In the Company of Bread: Sourdough Baking as Symbiotic Care

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Abstract

Sourdough baking is a mutualistic project that involves collaboration from humans and microbes. A loaf of sourdough bread is the result of a symbiotic relationship based on reciprocity between the baker and microbes. The baker is equally dependent on the microbes in the sourdough as they are on the baker. He feeds and cares for them, and they return the favor. Here, we propose the concept symbiotic care *to analyze the interspecies collaboration between humans and microbes through sourdough baking. These mutual social practices dictate the rhythms of everyday life and are part of a broader ecosystem that connects all forms of life. Caring for sourdough mothers and baking sourdough bread can be considered a form of self-care that always involves other species, emphasizing the mutualistic aspects of interspecies collaboration and expression. This symbiotic collaboration and care through time demonstrates how different communities of microbes have co-evolved with human bakers and shaped their common history. For a long time, sharing sourdough mothers has been a part of multispecies commensality and community making. However, there is another side to this story: the microbes that the sourdough mother consists of have also been creating their own communities over time. To share sourdough mothers that, in turn, share human bakers illustrates symbiotic care in everyday life.*

Keywords: sourdough; symbiotic care; time; multispecies collaboration; multispecies commensality

Introduction

> I was really stuck in all the rules, thinking it was some complex biology or math. I had an old Nissan Almera, and I went out partying, but I was always going out to the car because I had the dough in the back of the car. There is nothing normal about that. But that's the way I was then. I said to my boyfriend that either I take the dough with me, or I won't go - I am baking! (Interview No. 3 2020)

Sourdough baking is a serious commitment. It demands mutual care and collaboration from humans and microbes. Taking care of a sourdough mother demands patience, affection, and sometimes, going to great lengths to meet her needs, like bringing her along in the backseat when going out partying. This is microbial adult supervision.

Cultural Analysis 22.2 (2024): 76–95

During the COVID pandemic, the Icelandic sourdough group on Facebook grew exponentially. From March 2020, when the first restrictions took effect, until May 2020, the group grew by 78%. Before the pandemic, the group had around 3,500 members but has almost quadrupled in size, now counting around 13,700 members.[1] During the pandemic, photos of homemade sourdough bread, sourdough buns, and sourdough pizzas proliferated, accompanied by memes and narratives of both successes and failures in cultivating and caring for sourdough mothers (Byron 2021; Delap 2020). The sourdough Facebook group also became popular for sharing sourdough starters and different recipes. In that sense, sourdough became a powerful symbol of resilience, relationship-building, and care while people lived under the constraints of shutdowns and quarantines. At a time when life and its usual rhythm were disrupted and controlled mainly by the unknown, sourdough baking was, for some, a way to "restore a sense of an organized and structured everyday life" (Arantes 2020, 43). Others felt that sourdough baking brought them a sense of community by sharing baking recipes, experiments, and microbes with friends and family who were also baking during the quarantine (Siragusa 2020). As Michael Pollan has noted, people who ferment seem extremely generous when sharing their knowledge, recipes, and cultures with each other (Pollan 2013, 232). When disinfectant dispensers became standard equipment for everyday living, more and more people deemed it important to spend their time engaging with and nurturing this microbial soup that a sourdough mother consists of (Long et al. 2021).

During the pandemic, many people thus suddenly found themselves living a life where they had much more time on their hands, as the ethnologist Tine Damsholt has noted. The pandemic was time that could be used for crafting, reading, and baking sourdough bread (Damsholt 2020; see also Sofo, Galluzzi and Zito 2021; Ocklenburg 2020). However, most bakers featured in this article had all been baking before the pandemic hit. They perhaps had more time to bake and share the results on social media during the pandemic, but it was not the beginning nor the end of their baking, nor were the meanings attached to this practice.

Sourdough, or sourdough mother or starter, is a wild yeast used to make bread and pastries. It is made by mixing flour and water. The mixing activates bacteria and microbes from the flour, water, and the atmosphere, initiating a fermentation process that produces gas and makes the dough rise. One can either start one's own sourdough or get a little bit of someone else's sourdough, for sourdoughs can, with the proper care, be kept alive for years, decades, or even centuries. However, care is an indispensable ingredient whereas a baker can only bake bread with a good and healthy relationship with the microbes in the dough. Fermentation is, therefore, "an intentional act of care" (Drain 2021). For the microbes to survive, the sourdough baker must take care of the sourdough by feeding it regularly with flour and water. Some bakers feed their sourdough daily, even two times a day if baking regularly, while others keep their sourdough in the fridge and feed it every other week or so. If the microbes in the sourdough are not in good balance, the bread will not rise and may end up tasting bad. A delicious loaf of sourdough bread is, therefore, the result of a symbiotic relationship based on reciprocity between the baker and microbes; the baker is equally

dependent on the microbes in the sourdough as they are on the baker. He feeds and cares for them, and they return the favor. In other words, baking sourdough bread can be defined as an "intimate working relationship between microbes and humans" (Lee 2010, 176).

In the article, we propose the concept *symbiotic care* to analyze the interspecies collaboration between humans and microbes through sourdough baking. These mutual social practices dictate the rhythms of everyday life and are part of a broader ecosystem that connects all forms of life. Caring for sourdough mothers and baking sourdough bread can be considered a form of self-care that always involves other species, emphasizing the mutualistic aspects of interspecies collaboration and expression. Furthermore, we explore how the symbiotic care inherent in human-microbial sourdough practices influences and structures the experience of time. To investigate these practices of humans and microbes, we ask the following questions: What can *symbiotic care* tell us about interspecies collaboration, and how does this collaboration unfold daily? What does the temporality of sourdough baking and caring for the sourdough mother mean in the everyday life of the sourdough baker?

Mixing the Human-Microbial Dough

The materials for this article have been gathered from various sources and different ethnographic sites. They include in-depth interviews with humans, interaction with moody sourdough mothers, a questionnaire, a Facebook group on sourdough baking, as well as material culture in the form of freshly baked bread. The ethnologists Tom O'Dell and Robert Willim (2011) suggest that ethnographies should be understood as compositions. As compositions, ethnographies are not produced in one place but develop from ethnographic activities at multiple sites overlapping in various ways. Furthermore, O'Dell and Willim argue that ethnographies should be understood as fashioned from a "multitude of bits and pieces" (2011, 31) that are made through multiple experiences and encounters in collaboration with informants (O'Dell and Willim 2011). Here, we build on this understanding to incorporate interspecies collaboration of human bakers and sourdough mothers. This multispecies collaboration produces ethnographic compositions that "is concerned with the effects of our entanglements with other kinds of living selves" (Kohn 2007, 4; see also Helmreich 2010). This approach acknowledges the subjectivity of other species than humans and the multispecies relationality of agency.

Human bakers and sourdough mothers could thus be defined as "mixmates" (Franklin 2008), working together to make sourdough bread. Various scholars have pointed out that we have never *only* been human (Haraway 2003; Latour 1988, 2004). As Donna Haraway has taught us, being human is to be more-than-human; it is to "become with" other species with whom we share life: "to be one is always to become with many" (Haraway 2008, 4). The English word *companion* derives from the Latin word *com* (together with) and *panis* (bread). In French *compagnion* means: one who breaks bread with another. Sourdough mothers as companion species (Haraway 2003) thus describe both the biological relationality of humans and microbes, and the social

aspect of multispecies commensality.

Among other sources, the article is based on seven qualitative in-depth interviews (Taylor, Bogdan and DeVault, 2016) with eight experienced sourdough home bakers of different ages in Iceland. The interviews were conducted between 2020–2021. The bakers had all been baking for a minimum of three years by the time they were interviewed. Their symbiotic relationship with their sourdough was thus present in their everyday life prior to the pandemic. All of the bakers baked on a regular basis with occasional breaks during busy times in their lives or when traveling. Four of the interviews were conducted in the baker's home, where the participants either had freshly baked loafs or were making dough during the interview. Three interviews were conducted online due to restrictions that resulted from the Covid-19 pandemic. Participants were found through various methods. Some were referenced to the interviewer, some were found through advertisements on social media, and others were long-term sourdough bakers that the interviewer knew or knew of. The interviews focused specifically on sourdough baking in the home, where participants were asked to describe their baking practices in detail and comment on the values behind baking one's bread. In addition to exploring different temporalities in relation to sourdough bread-making, the interviews also investigated the methods of the sourdough bakers, the reasons why they use these methods, and the emotional connection bakers have to their sourdough. Furthermore, the interviews explored whether naming one's sourdough is a common custom amongst sourdough bakers and, if so, what naming traditions are most common.

Moreover, we draw upon a response to a questionnaire that was sent out in collaboration with the National Museum in Iceland (ÞÞ 2022-4). The questionnaire was about fermented foods in general and asked about different aspects of working with fermented food at home. It asked questions such as what methods people use, what kind of food they ferment, where and how they learned to ferment, and how they think and feel about the microbes in the fermentation process. People who answered the questionnaire participated in various fermentation practices that included sourdough baking, making kombucha and yogurt, fermenting sauerkraut, and brewing beer at home. We have sorted out relevant answers where informants talk specifically about sourdough baking. The interviews and the questionnaires complement each other as questionnaires are convenient for collecting material from many informants (see Kjus and Grønstad 2014).

In contrast, the interviews provide an opportunity to approach the topic more deeply, and the researcher can guide the conversation. With questionnaires, the informant may interpret and choose which questions to reply to and how to respond. It is, therefore, likely that the answers in the questionnaire are both carefully selected and filtered (Marander-Eklund 2012). The questionnaire answers include what matters to the informants, expressed in their own words, and the practices, impressions, and emotions connected to sourdough baking.

In addition, we rely upon posts on the Facebook page of Súrdeigið (The Sourdough), which includes discussions between bakers, pictures, and memes on everything sourdough. The posts express various emotions connected to the successes and

failures of sourdough baking and how taking care of and baking from the sourdough mothers affects everyday life. Ragnheiður Maísól, the co-author of the article, is an avid sourdough baker. Her interest in the subject, therefore, comes from her own personal experience of a symbiotic life with the same sourdough mother for over a decade. She has a deep understanding of sourdough baking, which meant that the interviews focused more on the effect sourdough baking has on the baker's everyday life, rather than the baking process. She is also the founder of Súrdeigið (The Sourdough), the Icelandic Sourdough Facebook group, and has been following the sourdough community in Iceland closely for the past years. When searching for informants, both active members of the group as well as bakers who do not use social media were included and interviewed to represent a more diverse group of bakers.

The Cyclical Time of the Sourdough

Figure 1. A bubbly sourdough mother. Photograph (2023) by Ragnheiður Maísól Sturludóttir.

Sourdough can be categorized as *slow* food: making and baking a loaf of sourdough bread can take up to 72 hours. To start making a good loaf of sourdough bread the baker must have access to a healthy and bubbly sourdough mother fed in the previous 4 to 12 hours. When the sourdough mother has been fed, the microbes in the dough take over and start munching away, giving the dough its distinct sour flavor and form-

ing carbon dioxide, which is visible to the baker as bubbles in the dough (Meyer 2014, 42). When mixing dough for a sourdough loaf, the baker takes a bit of the sourdough mother and mixes it with the dough, starting the fermentation of the dough. If a short time passes from feeding the sourdough mother to mixing the dough, the microbes in the sourdough have not begun working properly, and the dough will not rise. If too much time passes, the microbes in the sourdough mother have finished all their food, resulting in a sour smell and taste and a dough that does not rise properly. For successful sourdough baking, it is important that the baker takes good care of the sourdough mother and keeps it healthy. Usually, the baker feeds the sourdough mother right after using a part of it to mix the dough. The cyclical time of the sourdough is, therefore, intertwined with the practice of baking, with the bread being a result of regular engagement with the sourdough's cyclical rhythm.

There are countless ways and recipes one can use to bake sourdough bread. Most of them call for a process with two steps of fermentation. The first fermentation, often called bulk fermentation (Hamelman 2013, 13), usually lasts 6 to 10 hours. At the start of the bulk fermentation, the baker often needs to knead or fold the dough and keep an eye on how the fermentation goes; that is, tune into the microbes. After bulk fermentation, the dough is divided up, shaped, or put into bread tins and given a second rise. For the second fermentation, bakers often prefer to leave the dough in a fridge. The dough rises slower in the fridge, giving the baker a bit more freedom to bake the bread when it fits his everyday schedule. A cold fermentation also gives the microbes time to give the bread a deeper and more complex flavor (Reinhart 2016, 62), which many bakers seek.

In contrast, a loaf of bread made with baker's yeast, which has been dominant as a leaven in dough making for the past century, only takes a few hours to make. Only recently has sourdough made a comeback into the culinary scene, with sourdough bakeries becoming more popular and sourdough bread a standard within the restaurant branch. Despite this recent surge in popularity, sourdough baking is far from new. Some forms of fermented bread are even believed to date back as far as 4000 years B.C. (Pollan 2013, 124). It is, in fact, the commercial baker's yeast that is a relatively recent invention, only dating back to the end of the 1920s (Lahue et al. 2020: 3). The invention of baker's yeast came alongside temporal changes in societies where people were moving away from living according to the seasons and structuring time in a linear way that could perhaps be described as time being "straightened into an arrow" (Dawdy 2010, 764). Time became a commodity, a unit that could be bought and sold, and its price negotiated in labor disputes. Instead of doing the daily tasks in rhythm with the rise of the sun and the run of the seasons, people were controlled by the factory whistle (Löfgren 1987, 25). Using time efficiently meant that more things could be produced, enhancing profits. The production of bread was no exception to this.

Sourdough baking is not only a slow process it can also be an unpredictable one. Various factors affect how slowly or quickly the sourdough proofs, and some are hard to control, like the weather and microbes in the environment. Unlike sourdough, baker's yeast does not need to be attended to regularly, and fewer outside factors affect the way the dough proofs. The invention of baker's yeast made the bread-making

process quicker and easier to control. By making bread with baker's yeast, bakeries could now produce more bread in less time. The bread was also cheaper than before, so many homemakers opted to buy bread from the bakeries instead of using their own (valuable) time to bake bread at home (Bobrow-Strain 2012). Today, most people still buy their bread at the supermarket or from the bakery. Life is still guided by linear time, where the use of each time unit is to be maximized, and time always seems to be in short supply.

The culinary turn to artisanal food products such as sourdough bread can partly be attributed to people's interest in wholesome food and a desire for a slower lifestyle (Osbaldiston 2013). A baker who began baking sourdough bread during Covid said that her mindset had changed recently, "the slower things are more important than they were before" (ÞÞ 2022-4-2). In times of crisis, slowing down can become a coping strategy to manage everyday worries and maintain calm (Siragusa 2020). The fermentation of sourdough is a natural slow process. The microbes and the bacteria in the sourdough make the dough rise and fall at its own speed, a process that is repeated with each feeding. The inner time of the sourdough may be described as cyclical, a space of time found in many other natural elements that affect our everyday lives. The seasons are a cycle of repetition; menstruation is counted in cycles: the beating of our hearts and the sleep-wake cycle. The temporality of life is, therefore, characterized by various cyclical processes manifested in bodily experiences. However, Western thought has increasingly subscribed to a linear and progressive notion of time in the modern age. This Western notion of time sees life as having a beginning and an end, where life is always moving towards the future, the new. This is a sense of time where physical events cannot be repeated; each moment is forever spent. In our everyday life, which is mostly run by the clock and linear time, we constantly try to "synchronize the multiple times into temporal and material assemblages" (Damsholt 2020, 139). It is, therefore, interesting to ask why, today, when time is considered a scarce commodity, and sourdough bread can be bought on almost every corner, home bakers opt to spend their time attuning to the slow time of the microbes and making bread at home.

Sourdough is a living organism that has, in many ways, successfully evaded this Western notion of time; it is not so easily controlled and does not abide by the clock. The baker needs to be attuned to the temporality of the microbes, and for some, it can be a stressful event to start taking care of and baking from sourdough. Neophyte bakers are often advised to keep a close eye on their sourdough to familiarize themselves with the dough and study its moods and behavior. The same sourdough will act differently depending on the microbial environment, the flour it's fed with, and feeding method. All these different factors can lead to unpredictable sourdough behavior, which can be rather stressful for beginners. As many factors can affect the sourdough's behavior, it is often hard for a new sourdough baker to realize why the dough behaves the way it does. The most common questions posted on the wall of the Icelandic sourdough Facebook group come from inexperienced bakers wondering why their sourdough is behaving in certain ways: Why is the sourdough not rising properly? Why are there so few bubbles in the sourdough mother? Is the texture of

the dough supposed to be thick to the point of being stiff, or should it be runny like a soup? These worries concerning the sourdough mother illustrate the difficulties in synchronizing different temporalities, where the baker's understanding of time as linear clashes with the cyclical time of the sourdough mother.

Different temperatures inside kitchens also affect the behavior of the sourdough. A warmer kitchen will make the dough rise faster, and so will mixing the dough with warm water. However, if the kitchen is too warm, the bread can become over-proofed and thus taste too sour. Bakers who start baking during the summer are often shocked once winter arrives and their sourdough starts to act differently. A home baker who had been baking for over thirteen years still remembers a winter of failures at the start of his sourdough journey. No matter what he did, his bread didn't turn out the way he wanted it to:

> In the end I just had to admit defeat. It was freezing cold outside, and I just couldn't get it to the right temperature. And lo and behold! As soon as spring came my sourdough mother came back to life. (Interview No. 7 2021)

The cyclical time of the sourdough is thus influenced by the run of the seasons. Later, the baker bought a heat-controlled proofing box to better control the environment of the sourdough and made sure he would never again experience the frustration of his first winter of sourdough baking. His experience reveals the interconnectedness of the place, the liveliness of the sourdough and the importance of weather in the symbiotic practice. The example highlights how the agency is relational, and that baking sourdough bread is a collaboration between humans and the microbes that make up the sourdough mother. As Edwin Sayes notes, "nonhumans do not have agency by themselves, if only because they are never by themselves," but of course, the same may be said of humans—as is evident in the baking of sourdough bread (Sayes 2014, 144). Agency between humans and nonhumans—sourdough microbes included—is thus best described as relational, spun between social actors (Whatmore 2002, 4; Barad 2003). This relationality also raises questions about who, or what, is in the driver's seat when it comes to this co-production of bread loaves.

When asked who is in control, the baker or the microbes, another home baker said: "The microbes definitely. I need to wait for them to finish their job. But I can create preferable conditions for them" (ÞÞ 2022-4-41). The baker can strive to create the best environment for his sourdough, but the truth is that the timing of the fermentation is a natural process that we cannot rush. The cyclical time of the sourdough, unlike our linear human time, is a testament to the power and control of the microbes. The baker's role is to work with this natural rhythm and deeply respect it, appreciating the intricate dance of the microbes.

Symbiotic Care

One of the most common worries expressed in the Icelandic sourdough group is the fear of killing the sourdough mother. This stress often drives bakers to give the sour-

dough mothers special attention and delicate care. There are plenty of examples of bakers who take the dough with them to dinner parties or stay awake long into the night just to finish kneading the dough. They do this out of fear of harming the sourdough mother through negligence. A sourdough mother that is used on a regular basis needs ongoing care. It needs to be fed and attended to. Worries about harming the sourdough mother are connected to the fear of disturbing the slow cyclical time of the microbes. If the sourdough mother dies, the baker has failed to care for it. Often, to begin with, bakers take no chances when it comes to the ongoing care of the sourdough. On 28. September 2023, a new baker in the Icelandic Sourdough Group asked:

> Nine days old sourdough mother, doubles in size. I am going to a summer house over the weekend. Is it safe to store the sourdough mother in the fridge while I'm away? Or does it need to go to a sitter? (Facebook 2023)

When taking breaks from baking, it is possible to freeze or dry the sourdough to store it, but most bakers opt to keep it in their fridge and feed it regularly. It is also a common practice amongst bakers to have someone take care of their sourdough when they are away for a long time. A baker who went on a long trip didn't want just anyone to babysit her sourdough. "I got my mom to do the job, the person I trust the most in the world" (Interview No. 3, 2020). The mother, who at the time had not had any grandchildren, posted a photo of the sourdough on her personal Facebook page saying she was babysitting her first grandchild. A baker said that her daughter, aged eight at the time of the interview, knew how to use the kitchen scale and feed the sourdough in case she needed to get her daughter to feed it if the baker was away. In this way, the baker involves her friends and family in symbiotic care of the sourdough, making the caring process a mutual responsibility.

Over time, once the bakers have gained experience, they seem to find it easier to attune to the slow rhythm of the sourdough. A home baker indicated as much, saying:

> I am much more relaxed in terms of baking today compared to how I was to begin with. For a while I measured the temperature of the water, followed recipes to the gram and organized my day around the fermentation of the dough. Today I'm much more likely to measure ingredients roughly and do experiments that result in breads that are not as consistent in looks and quality but most of them taste good. (ÞÞ 2022-4-3)

This is a common experience among the home bakers. The rhythm of the sourdough dictated their everyday life from the outset. They couldn't leave the house at certain hours or, as described in the very first quote of this article, took their sourdough with them when they went out partying. Over time, by regularly caring for their sourdough, they became more relaxed and attuned to the needs of the sourdough mother. The home bakers adapted to the slower time of their sourdough. They cooperated with the sourdough mother to create routines for sourdough baking that suited both the mother and the baker. Many bakers commented that feeding the sourdough is one

of the last things they do in the evening or one of the first things they do in the morning. They have a standard routine: making sourdough pizza every Friday, two loaves of bread on weekends, or sourdough pancakes on Sundays. They all go through periods when they bake a lot and when their sourdough is dormant in the fridge for a while. They no longer worry about disturbing the rhythm of the sourdough as the bakers start to embody this rhythm in their everyday lives.

Baking sourdough bread embodies this temporal synchronization, helping bakers to stay grounded in the present and find calmness. The bakers, for example, talked about baking as a time to themselves. 'Me-time,' if you will. One baker said he preferred baking when he was home alone: "Then I am able to be undisturbed. Sometimes I listen to music but most often not. I just want the silence. I want to fully focus on baking" (Interview No. 7, 2021). A woman who bakes with her husband described how her husband went into his own zone while baking. "He's just fully there" (Interview No. 5, 2021); he can access a mental and physical place through the symbiotic practice of making sourdough bread. A more-than-human place is found, a place which is shared with the microbes in the sourdough.

A baker had been baking for some time before she had three kids in five years, leaving little time for baking regularly. She had wanted to have kids, but she was afraid it would drastically change her, that she would lose herself within the maternal role and, thereby, her independence. At the time of the interview, her kids ranged in age from 3 to 7 years old, and she had recently found time to start baking regularly. She said that despite being very content with her life, the last few years had been overwhelming, with little to no time for herself. However, she got solitary time through baking: "It's a quality of life. I'm not complaining about the kids or their needs but it's so valuable to get to enjoy this breathing space again" (Interview No. 3, 2020). Baking sourdough bread is thus a break from the pressure and manifold tasks of everyday life. Baking is a place of independence for her, a place she says she uses to connect with her former self, who she was before she became a mother.

One baker admitted that she had always been energetic and impatient. However, through sourdough baking, she became a more patient person and found calmness in the process of baking sourdough bread. Although she is still energetic and sometimes impatient, she uses baking as a form of meditation to ground herself against a busy schedule and the perceived acceleration of everyday life. The human-microbial practices of making sourdough bread are thus a prime example of how a sense of time is created through interspecies collaboration. These mutualistic practices create a special rhythm that helps the bakers to experience time more slowly in everyday life, to resist or find an alternative to the demands of modern temporal regimes. Just as with meditation, at the core of caring for the sourdough "lies agency, decision and intention" (Drain 2021). For many sourdough bakers, baking bread, therefore, becomes a part of a self-care routine. This routine was apparent in the words of one baker:

> Over a period of 24 hours, you are attending to the dough for maybe just five minutes in total. But during those minutes you have all your senses open. You are touching the bread, looking at it, smelling it. You are not thinking about anything else at that

> moment and that clears your mind. Even though it's just for a few minutes, you are free from all interruption, just for a short period of time while attending to the dough. I think this has the same effect on me as meditation. (Interview No. 4, 2021)

However, this form of self-care involves multispecies collaboration that demonstrates that humans' physical and emotional welfare is connected to the nurturing of the different ecosystems to which we belong. In many cases, this regular practice of microbial engagement stirs up pleasant emotions for the bakers:

> I love to fold the bread and make dough for pizza. Just feeding her every day brings me great joy and pleasure. The other day I was making dough balls for pizza and an overwhelming sense of happiness poured over me, I even teared up and everything. I think it's this mindfulness people are talking about. I was just there doing this, and it was perfect. (ÞÞ 2022-4-2)

Many bakers describe the profound pleasure of sharing their bread with others. It is the act of giving someone a loaf and establishing and sustaining human relationships. One baker recently gave his neighbor, who just had a baby, a loaf of bread. He described how he was thinking of them while baking the bread and how the gesture represented more than just the loaf: "You hope that people can sense that it comes with love. The process of baking the bread, that is also the present" (Interview No. 4, 2021). The bread materializes the gift of time, a time he spent attending to the sourdough and thinking warmly of his neighbors and their newborn child.

Other informants considered their sourdough baking a form of resistance to several dominating societal trends. One home baker, for example, commented:

> I am the type who wants to fight against this tendency of modern society that everything should be comfortable, quick and simple. In many ways sourdough baking is not quick and not simple. I do a lot of things to try and counterbalance this as I don't think it's sustainable for the future. (Interview No. 1, 2020)

This baker actively engages with the slow time of the sourdough as a form of resistance against the ills of a fast-paced life. The practice of sourdough baking thus demonstrates how people try to counter this linear dominance of time. This notion illustrates how the slowing down time, or taking time to bake, is closely connected to weaving together different temporalities. Furthermore, caring for the sourdough mother connects not only different times but also different people to whom we now turn our attention.

Sourdough Temporalities

Orvar Löfgren notes in another context that objects and things weave together the past, present, and future. In that sense, an object can have the aura of "emotions, longings

and memories" (Löfgren 2016, 60). A sourdough can entail all these things. Feeding your sourdough in the present is a way to gain foresight for your future self so that you can bake from the sourdough soon. Baking from an old sourdough in the present can also be a way to connect to the past. A sourdough that is well taken care of can live for years, even centuries. In 2019, an entrepreneur tweeted that he had, with the help of an archeologist and a microbiologist, brought back to life a 4,500 to 5,000-year-old sourdough found in an ancient Egyptian jar (Elliot 2019). People take pride in having an old starter, and bakeries even use it for their marketing and branding. The Boudin Bakery in San Francisco has a sourdough that is believed to date back to 1894. *The Original San Francisco Sourdough* is a registered trademark (Boudin Bakery 2023). So, when the bakers of The Boudin Bakery are feeding and baking from *The Original San Francisco Sourdough* today, they connect to the bakery's past and its previous bakers, who also cared for and used the same sourdough.

In April 2020, during some of the most onerous restrictions due to COVID-19, a

Figure 2. Jars of Holy Francesca up for grabs. Anonymous Photographer (2023). Published with permission.

woman posted in the Icelandic sourdough group that she recently got her hands on a very old sourdough mother and wanted to spread the love. She had fed it generously and left jars of sourdough mothers outside her home for anyone to take. The jars were displayed in a pretty basket, carefully lined with a colorful napkin. The basket stood some good distance from the woman's front door on top of a big paint jar with a note

that said:

> Holy Francesca, sourdough mother. Originated in San Francisco in 1920 and travelled from there to Sweden (Operakjällaren -> Oaxen -> Álafoss). She came to us 4. April and we named her Holy Francesca. You can take one mother and with her, in love, have many sourdough children.

The jars of Holy Francesca went quickly, and the woman restocked the basket a few times after the first post. For the bakers, this sourdough mother was not just any mother. She was a centurion, presiding over legions of microbes, had survived intercontinental travel, and left trails of bread wherever she went. By taking care of and baking from Holy Francesca, people became a part of her history, creating a sense of historical continuity and roots in an ever-changing world. By baking with Holy Francesca, bakers could travel through time in her company, back to 1920. Even one of the bakers interviewed, who lives on the opposite side of Iceland, had managed to get a hold of a jar of Holy Francesca and swore by its quality.

In sourdough groups online, one can repeatedly see people declare the age of their starter: the older the sourdough mother, the more noteworthy. Some bakers believe that an old starter is likelier to make better bread and survive mistakes and negligence by human collaborators. However, there seems to be no reliable way to determine and confirm the actual age of the sourdough starter (Feinstein 2022). When people say their starter is 100 years old, they must take their word for it. Bakers we interviewed who had gotten sourdough without any specific history didn't really seem to care as much about the age of their sourdough as the ones who had a mother that came with a story. The narrative of the origin of the sourdough mother contextualized her life culturally and socially as a giver of bread. To establish the actual age of the sourdough mothers is perhaps not as important as having a history, a lineage that can be traced back in time and space and narrated when breaking the bread with others or sharing the starter.

For the bakers who had a sourdough mother without a history dating back generations, the mutual and linear timeline of the baker and his sourdough mother seemed to be more important. Many recently hopped on board the sourdough wagon following the increased interest after COVID-19. However, sourdough has been a big part of some bakers' everyday life for years or decades. They have moved between parts of the country, or even between countries, they have baked alongside starting a family, throughout their studies, starting a career, and even into retirement: a life companion. Some have baked bread during the early stages of labor, and to showcase their love and care during times of death within the family. Bakers have described how baking has helped with their mental health during depression, noting that: "... the ability to be able to get so much pleasure out of such a simple process is extremely valuable and important" (Interview No. 1, 2020). For these bakers, the life of the sourdough is intimately connected to their own lives. The everyday rhythm of caring for their sourdough can be a trip down the baker's memory lane. The sourdough, therefore, creates several connections with the past: one's personal history and family history,

and microbial ancestry as a companion species to humans.

In a seminal work on food and memory, David Sutton illustrated how memory is intricately connected to sensorial experience. By exploring the food habits of the inhabitants of the Greek Island of Kalymnos, Sutton demonstrated how people use meals to remember past meals and to plan future meals. By making food, the Islanders gave structure to their individual and collective memory and strengthened their identity (Sutton 2001). This analogy can be applied to one home baker who had started baking in 1984 while studying in Copenhagen. He lived in collective student housing and joined a food club that some students had formed. The club emphasized making healthy food from scratch in order to save money. Every week, the students made a big batch of Danish rye sourdough and shared. When the baker moved back to Iceland, he took a part of the sourdough mother with him and has, since then, baked the same Danish rye bread, using the same recipe with minimal changes, for almost 40 years. He strongly believes you can eat healthy food made from scratch and says he learned to care for his finances when studying. This baker takes great pride in having baked his own bread for all these years, and baking is a big part of his self-image. These views are something he emphasized in the upbringing of his own children. Today, some of his children also bake from sourdough. The story of the sourdough mother is thus not only intricately connected to his biography but also to his family history and future, where one generation after another keeps the tradition alive.

When baking bread over a long period, memory becomes a matter of human-microbial collaboration, shaping how time is experienced and understood. Baking sourdough bread is a mutualistic project involving the baker and the sourdough mother in close cooperation that benefited both: the baker takes care of the mother, and the mother feeds the baker and the whole family. Their existence is intertwined, and their biographies are co-constituted in a textbook illustration of interspecies collaboration and symbiotic living in everyday life.

Taking care of and baking from an old sourdough mother can also be a way for bakers to connect to people of the past. In an article, Salla Sariola describes how she rummages through an old shed to find a vat containing dry crumbles of her grandmother's sourdough. She scrapes some of the dry sourdough from the vat and revives and bakes from the sourdough. Instead of getting her hands on a live sourdough, she chooses to go to the trouble of reviving her grandmother's sourdough, which she refers to as "an archive of past sourdough cultures" (Sariola 2021, 1). The symbiotic care of the sourdough, this more-than-human connection, allows Sariola to connect to her grandmother and her grandmother's history entailed within her sourdough. Caring for the sourdough is a physical act. The baker needs to use his hands and fingers to feed the sourdough. Some bakers even opt to use their fingers to stir the sourdough in each feeding so that the microbes on their hands can blend in with the microbes of the sourdough. The grandmother's sourdough thereby materializes the connection to ancestors of the past.

Research conducted in 2018 showed that eighteen bakers worldwide started their sourdough using the same flour and method. The baker's hands and the sourdough were then tested to see if the microbiome of the sourdough was similar to that of the

Figure 3. The hands of a sourdough baker. Photography (2023) by Ragnheiður Maísól Sturludóttir.

hands of the baker. The research showed that the bakers and the sourdough's microbiome overlapped. When tested against a random starter, the researchers found that the bakers shared a more similar microbial community with their own starter (Reese et al. 2020). That is, the baker's hands affected the final microbial flora of their sourdough. In Korean cooking, which is largely based on fermented foods such as kimchi, the term *son-mat* is often used to describe the taste of the food. *Son-mat* translates as "hand taste," that is, the taste of the person, in most cases the mother, who made the food, or "the care and thought and idiosyncrasy that the person has put into the work of preparing it" (Pollan 2013, 234). Koreans also describe *son-mat* as genealogical, a taste that one acquires by watching one's own mother put love and work into making the food while learning the practice of preparing the food. That is how hand taste is passed through generations (Chung 2021). The revival and rejuvenation of an old sourdough mother is, therefore, not only a subjective meeting point of the past and present but also a symbiotic collaboration through time: the present baker's microbes and the microbes of the previous caretaker of the sourdough. This collaboration, where communities of microbes co-evolve with human bakers, demonstrates how human history is mediated by microbes. Humans create their communities by sharing sourdough

mothers and knowledge amongst one another. In the same sense, the microbes create their communities, sharing bakers between them.

With regular interaction with their sourdough, bakers co-create a human-microbial place in the present that connects them to the past. However, connecting with the microbial ancestry of your grandmother can also become a part of your own microbial future. Another baker said she felt connected to her grandmother whenever she baked from her recipes. This baker had baked the same sourdough bread for seven years. She regularly gave a loaf of bread to her friends and often brought a loaf to family dinners. The loaf was seen by her friends and family as *her* bread, making it her signature baking. She wondered if the recipe would have the same value for her descendants as her grandmother's recipes have for her: "Maybe it's a silly way to leave something behind. It's my bread, my people know what that means. But I find that really precious" (Interview No. 3, 2020). The baker thus thinks about the future while attending to the sourdough in the present, wondering if her unborn descendants will connect to her through the microbial lineage of the sourdough.

The future was a common concern for many bakers, especially when they talked about baking with their children. Many bakers let their children take part in the baking process, some allowing them to assist with feeding the sourdough, while others have a tradition of a family pizza night, where everyone gets to make their own sourdough pizza. These measures are all done in hopes that their children find the same joy in the kitchen as the bakers themselves have. A male baker in his seventies said he baked because he wanted to normalize that men and women have equal responsibility in the kitchen for his three daughters. Emphasizing this, he said: "It's good for them to grow up with that being normal and then they can make that claim to their partners in the future" (Interview No. 2, 2020). The baker himself had grown up with a father who was completely dependent on his wife in the kitchen, not even able to make his own cup of coffee. Through the symbiotic care of sourdough, the baker was trying to break the cycle with his daughters' best interest at heart and making a conscious decision in the present with an eye to their future.

Conclusion

Sourdough mothers and human bakers have been companions for a long time. The making of sourdough bread is an interspecies collaboration that is captured by the term symbiotic care. The bread is thus a co-creation formed by a human-microbial relationship. This symbiotic care involves mutual dependency, where the baker must take good care of the sourdough mother in return for delicious and wholesome bread. The majority emotionally connect to their sourdough mothers, appreciating them, taking good care of them, worrying about their health, and even grieving them when they die. This emotional attachment influences the bakers' lives by shaping their everyday practices and experiences.

In the present, often experienced as a constant time crunch, the slow process of sourdough making can be a stressful addition to the everyday life of the baker. The sourdough and the billions of microbes within can behave in a complex way for the

baker to predict and control. It is difficult or even impossible for the baker to tame his sourdough; caring for it can cause a disruption in other activities such as social gatherings and even sleep. Over time, adapting to the rhythm of the sourdough, the baker learns that the microbes are in control of the process. Slowly, with repeated cycles of feeding, baking, and experimenting with the sourdough, the baker must accept and work around the cyclical time of the sourdough. This results in better bread for the baker and a healthy, well-fed sourdough mother.

This symbiotic care creates a specific rhythm in the baker's everyday life, resulting in bread and a form of self-care for the baker. Bakers can seek solitude and time through this collaboration with non-human others. The routine of taking care of the sourdough and baking from it becomes a form of meditation, a space to ground oneself, and a place of joy. Others use the slow pace of sourdough baking as a silent and personal protest of a fast-paced society where people are used to getting things done quickly and conveniently. The simple act of sourdough baking becomes an act of resistance to dominant temporalities. Such mutualistic practices of humans and non-humans help to structure time in a way that better serves the mutual needs of the bakers and sourdough mothers. This restructuring of time through collaborative practices demonstrates how human self-care and well-being are intricately bound up with the well-being of other species and the overall ecosystem. Furthermore, restructuring the experience of time through interspecies collaboration can perhaps nurture a new approach to sustainable living, where humans take the interests of other species into account when going about their daily business. To live well will thus mean to live well *with* other species.

By dipping one's hand in a bowl of sourdough, the baker can connect with the past, present, and future. A baker and his sourdough can travel together through life and co-exist within a joint timeline. While the baker slowly moves from one significant life event to another, matures, and gets older, the sourdough stays more or less the same, still slowly rising and falling. For bakers who've had the same sourdough as a travel companion for many years, the sourdough can act to connect to one's former self and emphasize one's outlook on life. The sourdough can even be a medium to travel through time and connect with family and people of the past through the microbial ancestry of the sourdough. A sourdough mother with a long linear history holds significance as it is contextualized socially and culturally as the giver or mother of bread. Sourdough can even be inherited and kept alive between generations, thereby repeatedly outliving human collaborators. The symbiotic care that the baker and the sourdough mother mutually participate in, often with the help of the family and friends of the bakers, can thereby stretch over centuries, where the sourdough mother is fed by a generation of bakers, attending and tuning into the rhythm of the sourdough. This is symbiotic collaboration and care through time as different com-

munities of microbes have co-evolved with human bakers and shaped their common history. For a long time, sharing sourdough mothers has been a part of multispecies commensality and community making. However, there is another side to this story: the microbes that the sourdough mother consists of have also been creating their own communities over time. To share sourdough mothers that, in turn, share human bakers illustrates symbiotic care in everyday life.

Notes

1 One of the authors of this article is the founder and admin of the Icelandic Sourdough. These numbers are through her data collection.

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