

FRAMING FERMENTS: DISCURSIVE (MICRO)BIOPOWER IN FERMENTATION
PRACTICE

by

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THESIS ABSTRACT

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This paper considers how *The Noma Guide to Fermentation* is a microbiopolitical artifact that (re)produces certain values and characteristics associated with fermentation praxis. *The Noma Guide to Fermentation* is a significant and popular book within fermentation circles; the text transforms the fermentation program at Noma, the restaurant, into a narrative. By discursively framing the practice of fermentation within potent ideological contexts, *The Noma Guide* assists human fermenters at Noma in shoring up hegemonic power via fermentation praxis. In the book, microbes regularly take on the discursive role of the natural, the magical, the cultural, and the technoscientific—often simultaneously. This portrayal of fermentation is an alluring one; it can be wielded to collapse the scale between microbiopolitics and biopolitics, in effect transforming fermentation into a practice that can harness (micro)biopower and entrench existing systems of power.

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Vignette

The first time I made hard cider I felt like a magician. That enchanted feeling came in no small part from the fact that I was in fact trying to make vinegar. I mashed and pureed a couple of dozen Bartlett pears, strained the mixture through cheesecloth, then proceeded to ferment the juice in a food grade bucket. Glamorous, I know. I had little to no idea what I was doing. In a sort of happy accident, I missed the part where, after the initial fermentation, I was supposed to let the liquid go into a secondary fermentation process. This would have allowed bacteria to convert alcohol into acetic acid, making vinegar. Instead, I bottled up my fermented pear juice, put it in the fridge, and eagerly awaited the fruits of my labor. After a few weeks, I pulled a bottle out. I was ecstatic; I'd read in *The Noma Guide to Fermentation* that pear vinegar was an excellent addition to a charcuterie board. I planned on dazzling my foodie friends with this new culinary tool; fresh bread, healthy layer of brie, thinly sliced pear, drizzle of homemade pear vinegar—that was the image in my mind as I examined my bottle of “vinegar.”

I pushed my thumbs against the bottle's flip top lid, ready for some sublime new flavors; BOOM. Liquid exploded from the mouth of the bottle like a geyser, painting my kitchen ceiling, leaving me dripping, surprised, and scared witless. *What the hell just happened?* After a moment of regathering myself, I let out a stunned giggle. I took a sip from the now calmed bottle. It tasted like cider. I'd made—and covered my kitchen with—hard pear cider? I was dumbstruck and delighted. What sort of magic had I unwittingly engaged with?

I begin my essays about fermentation and microbes with a vignette. I follow Maya Hey's lead in this regard. Hey begins her excellent essay “Fermenting Communication: Fermentation Praxis as Interspecies Communication” with a story describing the relationship she shares with her sourdough starter, Gigi, named after Hey's grandmother who was the starter's original

caretaker. I hope that beginning with a personal experience showcases the emotional bonds that form between fermenters (people who ferment things) and the many microbes they work alongside. The vignette also allows me to show my hand. While I am invested in this topic as a scholar, it is also an important realm of my non-academic life. It's a process I love. This affection is inseparable from my research and writing, and I would be remiss to gloss over that. Fermentation has changed who I am; in a sense, I've been fermented, body and mind.

Introduction and Context

This paper considers how *The Noma Guide to Fermentation* is a microbiopolitical artifact that (re)produces certain values and characteristics associated with fermentation praxis.

Fermentation is a material practice wherein humans and microbes collaborate and co-create. In fermentation practice, humans create conditions that allow certain microbes to thrive. Under these human created conditions, microbes transform food and drink in a variety of ways. *The Noma Guide to Fermentation* is a significant and popular book within fermentation circles; the text transforms the fermentation program at Noma—one of the most critically acclaimed restaurants in the world—into a narrative. By discursively framing the material practice of fermentation within potent ideological contexts, *The Noma Guide* assists human fermenters (the people involved in the process) at Noma in shoring up hegemonic power via fermentation praxis.

Microbiopolitics is a theoretical framework developed by anthropologist Heather Paxson. Paxson describes microbiopolitics as “the creation of categories of microscopic biological agents; the anthropocentric evaluation of such agents; and the elaboration of appropriate human behaviors vis-a-vis microorganisms engaged in infection, inoculation, and digestion” (2008, 17). *The Noma Guide* cordons microbes into categories based on their fermentation capacities, expounds on the varied meanings (cultural, aesthetic) of different microbes within human

contexts, and provides multiple templates for how to work with microbes in various ways. The book is riddled with attempts to linguistically pin down the role microbes play in fermentation. The text deploys massive webs of signification in an attempt to capture the flavor of human-microbe relationships. Within fermentation discourse and practice, microbes regularly take on the role of the natural, the magical, the cultural, and the technoscientific—often simultaneously.

In *The Noma Guide to Fermentation*, humans and microbes co-create each other through material-discursive practices. Throughout the book, human-microbe relationships and their microbiopolitical framing constitute ongoing intra-actions and mutual becomings. Drawing on Karen Barad's agential realist framework allows for a reading of *The Noma Guide*, and fermentation more broadly, as a site where discourse and matter collapse into each other. As Barad writes, "discursive practices are not human-based activities but material (re)configurings of the world through which boundaries, properties, and meanings are differentially enacted" (183). In this sense, the discursive elements of *The Noma Guide* become material inscriptions that change how humans, microbes, and food, to borrow Barad's term, come to matter.

The Noma Guide to Fermentation (2018) is a unique portal into the physical and rhetorical world of fermentation. The book, which was a *New York Times* bestseller, was written by René Redzepi, founder, owner, and head chef at Noma, and David Zilber, who was the head of fermentation at Noma from 2016 until 2020. The book's stated purpose is to "bring some clarity to a hazy realm of cooking, full of confusion and unfamiliar terminology." Redzepi and Zilber want their reader to "come away from [*The Noma Guide*] with the same feeling of exhilaration and wonderment" that they feel when they make and use the "miraculous products of fermentation" (23). Their target audience includes home cooks who "don't mind a weekend

project,” as well as professionals who can “read between the lines and pull out novel ideas” (17). While *The Noma Guide* is an instructional text, it is perhaps also, as immunologist John Maher noted in a review, “more handbook or bible than cookbook proper,” and has the potential to be a “450-page bacterial kick to bookshelf and kitchen alike.” The book also falls neatly into the categories of gastronomic narrative and gastronomic literature. Gastronomic narratives allow for readers to vicariously experience a restaurant through texts written by celebrity chefs, while gastronomic literature contains a miscellany of illustrations, photos, histories, and reflections, as well as recipes (McClean). As cultural historian Sasha Gora notes, Noma’s cookbooks build on the restaurant’s reputation, while at the same time standing in for a restaurant experience most people cannot access or afford (7). *The Noma Guide* contains the histories and principles behind seven different types of fermentation, as well as a broad strokes primer on fermentation, instructions for how to build an at home fermentation chamber, and notes on equipment and sourcing (often uncommon) ingredients.

The Noma Guide is couched in the story of Noma, the restaurant. Since opening in 2003, Noma has achieved a staggering level of success. The restaurant was ranked the best in the world by “The World’s 50 Best” in 2010, 2011, 2012, 2014, and 2021, and received its third Michelin star in 2021. The restaurant has done pop-ups in England, Japan, Australia, and Mexico, expanding and showcasing its international impact. Noma’s renown came, in large part, from its use of hyper local foods, foraging techniques, and fermentation. These features have become staples, if not pillars, of New Nordic Cuisine (NNC), which has gained global influence as a culinary framework, much of which can be credited to Redzepi and Noma. Given Noma’s incredible successes, *The Noma Guide* brings with it the prestige and authority of the culinary elite.

The framing of the practice of fermentation, and the cultural values associated with that framing, are human driven enterprises. As such, the discourse surrounding fermentation as a process comes to give its physical properties shape: how fermentation is talked about, thought of, and recounted has material consequences for the humans and microbes involved. *The Noma Guide* positions fermentation and its microbes as simultaneously natural, cultural, technoscientific, and magical actors. Within the text, fermentation's ability to dance across these juxtaposed rhetorical domains ends up creating the potential to instill the humans involved with a great deal of mastery and power. *The Noma Guide*'s representation of fermentation allows human fermenters at Noma, the restaurant, to gain immense cultural capital (as well as plain old capital) through fermentation. Using *The Noma Guide* and Noma as a case study, I argue that fermentation's discursive structures shape fermentation's attending microbiopolitics. How microbes and humans are framed within this context allows for a collapsing of scale whereby microbiopolitics lead to biopolitics, ratcheting up the (micro)biopower that can be harvested from both humans and microbes. In the conclusion I consider what an "affirmative microbiopolitics" (Ironstone 2019a) in fermentation might entail, and how fermentation can, materially and discursively, be turned against hegemony.

Inscribing Microbes: Discursive Elements in *The Noma Guide to Fermentation*

Framing fermentation as simultaneously natural, technoscientific, cultural, and magical instills the human fermenter with the power to control, coordinate, and mediate all of these elements. This rhetoric, on display in *The Noma Guide* (but also common in other fermentation media), collapses and confuses the distinctions between these frameworks. In this section, I show how fermentation in *The Noma Guide* blurs commonly held understandings of technoscience, nature, and culture. It is perhaps because of the coexistence of these seemingly disparate

discourses that *The Noma Guide* makes frequent use of another discursive element: magic. In the second half of this section, I analyze the function of magic's appearance in the book's second half. There is a correlation between *The Noma Guide's* use of magical rhetoric and the complexity of the ferments described as magical. In a sense, the presence of magic within fermentation allows the process to jump between nature, culture, and technoscience. At the same time, magic recenters fermentation practice's focus on the human fermenter as a sort of magician. This (over)emphasis on the individual human fermenter takes shape with the help of magic and becomes distilled into a term that can contain all of the above elements: hand taste.

The discourse surrounding fermentation, while often aimed at describing microbes and fermentation's end products, is inherently a reflection of the human agents involved. Depictions of microbes and fermentation are also descriptions of human fermenters, because the two—microbes and humans—come into being together via the performance of fermentation. Fermentation doesn't happen without both parties' involvement. Describing microbes in fermentation, one of *The Noma Guide's* major tasks, is challenging. The microbial actors in ferments are often invisible to human eyes. Fermentation *is* a space of overlap, where natural, cultural, and technoscientific actors coexist. The process of human-microbe collaboration that is fermentation can be understood as Donna Haraway's naturecultures, significant otherness, and companion species. Haraway's analysis of dogs as "a species in obligatory, constitutive, historical, protean relationship with human beings" (11-12), is equally apt for considering microbial agents.

Fermentation, broadly considered, breaks down the nature/culture binary on multiple levels; *The Noma Guide* and Noma leverage that breakdown in various ways. Environmental geographers Joshua Evans and Jamie Lorimer have described *Aspergillus oryzae*, the fungus that

co-creates koji with humans, as a “taste-shaping-nature,” a natural agent that simultaneously shapes and is shaped by human tastes. Evans and Lorimer’s work involved ethnographic study of chefs at Noma. Their work led them to label *A. oryzae* as a “charismatic” organism, in that the fungus makes itself sense-able to humans via visual, olfactory, and gustatory cues. They insightfully note that as Noma grew its fermentation operations the restaurant’s narrative “shifted from foraging wilderness ‘out there’ to fermenting wildness ‘in here.’” Evans and Lorimer see the human-microbe relationships performed at Noma as a prime example of how “humans and microbes come to shape each others’ lives.” Through the use of technologies—temperature control, fermentation chambers, etc.—humans and microbes co-produce fermentation’s end products, making both nature and culture material.

In *The Noma Guide*, the protean nature of human-microbe naturecultures is especially visible. Microbes are simultaneously capable of representing an agential, non-human nature and a culinary technology capable of enhancing the “natures” of non-microbial foods. Fermented products and the microbes that produce them are described as versatile culinary Swiss army knives (83, 215) and electrifyingly flavorful (83, 85, 107, 363). In one passage, Redzepi and Zilber state that drizzling lacto-fermented plum juice over oysters “is like hitting ‘play’ on the stereo” (80). These examples showcase a theme in *The Noma Guide* where fermented foods become culinary technologies that can be used to tweak and enhance dishes. This discursive move brings microbes into a middle ground between biological/natural agents and technoscientific tools put to use by human fermenters. The language surrounding microbes as technology takes another turn when fermented products are described as capable of “highlighting” the “natural beauty” of “raw ingredients” (Redzepi and Zilber 215) and “focusing and enlivening natural flavors” (363).

In *The Noma Guide*, it is the human mediator who determines what is natural. Human fermenters in *The Noma Guide* use microbes to bring a food's true nature to life, becoming creators and judges of nature's borders and aesthetic dimensions. In this sense, there is a teleological mission underway, in which human actors enlist microbial ones to show the true nature of nature. Microbes are figured as a natural technology which, under proper human prompting, can reveal natural designs. At the same time, microbes themselves are portrayed as natural. As with broader conversations around "nature," human agents are able to move the goalposts around in order to further political efforts and naturalize cultural/human endeavors.

Within *The Noma Guide*, and fermentation more generally, the natureculture/technoculture of fermentation gets more complicated in the context of wild fermentation. "Wild fermentation" is a term used by human fermenters to signal that the microbes involved in the ferment are those present on the skin of the fruit/vegetable/grain, in the air, or on the hands of the human fermenter. This is in contrast to ferments where an established microbial culture is introduced in order to inoculate the environment with desirable microbes. Redzepi and Zilber write that "by allowing nature to do its thing, we get layers of nuance and complexity in our ferments that wouldn't be possible if we dictated exactly which microbes were allowed to work... simply put, it's how fermentation was first performed, and it's still tried and true" (33). Here, wild microbes signify nature acting naturally, capable of achieving nuanced and complex flavors that human intervention would preclude. At the same time, wild fermentation is recognized as a performance, where the unstated performer is the human fermenter.

Through wild fermentation, human fermenters at Noma become the arbiters of what is and what isn't wild while simultaneously hyper-naturalizing their culinary endeavors. There is no "wild fermentation" without human intervention. Wild fermentation is subject to material

conditions that human fermenters produce by controlling the cleanliness, temperature, salinity, acidity, and oxygen levels of a given micro-ecology. However, “wildness” is also used to denote unwanted microbes. Redzepi and Zilber note that “there are thousands of wild and invasive molds that would jump at the opportunity to eat your fermentation project before you get the chance” (39-40). These pathogenic microbes are wild, but in a way that threatens the ‘good’ wilderness that desired microbial actors provide. At some point in wild fermentation, the process stops being wild, and wilderness becomes a threat to the culture—microbial and otherwise—of the ferment. Redzepi and Zilber point out that cleanliness can “prevent unwanted [wild] pathogens from invading” and remind the reader that they are “playing with live ammo” (36).¹ It’s worth noting that fermentation is commonly described as “controlled rot.” An uncontrolled rot (perhaps on display in the far reaches of one’s refrigerator) marks microbial agency without human intervention. While wild fermentation successfully puts to practice William Cronon’s call to celebrate “the wildness in our own backyards” (or kitchen counters) it does nothing to dispel the overarching trouble(s) with wilderness.

Technology and culture bookend the perceived “wildness” of wild fermentation in *The Noma Guide*. Anthropologists Heather Paxson and Stefan Helmreich note that microbes in cheese making are “figured simultaneously as agents of a nature that is not fully objectified *and* that is acknowledged to be inseparable from human enterprise” (173, emphasis original). The same figuring is visible in *The Noma Guide*. If microbes are considered “natural” actors, as they often are in fermentation circles, then much of human culture—in the form of fermented foods at

¹ The presence of militarized language in microbial discourse is common. It is perhaps less common in fermentation than in medical/contagion settings. For more on military metaphors and microbes see Walker 2020. Further analysis into military metaphors in fermentation could prove to be an interesting angle for future research. In a similar vein, the “live ammo” reference in *The Noma Guide*, alluding to pathogenic microbes, points towards the complicated role that risk, as well as the relationship between risk and wilderness (in the form of “wild” pathogens), play in fermentation. While it is beyond the scope of this paper to pursue this line of thinking, Sarah Jacquette Ray’s essay “Risking Bodies in the Wild” could be an interesting framework to think through in the context of fermentation, risk, disability, and wildness.

least—loses its ability to function as antithetical to the non-human world. As Paxson and Helmreich succinctly put it, microbial ecosystems may be enlisted in “both naturalizing cultural practices and culturing nature” (168).

Within *The Noma Guide*, fermentation allows the human fermenter to imbue “wildness” or “nature” into essentially anything touched by fermentation. At Noma, but really in any fermentation setting, environments built and controlled by humans are made natural through the presence of microbes. Redzepi and Zilber describe the setup of one of the rooms in Noma’s fermentation lab. It’s a “waterproof insulated room with electric coil heaters...hooked up to PID (proportional-integral- derivative) controllers which are computerized thermostats....they measure the rate of heating with a thermocouple and modulate power supply accordingly” (227). Considering this setup, the boundaries between natural, wild, cultural, and technoscientific become blurry. However, the discursive foregrounding of the natural and the wild allows for human fermenters to stay in touch with, and dictate what constitutes, a perceived natural order.

The Noma Guide’s tone shifts distinctly in its second half. The first half of the book—which covers lacto fermentation, kombucha, and vinegars—largely uses technoscience, culture, and nature to signify fermentation. The second half of the book covers koji, misos, shoyus, and garums. It is in the second half that the rhetorical deployment of magical language comes to a peak. The second half starts out with a chapter about koji. The subtitle of this chapter, which is its very first line of text, is “The Magic of Mold.” The magic mold in question is *Aspergillus oryzae*, the fungus that humans work with to make koji, which in turn allows for the making of miso, shoyu, and Noma’s version of garums. Redzepi and Zilber open the chapter with the following paragraphs:

‘Any sufficiently advanced technology is indistinguishable from magic,’ said Sir Arthur C. Clarke. And some of the most remarkable technologies on earth are biological—systems blindly refined by chance and circumstance, built over eons. The natural world is an endless source of wonder, its infinite variation a bottomless well of discovery.

We find koji indistinguishable from magic. The best kind of magic, in fact, because anybody can wield it. To experience koji’s brilliance yourself, you simply need to pop some in your mouth and taste it. (212)

The distinctions between technology, nature, and magic are abandoned in this passage. The “advanced technology” invoked by the Arthur C. Clarke quote is *A. oryzae*, a “natural” fungus that also represents a *biological* technology, advanced enough to cross over the boundary of technology into the realm of magic. The techno-magical fungus is portrayed as “blindly” coming into being, a drop in the well of knowledge, awaiting human discovery. Koji is portrayed as magical², and an accessible, wieldable magic at that, one that is available to anyone with a mouth.

The prevalence of magical language³ in fermentation discourses does significant cultural and material work. Elizabeth Graham notes that magic, religion, and science are often used in the same breath because none of these terms have clear, demarcated definitions (256). This blurring

² Portrayals of fermentation as magical, especially Koji, are common in fermentation media. For example, one of the most popular koji-focused books available is *Koji Alchemy: Rediscovering the Magic of Mold-Based Fermentation*. In fact, I have yet to encounter any fermentation related content—books, Youtube series, Instagram channels, etc.—that *doesn’t* lean into magical descriptions of fermentation.

³ As the book’s ferments become more complicated, requiring more technoscientific control and expertise, magic becomes a more common descriptor. Also of note is that magic abounds in the Koji, Miso, and Garum sections of the book. These ferments are distinctly East Asian in their origins. The use of magic as a descriptor could certainly be read as a form of exoticism and Orientalism. The presence of exoticism and Orientalism in Western fermentation settings is not uncommon and deserves further investigation.

between terms is visible in the above passage from *The Noma Guide*. In her excellent study of cheesemaking, Heather Paxson notes that magic and science both operate as intermediaries between humans and the natural world. Paxson argues that science entails humans interposing on nature, whereas magic prompts “the supernatural to intervene in the natural world,” implying a degree of human humility. However, Paxson also points out that magicalizing microbes brings with it the risk of fetishizing non-human agents and their role in fermentation (2012, 53-54).

The murkiness and adaptability of magic makes its use in fermentation media like *The Noma Guide* understandable, perhaps even inevitable. It’s hard to imagine rhetorical tools that can jump between science, technology, nature, and culture as deftly as magic can. Timothy de Waal Malefyt explains that magic is intimately tied to practices with uncertain outcomes. Malefyt also points out that as forms of objective knowledge have come under scrutiny spaces open up for “uncertainty, mystery, the unknown, and seemingly nonrational alternatives.” He argues that magic, science, and technology are all tools that people use to feel in control when faced with uncertainty regarding their understanding of the world. Anthropologist Graham Jones observes that the concept of magic is immensely complex and ever evolving, and that figuring out how and why magic is rhetorically deployed would practically solve anthropology (5). The microbial actors, both “good” and “bad,” present within a ferment plant a permanent seed of uncertainty within the practice of fermentation. That uncertainty becomes a site of value production.

The Noma Guide’s portrayal of miso showcases magic’s ability to jump between and unravel other rhetorical features. Redzepi and Zilber note the “creative genius—and luck” that lead to “time, bacteria, and fungus conspir[ing]” to create miso and a human deciding to taste it. They describe that in making miso “one seemingly defies the laws of physics by creating wholly

new matter out of thin air” (271-272). The “one” here is important, as it presumably marks the human actor in the process. In this sense, it is the human fermenter who is primarily responsible for breaking away from physics, leaving science behind in the wake of miso fermentation. Miso and its microbes are *constrained* by physics and, with help from the human side of fermentation and magic, manage to leave it behind. The material conditions that Noma utilizes to make miso though—the fermentation rooms described above—are central to its creation, and remain decidedly technoscientific. It is creativity, genius, and luck that allow for the human fermenter to bring themselves and miso’s microbes outside of the realm of science.

Magic recenters the aesthetic domain (this is, after all, about food), whereby elite chefs, like Redzepi and Zilber, maintain their status as the ultimate arbiters of taste while maintaining a connection to the more than human world. In a sense, the use of magical rhetoric allows for *The Noma Guide*’s human actors to be technoscientists, wielding nature and culture as tools, while retaining the identity of aesthetically inclined artisanal chefs. Magic acts to soften the edges of the control human fermenter’s exert on natural, scientific, and cultural knowledge and methods. The lightness of touch that magic brings acts as an alloy, strengthening the human fermenter’s hold over the process. Weaving magic into fermentation practice prevents it from being pinned into any one discursive category, rendering the material practice capable of moving between them.

The myriad meanings described above—technoscience, nature, culture, and magic—come to a point in *The Noma Guide* via *san-mat*, a Korean term meaning “hand taste.” *San-mat* is integral to *The Noma Guide*’s portrayal of miso making and central to the book as a whole. In fact, the image that accompanies the definition, a black and white illustration of a human hand surrounded by tendril-like branches moving around and away from it, is also the book’s cover

image, emphasizing the importance of the concept in the book. Redzepi and Zilber describe hand taste as “minute differences” in technique, environmental conditions, and even the human fermenters microbiome, that “ensure no two batches [of miso] will ever be exactly the same.” For Redzepi and Zilber, “hand taste, in essence, is chaos theory at work...it’s what makes fermentation unpredictable and thrilling” (278). The invocation of chaos theory brings fermentation back into the realm of physics, but in an unpredictable, perhaps magical, manner that stems from the human actor.

Hand taste within *The Noma Guide* implies that the unique conditions at Noma, and the auteurial capabilities of Noma’s chefs, are inimitable; Noma’s success through fermentation becomes contingent on individual genius, naturalized and made material through hand taste. Through hand taste, the human fermenter in *The Noma Guide* becomes the critical agent; it is the individual’s unique position in time, place, relation to nature, etc., that sparks the chain of events leading to a successful ferment. Hand taste is the condensation of every other discursive element into the human fermenter. It allows for the disparate elements of fermentation to come together at once. This conglomeration of signification again brings with it the appeal of magic’s undefined rhetorical borders. Hand taste simultaneously connotes the unique signature of the human fermenter, the stamps of time, place, and environment on a ferment, and an escape from industrialization and commodity fetishism. The unpredictability accompanying hand taste creates the discursive need for technoscience and magic, tools used to navigate fermentation’s uncertainty. Hand taste becomes a unifying property possessed by the singular human fermenter; at Noma, it comes to represent the concentration of knowledge and power in individual chefs.

The Collapsing of Scale: From Micro to Biopolitics and (Micro)Biopower

In this section, I argue that fermentation's microbiopolitics, created through texts like *The Noma Guide*, facilitate a collapsing of scale whereby the microbiopolitical becomes the biopolitical. The portrayal of microbes and fermentation described in the previous section works to imbue chefs with knowledge on various cultural fronts, leading to the accumulation of significant sway and power, which in turn can be wielded biopolitically. *The Noma Guide* both reflects and creates the material conditions at Noma. The simultaneous embrace of and mastery over, natural, cultural, technoscientific, and magical material-discourses have real consequences in the restaurant, and restaurant culture more broadly. The book itself is a projected image of Noma. As Gora notes regarding Redzepi's first book, these images influence public perception of the restaurant, making them useful tools in constructing Noma's identity (9). *The Noma Guide* and Noma's imbrication constitute an ongoing material-discursive performance with (micro)biopolitical consequences.

Biopolitical and necropolitical structures are materially visible within fermentation practice, albeit on the micro scale. Redzepi and Zilber, like most fermentation guides, stress the importance of sanitation and cleanliness in avoiding unwanted microbes. In their sanitation section, they warn of the dangers pathogenic microbes pose, categorizing them as "live ammo" (36) as I mentioned above. Importantly, cleanliness and sanitation not only protects the human fermenter, but the "good" microbial agents involved in a ferment. Cleanliness, along with the methods of control deployed in creating microbial environments (salinity, acidity, temperature, etc.), act in conjunction to allow "good" microbes to live and proliferate, and kill off "bad" microbes. Biopolitics are at work in fermentation; fermenters are actively engaged in the process of "making live and letting die" (Foucault qtd. in Wolfe 22). At the same time, the controlling of micro-ecological conditions and use of sanitation and sterilization practices neatly maps onto

Achille Mbembe's notion of necropolitics. Eradicating "bad" microbes to encourage "good" microbial life is a way of "subjugating life to the power of death" (Mbembe 92).⁴ Great efforts are made, in the end, to prevent the wrong microbes from getting into human bodies via a "bad" ferment. In their own ways, microbes pull at and dictate human fermenter's actions.

Noma provides a case study for how microbes can be harnessed by hegemony and in fact *facilitate* the entrenching of systems of power. Through the construction of fermentation's cultural significance in *The Noma Guide*, the microbiopolitical becomes more than humans simply dealing with "good" and "bad" microbes; instead fermentation becomes a tool for expressing immense value through food. At the beginning of 2023, René Redzepi announced that Noma would be closing as a restaurant, rebranding itself as Noma 3.0. The restaurant's newest iteration will primarily be a food laboratory, focused on producing fermented products for resale. As a result, food media has been abuzz with opinions about Redzepi, Noma, and the announcement. A recent *New York Times* article claims that Redzepi upended fine-dining traditions by "discarding imported delicacies like French foie gras and Italian truffles" and instead favoring local, foraged, and fermented ingredients (Moskin). Through fermentation, Redzepi and Noma have come to be seen as revolutionaries in the food scene, despite maintaining a \$500 price tag for a seat at their tables (and that's before the drink pairings). While Redzepi and Noma have certainly had a huge influence on what ingredients fit into fine dining paradigms, the socioeconomic structure and labor practices of ultra-high end restaurants remains intact.

Noma's use of ingredients, including fermented one, goes against the grain of traditional fine-dining, but the restaurant's labor practices, customer base, and price point represent a

⁴ I do not mean to equate the lives of microbes to the lives of humans navigating bio/necropolitics, I only aim to show that these theories can be useful in understanding human-microbe relationships.

commitment to, not a rejection of, business as usual for global elites. Fermentation at Noma has allowed for a revolution of taste to obfuscate unfair labor conditions that in fact constitute the *opposite* of a revolution. In a sense, the proper treatment of microbes allows for the improper treatment of workers, as long as the flavors justify the means. In a recent article for *The Atlantic*, Rob Anderson points out that nearly half of Noma's workforce is made up of unpaid stages (the restaurant equivalent of an unpaid intern). Anderson argues that exploiting free labor does not merit celebration, regardless of how unique and original the food on the plate is. Within Anderson's solid critique of Noma, he slips into a level of admiration, admitting that when he ate at Noma he "marveled at the way the wizards in Noma's kitchen transformed several courses of fuzzy mold and crunchy insects into something beautiful." Anderson's language showcases how the magic-laced discourse of fermentation in *The Noma Guide* has infused the chefs at Noma with the very magic they ascribe to microbes.

The "fuzzy mold" that Anderson sees as being magically transformed by the wizard-chefs at Noma is in fact an agent that *actively transforms the chefs who wield it*. Fermentation is decidedly microbiopolitical; however, *The Noma Guide* and Noma also rope microbes into biopolitical structures. Cary Wolfe describes biopolitics as the strategic coordination of power dynamics, aimed at extracting power from living organisms (33). While Wolfe is primarily concerned with the relationship between animals and biopolitics, his insights hold true with microbes. Noma and *The Noma Guide* work in tandem. At Noma, microbes' biopower is harnessed in order to produce fermented foods. In *The Noma Guide* the practice of fermentation is shaped by the rhetorical deployment of potent cultural ideas. Imbuing the microbes involved in fermentation with magical, technoscientific, natural, and cultural significance ratchets up the biopower fermenter's can harvest from microbes and fermented foods. A fermented dish isn't

simply food; it becomes instead the distillation of magic, nature, technoscience, and culture, all packed into a literal bite. In turn, those wielding the material-discursive network that fermentation represents come to embody the role of wizards, scientists, naturalists, and gourmands.

The wizard-naturalist-scientist chefs at Noma end up gaining power from microbes by inscribing them with magic-nature-technoscience laden discourse. Fermentation's protean signification allows for the power pulled from it to be mutable and adaptable. It can be molded to fit different cultural domains, even at the same time, to best fit the motive or narrative of the human fermenter. For example, the cover of *Time Magazine* on November 18, 2013 pictures Redzepi, standing between chefs David Chang of Momofuku, and Alex Atala of D.O.M. The caption, in bold, red, capitalized letters read "The Gods of Food." While this magazine cover predates *The Noma Guide*, it remains a vivid example of the power chefs can accumulate through a combination of narrative and food practices. The prestige that Redzepi has comes in no small part from his work with microbes at Noma and in *The Noma Guide*. This status, fueled by the molding of fermentation practices, is the driving force that allows Noma to recruit such large cohorts of unpaid stages; the opportunity to work with one of the gods of food—an auteur who is equal parts scientist, naturalist, artisan, and magician—is a powerful incentive.

The discursive shaping of fermentation—as a site of nature, culture, technoscience, and magic that chefs can wield to great success—has had material consequences at Noma, consequences that come to matter for people and microbes alike as they navigate (micro)biopolitics. The promise and allure of Noma has facilitated the restaurant's ability to recruit unpaid labor in the form of stages. Nearly *half* of Noma's workforce is made up of unpaid stages, willing to work for free in the hope of gleaning knowledge and prestige from the

restaurant. One chef who staged at Noma recounted selling all of his belongings and *spending* \$15,000 in order to work for free at Noma (Carman). Other stages report conditions at Noma ranging from boring and monotonous (three months of shaping fruit leather into the shape of a beetle), to abusive. Namrata Hegde, who staged at Noma in 2017, reported that she was required to work in silence and “forbidden to laugh” (Moskin). Redzepi himself has admitted to the abuse he subjected his employees to in an essay he wrote called “Culture of the Kitchen” where he asks how chefs can rectify the “screaming and shouting and physical abuse we’ve [sic] visited on our young cooks” (Redzepi). While it isn’t the whole story, *The Noma Guide* and texts like it have shaped fermentation into something so promising and powerful that it can be used unjustly to shore up power and capital.

The portrayal of fermentation in *The Noma Guide* isn’t mere portrayal; it is an active and ongoing inscribing of the performance of fermentation, one that gives shape to both the humans and microbes involved. Barad writes that “discourse is not what is said; it is that which constrains and enables what can be said...discursive practices produce, rather than merely describe, the subjects and objects of knowledge practices” (146-147). The discourse of fermentation *matters*. The ways that *The Noma Guide* depicts fermentation rhetorically become fundamental parts of the material practice and the meaning derived from it. I’m not committed to jettisoning all of the language used within the book. In my own experience, it is hard to talk about fermentation without falling back on the same descriptions *The Noma Guide* uses. Interpreting fermentation is a very sensory and embodied practice, steeped in smells and tastes and feelings. Smell and taste are genuinely hard to describe, and have long been considered as lesser senses in Western thought, resulting in a lack of language attached to them (Brady). Maya Hey has argued that “the imbricated nature of human and microbe complicates who is sender and

who is receiver.” Hey further suggests that this human-microbe imbrication necessitates “that our communication paradigms must be updated” (2019, 150). Hey’s insights prompts important questions: What parts of existing fermentation discourse are important and worth saving? What discursive methods might be replaced? As Lauren Fournier has shown, fermentation can be considered a practice in theory, whereby something can be simultaneously preserved and transformed. How might fermentation itself be fermented?

Conclusion: Towards an Affirmative Microbiopolitics, or Fermenting Fermentation

In this paper, I’ve tried to show the inseparable relationship between how fermentation is framed and how it comes to be performed. The variety of meanings built into fermentation—in *The Noma Guide*, at Noma, and more broadly—change what it means for humans to work with microbes to create food and drink. *The Noma Guide* and Noma showcase how the cultural lens through which humans view fermentation have political consequences. Microbes can be roped into biopolitics and used to build hegemonic power. Fermentation isn’t a panacea; its borders, boundaries, meanings, and uses are subject to systems of power. Fermentation does not inherently signal any radical restructurings of (micro)biopolitics or power. However, in this final section, I consider fermentation, and its accompanying microbes, as a powerful method of thinking and practice, capable of co-facilitating important change.

Fermentation has the potential to be a site of what Penelope Ironstone has called an “affirmative microbiopolitics.” For Ironstone, the onto-epistemologies that might arise from human microbiome research—multispecies relations, upending of power dynamics, and reconceptualizations of the self—represent the potential for this “affirmative microbiopolitics.” While Ironstone’s focus is the human-microbiome, I see fermentation as a similarly rich space capable of facilitating radical change. Lauren Fournier has shown the useful metaphorical

applications that fermentation unlocks. Fermentation allows for the simultaneous preservation and transformation of food; Fournier extends this process to include the notion of fermenting ideas and concepts (in her case, “Fermenting Feminism”), allowing epistemologies to be “flexible and mutable, open and bubbling and ready to trigger transformation with the passage of time and the introduction of new materials” (97).

Megan Carney, a professor at the University of Arizona, hypothesized that fermentation has pedagogical promise and put it to the test in a classroom in the spring of 2020. Carney relates that “for many students, the slow and evolving process of fermentation seemed to catalyze a shift in their relationship to food in which they were not the primary agent of change.” Fermentation opens up space for a slowing down of food systems. In that slowed down space, students witness the collaborative effort between themselves, microorganisms, and fruits and vegetables. The end result is a foodstuff that has significant personal and cultural meaning. Carney’s class was interrupted by the Covid-19 pandemic, adding a complex layer of microbiopolitics to her student’s experience. Similarly, I had the opportunity to teach fermentation workshops at the University of Oregon’s Urban Farm during the summer of 2022. Many of my students relished the opportunity and came away from it with a deeper understanding of food and the complex ecological and cultural processes that make fermented foods possible. Plus, they enjoyed eating products they had both helped grow and ferment.

As a practice, fermentation is shot through with coexisting contradictions, capable of sparking epistemic and ontic paradigm shifts. The first contradiction a human fermenter encounters lies within fermentation's primary purpose: preservation via transformation. As *The Noma Guide* puts it, “the best ferments still retain much of their original character... while simultaneously being transformed into something entirely new” (Redzepi and Zilber 19). The

output of a successful, say, sauerkraut ferment, is radically different from its input—in this case cabbage—yet it is still in fact cabbage. Microbes thrive in the realm of contradictions. They are able to occupy disparate spaces, collapsing commonly held distinctions. Because of this, the practice of fermentation has the potential to be a fruitful method in undoing binary structures, and facilitating what Karen Barad describes as diffractive thinking. As Carney noted, and as my fermentation workshops also allude too, fermentation can be fit into classroom environments, and act as a method for praxis to accompany a range of theoretical frameworks.

Fermentation, like diffractive thinking, allows for (or perhaps is underpinned by) the coexistence of contradictions, the overlap of seemingly conflicting phenomena. Barad advocates for a shift away from reflection and reflexivity based epistemological frameworks. She instead calls for the implementation of diffractive methodologies. Diffractive methods take seriously “how practices matter,” in both the literal and figurative sense of mattering (90). For Barad, diffractive thinking opens up the possibility for an “ethico-onto-epistem-ology.” In other words, the type of thinking that diffractive practices allow for are not just thinking. A diffractive method recognizes that thinking, being, and ethics are not separable, but processes that co-construct each other. This theoretical framework can simultaneously aid in better understanding human-microbe relationships, and *be developed through the practice of fermentation*. The paradoxical, hard-to-square aspects of fermentation are examples of diffraction patterns at work. At the same time, the contradictions within fermentation practice loosen the constraints that can make diffractive thinking so challenging.

An affirmative microbiopolitics in fermentation requires attention to, and deliberate cultivation of, building justice frameworks into the practice. *The Noma Guide*’s portrayal of fermentation showcases the microbial ability to confuse human assumptions about the nature of

nature. There is potential for fermentation to challenge anthropocentric assumptions about human non-human relations and break boundaries. However, there is also the chance that the material-discursive practices might fall into the well-worn tracks of healthism (Hey 2020), hegemony, and normative/status quo values. As more people take an interest in fermentation, and the “microbial humanities” as Rees et al. have labeled them, the discourse surrounding microbes will continue to grow. Taking it seriously, shaping it deliberately, and bending it towards just and equitable ends, are key components in moving toward an affirmative microbiopolitics of fermentation. The deliberate use of discourse is a critical aspect of creating human-microbe relationships with the potential to radically change how we come to be together. Barad writes that “*we are part of that nature that we seek to understand*” (26, emphasis original); Barad’s insight here is important to keep in mind when working alongside, thinking through, and coming into being with microbes.

Works Cited

- Anderson, Rob. "How Noma Made Fine Dining Far Worse," *The Atlantic*, January 16, 2023. <https://www.theatlantic.com/ideas/archive/2023/01/noma-copenhagen-fine-dining-unsustainable/672738/>. Accessed 1/19/23.
- Barad, Karen. *Meeting the Universe Halfway: Quantum Physics and the Entanglement of Matter and Meaning*. Duke University Press, 2007. <https://smartrnightreadingroom.files.wordpress.com/2013/05/meeting-the-universe-halfway.pdf>. Accessed 12/24/2022
- Brady, Emily. "Sniffing and Savoring: The Aesthetics of Smells and Tastes." *The Aesthetics of Everyday Life*, ed. A. Light and J.M. Smith, Columbia University Press, pp. 177-193, 2005.
- Carman, Tim. "Former Noma Cooks Dish on Grueling Work, Experimentation at Restaurant." *The Washington Post*, January 2023. <https://www.washingtonpost.com/food/2023/01/11/noma-closure-chefs-reactions/>. Accessed 2/9/23
- Carney, Megan. "Teaching with Microbes: Lessons from Fermentation During a Pandemic." *mSystems*, vol. 6, issue 4, August 2021.
- . "Critical Perspectives on the Microbiome." *American Anthropologist*, vol. 122, issue 3, pp. 643-644, 2020. <https://doi-org.libproxy.uoregon.edu/10.1111/aman.13439>
- Cronon, William. "The Trouble with Wilderness; or, Getting Back to the Wrong Nature." *Uncommon Ground: Rethinking the Human Place in Nature*. https://www.williamcronon.net/writing/Trouble_with_Wilderness_Main.html. Accessed 2/8/23
- Evans, Joshua and Jamie Lorimer. "Taste-Shaping-Natures: Making Novel Miso with Charismatic Microbes and New Nordic Fermenters in Copenhagen." *Current Anthropology*, vol. 62, no. S24, August 2021. <https://www.journals.uchicago.edu/doi/full/10.1086/714851>.
- Fournier, Lauren. "Fermenting Feminism as Methodology and Metaphor: Approaching Transnational Feminist Practices through Microbial Transformation." *Environmental Humanities*, vol. 12, issue 1, pp 88-112. <https://doi.org/10.1215/22011919-8142220>.

- Graham, Elizabeth. "Do You Believe in Magic?" *Material Religion*, vol. 14, no. 2, June 2018, pp. 255–57. *EBSCOhost*, <https://doi-org.libproxy.uoregon.edu/10.1080/17432200.2018.1443843>
- Gora, L. "Eating the North: An Analysis of the Cookbook Noma: Time and Place in Nordic Cuisine." *Graduate Journal of Food Studies* 4.2 (2017): 7-20.
- "The Gods of Food." *Time Magazine*, November 18, 2013. <https://time.com/729/the-gods-of-food/>. Accessed 2/8/23.
- Haraway, Donna. *The Companion Species Manifesto: Dogs, People, and Significant Otherness*. Prickly Paradigm Press, 2003. https://xenopraxis.net/readings/haraway_companion.pdf. Accessed 2/10/23.
- Hey, Maya. "Against healthist fermentation: Problematizing the 'good' of gut health and ferments." *Journal of Critical Dietetics*, vol. 5, issues 1, 2020. <https://doi.org/10.32920/cd.v5i1.1334>
- . "Fermenting Communications: Fermentation Praxis as Interspecies Communication." *Public*, vol. 30 number 59, pp. 149-157, June 2019. <https://doi-org.libproxy.uoregon.edu/10.1386/public.30.59.149>.
- Jackson, Zakiyyah Iman. *Becoming Human: Matter and Meaning in an Antiracist World*. New York University Press, 2020.
- Jones, Graham M. *Magic's Reason: An Anthropology of Analogy*. University of Chicago Press, 2017.
- Leer, Jonatan. "New Nordic Men: Cooking, Masculinity and Nordicness in René Redzepi's Noma and Claus Meyer's Almanak." *Food, Culture, & Society*, vol. 22, no. 3, 2019, pp. 316–33, <https://doi.org/10.1080/15528014.2019.1582250>.
- Lorimer, Jamie. "Probiotic Environmentalities: Rewilding with Wolves and Worms." *Theory, Culture & Society*, vol. 34, no. 4, July 2017, pp. 27–48, doi:10.1177/0263276417695866.
- . *The Probiotic Planet: Using Life to Manage Life*. University of Minnesota Press, 2020.
- Maher, John. "FOMENTING FERMENTS WITH Noma's BEST: In superstar chefs René Redzepi and David Zilber's new cookbook, The Noma Guide to Fermentation, the proof

- is in the probiotics." *Publishers Weekly*, vol. 265, no. 37, 10 Sept. 2018, pp. 46+. *Gale Academic OneFile*,
link.gale.com/apps/doc/A558979253/AONE?u=euge94201&sid=bookmark-AONE&xid=858e761f. Accessed 6 Feb. 2023.
- Malefyt, Timothy de Waal. "Magical Practice." *Oxford Research Encyclopedia of Anthropology*. 25. Oxford University Press. Date of access 7 Dec. 2022,
<https://oxfordre.com/anthropology/view/10.1093/acrefore/9780190854584.001.0001/acrefore-9780190854584-e-463>
- National Institutes of Health. "Human Microbiome Project Defines normal bacterial makeup of the body." *NIH*, 2012.
<https://www.nih.gov/news-events/news-releases/nih-human-microbiome-project-defines-normal-bacterial-makeup-body#:~:text=Where%20doctors%20had%20previously%20isolated,microorganismal%20genera%20in%20healthy%20adults>. Accessed 5/25/22.
- Ironstone, Penelope. "Me, My Self, and the Multitude: Microbiopolitics of the Human Microbiome." *European Journal of Social Theory*, vol. 22, no. 3, Aug. 2019, pp. 325–341, doi:[10.1177/1368431018811330](https://doi.org/10.1177/1368431018811330).
- Mbembe, Achille, and Steven Corcoran. *Necropolitics*. Duke University Press, 2019. *JSTOR*,
<https://doi.org/10.2307/j.ctv1131298>. Accessed 25 May 2022.
- McClean, Alice. "Cookbooks and the Publishing Industry," in *Food Issues: An Encyclopedia*, pp. 296-299, ed. Ken Albala. Sage Publication, 2015.
- Moskin, Julia. "Noma, Rated the World's Best Restaurant, Is Closing Its Doors." *The New York Times*, January 9, 2023.
- Paxson, Heather. *The Life of Cheese : Crafting Food and Value in America*, University of California Press, 2012. *ProQuest Ebook Central*,
<https://ebookcentral-proquest-com.libproxy.uoregon.edu/lib/uoregon/detail.action?docID=1040634>.
- . "Post-Pasteurian Cultures: The Microbiopolitics of Raw-Milk Cheese in the United States." *Cultural Anthropology*, vol. 23, no. 1, 2008, pp. 15–47.
- Paxson, Heather, and Stefan Helmreich. "The perils and promises of microbial abundance: Novel natures and model ecosystems, from artisanal cheese to alien seas." *Social Studies of Science* 44.2 (2014): 165-193.

Ray, Sarah Jaquette. "Risking Bodies in the Wild: The 'Corporeal Unconscious' of American Adventure Culture." *Journal of Sport and Social Issues*, vol. 33, no 3, pp 257-284, August, 2009.

Redzepi, René. "Culture of the Kitchen: Rene [sic] Redzepi." *MAD*, 2015.
<https://madfeed.co/2015/culture-of-the-kitchen-rene-redzepi/>. Accessed 2/6/23

Redzepi, René, and David Zilber. *The Noma Guide to Fermentation*. Artisan, 2018.

Umansky, Jeremy and Rich Shih. *Koji Alchemy: Rediscovering the Magic of Mold-Based Fermentation*. Chelsea Green Publishing, May 202.

Walker, Iona. "Beyond the military metaphor." *Medicine Anthropology Theory*, 7(2), 261-272, 2020. <https://doi.org/10.17157/mat.7.2.806>

Wolfe, Cary. *Before the Law: Humans and Other Animals in a Biopolitical Frame*. University of Chicago Press, 2013.