which we are a part and with which we co-evolved” (Margulis & Sagan, 1997). Microbes feed us, feed off us, protect us from disease, and may even affect our moods and our habits (Donati, 2014; Valles-Colomer et al., 2019; Vuong et al., 2017; Yong, 2016).

These discoveries make it increasingly difficult to separate ourselves as human beings from our microbial entanglements (McFall-Ngai, 2017; Yong, 2016). Humans are a colony of bacteria, and we are also individuals who make up cultures and societies. We are a result of millennia of bacterial development and co-constitution that allow us to digest food, and of viral infections that shaped our ancestors' placenta (Shotwell, 2016). The diverse cultures at play in fermentation situate human and non-human beings as part of complex webs of interdependence and shared kinship, and challenge essentialising categories such as “human” and “other”. Humans are a part of nature, and nature is part of us; thinking through more-than-human modes might offer novel ways to re-imagine our relationships with other organisms and with each other as symbiotic and co-constitutive.

However, these multispecies potentialities raise important questions about the agency of collaborators, both inter- and intra-species. Can convivial interactions exist without consent? Can a concept of consent in other organisms be presumed without falling in anthropocentrism? Political theorist Jane Bennett (2010) suggests a “vital materiality” that runs through and across bodies, both human and nonhuman. By exploring how political analyses of public events could change were we to acknowledge that agency always emerges as the effect of multispecies entanglements of human and non-human (including what we might traditionally refer to as “things”), she suggests we might recognise that this agency is not solely the province of humans. Perhaps fermentation as a more-than-human practice offers us a way into this “vital materiality” as it is accessible, immediate and urgent, yet also complicates notions of agency and agential collaboration in terms of flattened hierarchies of humans and others.

Decolonial cosmologies and a billion black anthropocenes

This attempt to absolve the positionality of Western colonial knowledge and extraction practices, while simultaneously reinforcing and resettling them in a new territory — a Western frontier of pioneers armed with eco-optimism and geoengineering — indicates a desire to overcome coloniality without a corresponding relinquishing of the power it continues to generate in terms of who gets to formulate, implement, and speak to/of the future. (Yusoff, 2018, 27)

Multispecies modes of thinking ecological relations are not new. As anthropologist Zoe Todd (Todd, 2015, 2016) has pointed out, multispeciesisms have their roots in Indigenous beliefs, laws and activism, as well as in the cosmologies and sociocultural practices of non-European, pre-colonial and pre-industrial cultures. Concepts such as animism and the beinghood of natural phenomena like trees, rivers and rocks are common outside of the type of Eurocentric secularism that has its roots in the Enlightenment (de la Cadena & Blaser, 2018; Horton, 2017; Horton & Berlo, 2013; Todd, 2015, 2016; Yusoff, 2018). Decolonial ecological thinking teaches us that we do not have to see other beings as resources to be exploited or see ourselves as outside of the systems that contain them (de la Cadena & Blaser, 2018; Horton, 2017; Horton & Berlo, 2013; Todd, 2015, 2016).

Anthropocenic thinking is a (pro-)claiming of species life (anthropos) that has been argued as a universalist geological epoch that flattens responsibility and neatly erases racism by denying all of the ways in which colonialism has created hierarchies of extraction on the global south and those who originate there (Haraway, 2016; Yusoff, 2018). This is a geological era notionally determined by human impact on the climate, where the boundaries of that impact are often argued to be drawn by colonial genocide, both sudden and protracted (Shotwell, 2016; Yusoff, 2018). Theorisations of the Anthropocene erase the colonial histories of capitalist extractivism, and how they have been (and continue to be) enacted on both the earth and racialised bodies alike through colonialism and racial capitalism. As Kathryn Yusoff (2018) notes, “to be included in the ‘we’ of the Anthropocene is to be silenced by a claim to universalism that fails to notice its subjugations” (p. 10).

The appropriation of these epistemologies without the people who have originated them might itself be a form of (colonial) extractivism. To think the “thought of the other” without the “other of thought” (Césaire, cited in Yusoff, 2018, 18) is an act of epistemic violence. As Yusoff (2018) and many others have noted, “any critical theory that does not work with and alongside black and indigenous studies (rather than in an extractive or supplementary mode) will fail to deliver an epochal shift at all” (p. 16). Noticing the ways in which these ontologies are shaped and have shaped our natural-cultural worlds is an important step towards creating a form of multispecies justice that includes other-than-humans and other-humans as collaborators, instead of simply as resources to be mined. Our bodies could be seen as extensions of the blasted landscapes of Capitalism, that by being set up only for extraction, are ignored as barren once that extraction is complete (Villalba, 2019). However, as Tsing (2015) suggests, not all blasted landscapes are deadly: much as with fermentation, environmental precarity and contamination are necessary pre-conditions for certain forms of ecological life to flourish.

Fermentation as multispecies metaphor

Fermentation is political; fermentation is vitalism; fermentation is accessibility; fermentation is preservation and transformation; fermentation is inter-species symbiosis and coevolution; fermentation is survival and futurity; fermentation is care of the self and



care of others; fermentation is harm reduction; fermentation is queer time; and fermentation is collaboration. Fermentation is a way to tap into the fizzy currents within transnational feminist practices. (Fournier, 2020, 89)

In their intensely situated nature, food fermentation practices preclude simplification, reduction and translation (Katz, 2012), seeming to resist commodification and production at scale, at least at the levels of complexity and specificity that might render them effective, useful⁴ (Yong, 2016), or compatible with capitalist modes of extraction and sanitisation (Paxson, 2008, 2014). Everything about fermentation, from the language we use to talk about it (culture, collaboration, symbiosis) to the fact that, as a domestic practice it contributes to care and nourishment in the most immediate sense, suggests mutually-constitutive modes of being that echo new insights in science and ecology about life being symbiotic instead of always competitive (Gilbert, 2017; Margulis, 1981; McFall-Ngai, 2017; Yong, 2016).

Fermentation practices prefigure our bodies as a continuation of landscape ecologies (Kelley, 2016; Yong, 2016). They connect us materially and metabolically to our environments. They recolonise/decolonise our bodies as diasporic, and tendrilled/tentacular; they prefigure ecology, geography and migration. Biologically, microbially, these practices and their outcomes are, in anthropological terms, monstrous. They do not build, but grow, and in growing, engage in a continuous process of killing, eating and reforming (Lien, 2015). Microbes perform different functions in different bodies, even within the same species, which means that they foreclose the possibility of essentialisation (Yong, 2016). As a collaborative kitchen technology, fermentation predates our awareness of microbes, and as a metaphor, they offer us a paradigm through which to think complex collaborations. Fermentation practices are bounded, yet symbiotic; adaptive and contingent, yet contextual and situated; metabolically diverse/rich, contaminated, and impure. As humans, we are collaborative and collective. We are not individuals; we are a colony, and we have the capacity to (re-)colonise (with) others.

Sandor Katz (2020) explores the multiple potentialities of fermentation as a tool for imagining and creating the future, using it as a lens through which to explore ourselves and our cultures. Materially, Katz (2020) is concerned with fermentation as a practice of cellular metabolism that can be mobilised towards activism and as a practice of care. Conceptually, he uses it as a lens through which to explore political and personal concerns including neurodiversity, nationalism and identity. Curator and artist Lauren Fournier uses fermentation in her curatorial experiments as a way to explore and juxtapose intersectional feminisms. Fournier is fascinated by the fact that fermentation embodies both preservation and transformation, and is therefore a vital practice to think through the pressing political concerns of our time (Fournier, 2020; Fournier et al., 2017). Villalba (2019) tells us that fermentation shows us the invisible connections of everything. She calls for us to rise in fervor, to create joy as a political matter, and to demand the right to survive in happiness. We must craft bubbles, as pockets of air and spaces of exception, even if they are temporary, in which to cultivate the future (Villalba, 2019).

⁴ Microbially diverse fermentation resists commodification at scale. According to science writer Ed Yong (2016), the fermented products available commercially contain microbes that are common in our environments and so easy to replicate in the lab (such as lactobacilli, acidophilous, etc.), and that, unlike other microbes, are not known to pose any danger to humans. As a result, there's very little evidence to show that, beyond treatment for a few specific conditions, they make very little difference to our overall health and wellbeing (Hey, 2020; Yong, 2016).

Conclusion: Liveable collaborations in blasted landscapes

staying alive—for every species—requires liveable collaborations. Collaboration means working across difference, which leads to contamination. Without collaborations, we all die. (Tsing, 2015, 28)

What could it mean for our perception of our place within (and responsibility to) ecological systems if we were to understand our bodies as site of continuous ecological interaction shaped by, and having the capacity to shape, our natural/cultural environments (Kelley, 2016)? By exploring fermentation as a material and conceptual paradigm through which to conceive how our ecological worlds move from the dinner plate through our digestive systems, I wanted to notice how our bodies connect us to our ecosystems and make us part of natures. Deep ecology in the Western (Enlightenment) mode teaches us that humans are anathema to the natural world, and this colonial mindset pits humanity against ecology. In what ways might seeing the landscape as part of human bodies enable us in the global north to live as though our choices mattered? I do not mean this simply in terms of what we choose to consume as individuals (the ultimate reduction of environmental action under neoliberal capital). Instead, I wonder what it might mean to act collectively, politically, with an awareness of our entanglements.

What could we notice about different relationships to climate through the food fermentation practices of migrants in the kitchen, a site that has traditionally belonged to domestic, feminised labour? Haraway (1991) argues that to be feminised is to be precarious. However, what could it mean to work through this precarity as a radical generative condition; one of vulnerability, of unpredictability and transformation, or ceding control to unknown variables, of being transformed as we transform others (Tsing, 2015)? Shifting our view of precarity in this manner changes social analysis, as it forces us to see the precarity not as the exception to, but as the condition of our present time. A politics of precarity creates the possibility for a world without teleology (Tsing, 2015), which is a world without genesis, which (as the saying goes) is perhaps a world without end (Haraway, 1991). This is a world without Eden, where we do not need to be innocent or pure to thrive, but may in fact thrive as a result of impurity (Shotwell, 2016; Tsing, 2015).

The natural-cultural binaries that underpin ideals of purity are imbricated within categorisations and classifications that far too easily fall into the delineations of material purity across race, class, gender, ability, sexuality and illness (Shotwell, 2016). By working through contamination, through fermentation, we might create “bubbles... in which to cultivate the future,” however temporary (Villalba, 2019), where we might all flourish. While this way of knowing the world is compelling, it sometimes fails to take into account the ways in which some of us are already entangled within forms of structural inequality that are the legacies of these landscapes, such as racism, homophobia, class inequality, gender inequality, transphobia, ableism, and many others. While we are always already complicit, not all of us are equally implicated within these structures of complicity. Silvia Wynter’s challenge to the category of human is instructive here: to those of us who have had the possibility of inhabiting this category deliberately foreclosed to us, in what ways can thinking through precarity open up new ways of be(come)ing human (McKittrick, 2015)? Can we claim this dehumanisation, not as a normative position, but as a challenge to the forms of binarism that require us to conform or to be other(ed)?

These are particularly difficult troubles to stay with for those of us who are rendered precarious by present social, cultural and economic Global structures and systems. Yet perhaps as collectives who recognise our affinities across difference, who might heterogeneously and horizontally share



resources, we might find ways to survive. Through this research, I explore fermentation as part of a process that values the context in which these ecologies emerge, as stories, practices and climate cosmologies of my collaborators, using an emergent participatory methodology that attempted to act beyond the extractive, exploitative, and tokenistic. It was important to not serve up our outcomes as orientalist morsels for consumption without due care or regard for their origins. At the same time as trying to stay true to the experiences of our collaborators, it was important not to fetishise the cultural origins themselves: the heart of this project is cross-contamination and cross-pollination of ideas and experiences, and the adaptation and evolution, and response to context that is both necessary to fermentation, and a key part of any migrant's story.

Much like with the process of fermentation, the outcomes have been emergent, contradictory and surprising. As ancestors and allies, microorganisms might offer us new modes to think through cross-contamination and collaboration as a necessary condition for (symbiotic) survival. In the same way that colonisation creates new affordances and opportunities via migration as it destroys our homelands, these diasporic imaginings and affordances offer materialities and metaphors through which to navigate our blasted landscapes. The symbiotic relationships simulated through the process of collaborative making grows new ecologies (and the root of the world ecology is *oikos*: home). Our old worlds are gone. What can flourish in the ruins?

Recipes

Chilli Carrot Pickle

1. Wash, peel & cut carrots into desired sizes (approx. 4 carrots for 1 jar).
2. Mix carrots into salt & turmeric dry mix bowl, cover, and let carrots rest in mixture for five hours.
3. After five hours, drain the water content released from the carrots, wrap them up in a clean cloth and let it rest overnight (minimum 8 hours).
4. Heat up one tablespoon of oil with crushed methi seeds (fenugreek) and mustard seeds, let this roast for a couple of minutes and then cool.
5. Create a dry spice mix for the pickling including chilli powder, sumac, salt, fennel seeds, and black cumin (kalonji) if you have it.
6. Mix the carrots into the dry mixture and add the oil mix to it as well. Once mixed in, place into a sterilized jar. Add one spoon of vinegar.
7. Now, heat up an oil of your choosing, the amount is dependent on how you'd like it to be stored. If you want to keep it out of the fridge for up to a year, the carrots should be covered in oil. Or you can do it about halfway or so if you want to leave it out of the fridge for only about a month, or if you'll be putting it in the fridge eventually.
8. Get the oil very hot, and then turn off the heat and let it cool completely for a few hours.
9. Add the cooled oil to your jar.
10. All done!

Recipe notes: Heat the oil the night before and allow to cool fully before adding to the pickle. The longer you leave it out of the fridge, the more the taste will develop.

Carrot Torshi Style

1. Wash and chop all vegetables (carrots and also cauliflower if desired). add salt and leave to dry over night.
2. Wash and chop herbs (coriander, tarragon, dill) and allow them to dry as well (overnight not necessary).
3. Mix vegetables and herbs in a bowl.
4. Mix spices in a separate bowl or the same one as vegetables:
 - a. turmeric for colour,
 - b. 3 tablespoons of salt (for two large jars of torshi – eyeball the salt just to ensure it coats and salts the size of your bowl of vegetables),
 - c. 1 teaspoon per jar of any other spices such as cumin seeds, fenugreek seeds, and fennel seeds, depending on what you have.
5. Vegetables and herbs go into the jar and you fill it to the top with vinegar of your choice. One chilli and a couple of cloves of garlic/shallots and a bay leaf are nice inside as well, usually placed at the bottom.
6. Let it sit in a dark cool place for ten days before opening. Good to keep out of the fridge for at least a month as long as liquid is still covering the vegetables/herbs. I prefer it in the fridge for an extra crunchy and contrasted temperature to hot foods.

For both recipes, herbs and spices can be used based on what's available! Open for experimentation



Poetry

Edible Memory by Soha

at times i find it difficult to remember things that are probably significant
but some memories just aren't appetizing
they're bitter but not in a nice way like sucking on citrus peels
they're tart but not in a nice way like an entire greengage in my mouth
they can be hard to chew and hard to swallow too
so sometimes i'll eat fast and then forget

the moments i do remember keep me full though

realizing i could have feelings for her when she pocketed three apricots before leaving the house
learning that the perfect grilled cheese has its bread buttered inside and out
discovering we were both lactose intolerant and trying our best to hold off
drawing with pancake batter
instructed to eat every last grain because "do you know how much water it takes to grow rice?" (i'm
habitually vigilant now)
three days straight of smelling like my favourite stew, you said I tasted like it too
making loved ones laugh when i lick the plate clean and silly
watching in awe as you lower saffron cotton candy into your mouth with your head tilted way back
confessing that i enjoy eating onions raw



her admitting she enjoys it too
spitting small pits into big hands
struggling to crack open fully enclosed pistachios with baby teeth
bullied off the beach by seagulls with our takeout fish & chips
tupperware filled with fresh pomegranate seeds for recess when the season hit
judged by my dentist for an obvious excess in lemon intake
our first and only argument over leftover chilli
heart shaped fig insides on our second date but you couldn't look because you have trypophobia
ghee as a gift
meeting someone i want to cook for forever

these memories are sandwiched between blank spaces that look like empty plates
but i think what matters is that i can remember these
and i'm happy to only remember these

Crunchy Carrots by Rinkal (helped by Arya)

Crunchy carrots, carrots, carrots.
As bright as a parrot, parrot, parrot.
You can use it as a snowman's nose but
don't put it in your hose!

I like carrots in my soup,
I like carrots in my cake,
I like carrots, nice and crunchy but they're
hard to bake!

Crunchy carrots, carrots, carrots.
As bright as a parrot, parrot, parrot.
You can use it as a snowman's nose but
don't put it in your hose!

When I cook a carrot, the smell is nice.
When I cook a carrot, I put it in my rice!

Crunchy Carrots by Rinkal (helped by Shriya)

I like rice,
I like rice,
I like rice,
With a bit of spice.

I like spice,
I like spice,
I like spice,
When it's on some rice.

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The outcomes for Kitchen Cultures include a book that can be downloaded digitally from kaajalmodi.com/kitchen-cultures-eden, and a speculative soundscape that was developed as part of the Radio Arts Catalyst residency which can be listened to at kaajalmodi.com/sonic-cultures-radio-arts-catalyst.

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References

- Armstrong, R., Black, G., Bridgens, B., Morrow, R., Dade-Robertson, M., Smith, D., & Zhang, M. (2019). *Hub for Biotechnology in the Built Environment*. <http://bbe.ac.uk/>
- Bennett, J. (2010). *Vibrant matter: A political ecology of things*. Duke University Press.
- Braidotti, R. (2013). *The posthuman*. John Wiley & Sons.
- Bridges, G., & Benisch, E. (2020). *Xylinum Mask*. <https://www.sum.design/work/xylinum-mask>
- de La Bellacasa, M. P. (2017). *Matters of care: Speculative ethics in more than human worlds*. University of Minnesota Press.
- de la Cadena, M., & Blaser, M. (2018). *A world of many worlds*. Duke University Press.
- Dirar, H. A. (1993). *The indigenous fermented foods of the Sudan: A study in African food and nutrition*. CAB international.
- Donati, K. (2014). The Convivial Table: Imagining Ethical Relations Through Multispecies Gastronomy. *The Aristologist: An Antipodean Journal of Food History*, 4, 127-143.
- Drain, J. (2020). Sandor Katz on interspecies collaboration and reclaiming food through fermentation. *MOLD*.
- Fournier, L. (2020). Fermenting feminism as methodology and metaphor. *Environmental Humanities*, 12(1), 88–112. <https://doi.org/10.1215/22011919-8142220>
- Fournier, L., Zegers, A., Morigan, C., Kartsaki, E., Yesmin, F., Regel, H., Meyer, H., Bencke, I., Antonsen, D., & Mars, J. I. (2017). *Fermenting Feminism*. Laboratory for Aesthetics and Ecology. <https://e-artexte.ca/id/eprint/28709/>
- Gilbert, S. F. (2017). Holobiont by birth: Multilineage individuals as the concretion of cooperative processes. In A. Tsing, H. Swanson, E. Gan & N. Bubandt (Eds.), *Arts of living on damaged planet* (pp. M73-M89). University of Minnesota Press.
- Gulin, D., & Scott, T. (2015). *Fermented foods for vitality & health: Boost your digestive and immune systems with delicious probiotic recipes*. Ryland Peters & Small.
- Haraway, D. J. (1991). *Simians, cyborgs and women: The reinvention of nature*. Routledge.
- Haraway, D. J. (2008). *When species meet*. University of Minnesota Press.
- Haraway, D. J. (2016). *Staying with the trouble: Making kin in the Chthulucene*. Duke University Press.
- Hey, M. (2020). Against healthist fermentation: Problematizing the 'good' of gut health and ferments. *Journal of Critical Dietetics*, 5(1), 12–22. <https://doi.org/10.32920/cd.v5i1.1334>



- Horton, J. L. (2017). Indigenous artists against the Anthropocene. *Art Journal*, 76(2), 48–69. <https://doi.org/10.1080/00043249.2017.1367192>
- Horton, J. L., & Berlo, J. C. (2013). Beyond the mirror. *Third Text*, 27(1), 17–28. <https://doi.org/10.1080/09528822.2013.753190>
- Katz, S. E. (2003). *Wild Fermentation*. Chelsea Green Publishing.
- Katz, S. E. (2012). *The art of fermentation: An in-depth exploration of essential concepts and processes from around the world*. Chelsea Green Publishing.
- Katz, S. E. (2016). *Wild fermentation: The flavor, nutrition, and craft of live-culture foods*. Chelsea Green Publishing.
- Katz, S. E. (2020). *Fermentation as metaphor*. Chelsea Green Publishing.
- Kelley, L. (2016). *Bioart kitchen: Art, feminism and technoscience*. Bloomsbury Publishing.
- Kirksey, E. (2014). *The multispecies salon*. Duke University Press.
- Latour, B. (1993). *The pasteurization of France*. Harvard University Press.
- Law, J., & Mol, A. (2008). The actor-enacted: Cumbrian sheep in 2001. In C. Knappet & L. Malafouris (Eds.), *Material agency* (pp. 57–77). Springer.
- Lien, M. E. (2015). *Becoming Salmon. Aquaculture and the domestication of a fish*. University of California Press.
- Margulis, L. (1981). *Symbiosis in cell evolution: Life and its environment on the early earth*. Wiley.
- Margulis, L., & Sagan, D. (1997). *Microcosmos: Four billion years of microbial evolution*. University of California Press.
- McFall-Ngai, M. (2017). Noticing microbial worlds: The postmodern synthesis in biology. In A. Tsing, H. Swanson, E. Gan & N. Bubandt (Eds.), *Arts of living on damaged planet* (pp. M51-M69). University of Minnesota Press.
- McGovern, P. E. (2019). *Ancient wine: The search for the origins of viticulture*. Princeton University Press.
- McKittrick, K. (2015). *Sylvia Wynter: On being human as praxis*. Duke University Press.
- McMaster, D. (2019). *Silo: The zero-waste blueprint. A food system for the future*. Leaping Hare Press.
- Mintz, S. (2011). The absent third: The place of fermentation in a thinkable world food system. In H. Saberi (Ed.), *Cured, fermented and smoked foods: Proceedings of the Oxford symposium on food and cookery*. Prospect Books.
- Noel, L., Hamilton, C., Rodriguez, A., James, A., Rich, N., Edmunds, D. S., & TallBear, K. (2014). Recipe 4. Bitter medicine is stronger. In E. Kirksey (Ed.), *The multispecies salon* (pp. 154-163). Duke University Press.
- Paxson, H. (2008). Post-pasteurian cultures: The microbiopolitics of raw-milk cheese in the United States. *Cultural Anthropology*, 23(1), 15–47.
- Paxson, H. (2014). Interlude. Microbiopolitics. In E. Kirksey (Ed.), *The multispecies salon* (pp. 115-121). Duke University Press.
- Rawlings, D. (2013). *Fermented foods for health: Use the power of probiotic foods to improve your digestion, strengthen your immunity, and prevent illness*. Fair Winds Press.
- Redzepi, R., & Zilber, D. (2018). *The Noma guide to fermentation: Including koji, kombuchas, shoyus, misos, vinegars, garums, lacto-ferments, and black fruits and vegetables*. Artisan Books.
- Shotwell, A. (2016). *Against purity: Living ethically in compromised times*. University of Minnesota Press.
- Sloan, M. R. (2019). *Food: Bigger than the plate*. V&A Publishing.
- Song, S. J., Lauber, C., Costello, E. K., Lozupone, C. A., Humphrey, G., Berg-Lyons, D., Caporaso, J. G., Knights, D., Clemente, J. C., & Nakielny, S. (2013). Cohabiting family members share microbiota with one another and with their dogs. *Elife*, 2, e00458. <https://doi.org/10.7554/eLife.00458>
- Steinkraus, K. H. (1997). Classification of fermented foods: Worldwide review of household fermentation techniques. *Food Control*, 8(5–6), 311–317.
- Swanson, H. A., Tsing, A., Bubandt, N. O., & Gan, E. (2017). Introduction. Bodies tumbled into bodies. In A. Tsing, H. Swanson, E. Gan & N. Bubandt (Eds.), *Arts of living on damaged planet* (pp. M1-M12). University of Minnesota Press.
- Todd, Z. (2015). Indigenizing the Anthropocene. In H. Davis & E. Turpin (Eds.), *Art in the Anthropocene. Encounters among the aesthetics, politics, environments, and epistemologies* (pp. 241-254). Open Humanities Press.
- Todd, Z. (2016). An Indigenous Feminist's Take On The Ontological Turn: 'Ontology' Is Just Another Word For Colonialism. *Journal of Historical Sociology*, 29(1), 4–22. <https://doi.org/10.1111/johs.12124>
- Tsing, A. L. (2015). *The mushroom at the end of the world: On the possibility of life in capitalist ruins*. Princeton University Press.

- Tsing, A., Swanson, H., Gan, E., & Bubandt, N. (2017). *Arts of Living on Damaged Planet*. University of Minnesota Press.
- Valles-Colomer, M., Falony, G., Darzi, Y., Tigchelaar, E. F., Wang, J., Tito, R. Y., Schiweck, C., Kurilshikov, A., Joossens, M., & Wijnenga, C. (2019). The neuroactive potential of the human gut microbiota in quality of life and depression. *Nature Microbiology*, 4(4), 623–632. doi: 10.1038/s41564-018-0337-x
- Villalba, M. (2019). *Fervent manifesto*. No-Libros.
- Vuong, H. E., Yano, J. M., Fung, T. C., & Hsiao, E. Y. (2017). The microbiome and host behavior. *Annual Review of Neuroscience*, 40, 21–49. doi: 10.1146/annurev-neuro-072116-031347
- Weismantel, M. J. (1988). *Food, gender, and poverty in the Ecuadorian Andes*. University of Pennsylvania Press.
- Wood, B. J. (2012). *Microbiology of fermented foods*. Springer Science & Business Media.
- Yong, E. (2016). *I contain multitudes: The microbes within us and a grander view of life*. Random House.
- Yusoff, K. (2018). *A billion black Anthropocenes or none*. University of Minnesota Press.

