Compostories: Exploring Narratives of More-than-Human Relations in Soil Communities

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Abstract
Composting organic materials to turn them into soil or fertilizer for plants is an increasingly common practice in countries like Iceland. There are many reasons to compost and a variety of driving forces behind the practice. In this article, the focus is on the more-than-human relations found in and around the compost heap and the following research questions are answered: What kind of stories emerge by discussing composting? What are the main themes, who are the main characters in these narratives and what other stories emerge through people's stories of their composting? The article is built on qualitative data about composting, gathered through interviews and an ethnological online questionnaire.

Keywords: composting; human-microbe interaction; more-than-human relations; infrastructure; qualitative; narrative

Introduction

Composting organic materials to turn them into soil or fertilizer for plants is an increasingly common practice in countries like Iceland where affluence and consumer behaviour creates copious amounts of food waste. Humanure—organic matter from toilets of any kind—joins other organic material streams which these societies are trying to manage in a global environment that is increasingly threatened and threatening. In this article we focus on composting, building on our research in Iceland. Composting has recently been gathering momentum in Iceland but is in many ways a rather underdeveloped practice, especially in terms of waste management in the form of large-scale composting by municipalities and other such entities. Privately, many people all over the country have been composting their organic waste from both garden and kitchen and a few their toilet waste, some even for decades. In compost projects the individual and the communal meet in a social atmosphere increasingly focused on reducing waste, combatting climate change and protecting nature. Other drivers are, for instance, people's interest in their physical and mental health and creativity, and through composting, people find ways to practice and care for these.

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Organized management of solid waste, such as food rests, with the aim of recycling and composting, had a slow start in the 20th century in Iceland. Throughout and towards the end of the period its fate was mostly in the hands of individual households and companies, some maybe burned somewhere far from human dwellings, but almost all of it ending in landfills on private land or in areas designated but poorly regulated by the country's municipalities. In the rural areas people would use food rests to feed their animals, such as dogs and chicken, but organic waste produced in urban areas ended up in the homes' only garbage bin along with solid waste of any other kind and from there in the already mentioned landfills. Organic waste that was not useable for the rural household's animals had for centuries ended up in the farm's midden or mound (*bæjarhóll* in Icelandic) that was gradually created under and around the turf houses which Icelanders lived in from settlement times, in the 9th century, and well into the 20th century in many areas. There is thus a short time span, only a few decades, from the house midden to today's solid waste sorting, recycling or reusing, and composting of organic waste that has very recently gained such a momentum that the majority of the country's organic waste is collected by the municipalities and then composted. This development has taken place not least because of the implementation of EEA's landfill directive and a following domestic law, implemented in January 2023, stating a ban on placing biodegradable waste in landfills, thus making composting an attractive option (Lög um breytingu á lögum um hollustuhætti og mengunarvarnir, lögum um meðhöndlun úrgangs og lögum um úrvinnslugjald, n.d.).

In this article we build on qualitative data about composting in Iceland gathered through an ethnological questionnaire, sent to the general public, as well as with interviews with people who compost, most of whom were recruited through Facebook groups where composting, gardening, soil reclamation and related issues are discussed, but also through snowball sampling. This particular research on composting is a part of a larger project titled *Symbiosis: Human–microbial relations in everyday life*, which is a three-year interdisciplinary center of excellence, gathering researchers at the University of Iceland, Matís, the National Museum of Iceland, and various companies, institutions and entrepreneurs in the country who work with microbes in food production, waste management, and for medical and health purposes. The work package of *Symbiosis* focused on composting is named *Living Earth: Composting as Human-Microbe Interaction, Cooperation, and Communication*, stressing the more-than-human presence and agency of microbes in the process of creating soil from the organic waste that humans leave. The disciplines involved in the research project, which is inescapably inter- and trans-disciplinary, are microbiology, folkloristics, food and nutrition sciences, and anthropology, to name the main ones, and the project is financed by the Icelandic Center for Research.

There are many reasons to compost and a variety of driving forces behind the practice; in this article, however, we focus on the more-than-human relations found in and around the compost heap and provide some answers to the following research questions: What kind of stories emerge by discussing composting? What are the main themes, who are the main characters in these narratives and what other stories emerge through people's stories of their composting, or "compostories"? To answer these

questions, we look into how people talk about, perceive and relate to their compost. Furthermore, we explore how people describe their relations to the organisms that turn food waste and humanure into fertile soil; these creatures that often are invisible to humans but who leave "traces" of various kinds, in the end truly transforming our world and making it livable.

Theory

Composting has emerged as a metaphor that provides critical insights for rethinking human relationships with the world in this era commonly referred to as the Anthropocene. Feminist scholar Donna Haraway (2015) emphasizes the need to make kin, as we are "compostist[s]," not post-humanists, she insists. For flourishing multispecies futures, humans need to commit to labor, play, and collaboration with their companion species, "becom[ing] with each other, compose and decompose each other" (Haraway 2017, M45). For Hamilton and Neimanis (2018, 501) composting informs a feminist methodology that enables accounting for messy and undervalued work of discarded scraps, and a scholarship for "growing different kinds of worlds."

Composting is central for Jones' (2019) hopeful approach for ethnography in the Anthropocene, where paying attention to rebuilding and regenerating reveals the new values and entanglements that sprout in unruly edges and disturbed landscapes. This

> …requires a careful (and care-full) tending and attending to those making the best of the mess that's been made: a commitment to noticing things not (only) falling apart, but (also) coming back together again. (Jones 2019, 4)

Engaging with composting reveals the inherent complexity of environmental relationships and challenges the idyllic notion of harmonious cohabitation. For Abrahamsson and Bertoni (2014), composting reveals "the 'dirty' side of the 'green'". It is all about togetherness and coexistence, not necessarily a cozy and comfortable version. It is a messy and complex but productive and continuously ongoing set of processes and activities involving numerous entities, such as microbes, earthworms and humans.

> In the dirty and messy togetherness of compost, constructing a common world is not about bridging differences, bringing about similarity, understanding and agreement. The togetherness of the bin is political, in that it calls for assembling, arranging, composing, separating, and working with others." (Abrahamsson and Bertoni 2014, 143)

Further, building on Puig de la Bellacasa's (2019) feminist philosophies of care, we discover a whole spectrum of relationality in the compost that ignites the imagination, creativity, and a sense of wonder among the human composters. In this dynamic micro-world, they encounter something bigger than they've experienced before. Puig de la Bellacasa (2019, 400) frames it as an "invitation to sympathy in shared more than human matter, eco-commoned by biogeochemical processes that return compounded matter to elementals, counters the individuation of anthropocentric earth as 'our own

creation'."

Composting defies scale, it stretches the familiar linear time, and it challenges the composter's identity and individuality, even the very agency of humans as creators and controllers of earthly matters. Composting brings with it an alternate sense of time, as Saltzman (2005, 67–68) continues: "Composting requires time, oxygen and mixing, and the result does not appear immediately in neat ready-made packages." The issue of time and how perceiving and practicing composting wraps it into a circular and irregular temporality is an even more striking feature of this messy and relational activity (Abrahamsson and Bertoni 2014), or as Barlow and Drew (2021) phrase it:

> The (post)colonial logics of speed and convenience are manifest in many of today's infrastructural projects, creating what we consider to be 'fast infrastructures'. These infrastructures create ease for some and harm for others while exacerbating social and environmental crises around the world. Addressing these crises, we argue, a slowing down. Enter the role of 'slow infrastructures'. (Barlow and Drew 2021, 212)

In relation to time, composting is an example of a slow infrastructure. With the slowly flowing and circular temporality of composting comes the ever-increasing intimacy between the composter and their compost, with its communication with, care for and knowledge of the organisms and really the whole micro-world of the compost heap.

In the broader scientific discourse on multispecies soil making, Meulemans (2020, 101) evokes the living soil approach and reveals that soil is far from an inanimate mix of materials. Soil is rather something that grows out of intra-active relations of organisms, minerals, water and air, "constantly transforming each other into something else." It can be argued that co-creating soil with the microbes, through composting, is a democratic project, as it literally and metaphorically puts us all on the ground—and in the end in the ground. It makes us all equal since none of us is at the center, more important nor more powerful than the others. In fact, and as many of the survey correspondents in the research project acknowledged, the microbes are in charge, with the human agents only as facilitators, feeders and in some cases admirers of their formidable work. Ultimately, composting is a practice of sympoiesis (which means "making with"), where "beings–human and not–become with each other, compose and decompose each other, in every scale and register of time and stuff in sympoietic tangling" (Haraway 2017, M25 and M45).

Furthermore, Puig de la Bellacasa (2014, 65–66) says that it requires a "particular consciousness" or "spiritual wisdom" to acknowledge that humans are part of "a living organic web of being." She approaches soil as infrastructure to "reveal one of its dimensions, one of its modes of existence: that of a basic understated, stabilized, indispensable ground upon which a collective lives and works." Importantly, acknowledging and understanding soil as infrastructure gives an opportunity to "avoid some of the devastating effects of its breakdown" (Puig de la Bellacasa 2014, 66). If life on earth is dependent on healthy soil, we need to properly maintain and care for this infrastructure and realize that we only can do it in collaboration with the "invisible,

non-human, workers of the soil," as Puig de la Bellacasa (2014, 65) calls the organisms that break down organic matter. That gives us reason to reassess our relationship with these different organisms and likewise our relationship with leftovers, but many informants of this research said they had stopped looking at these materials as waste and began to see them as valuables. The breakdown of organic matter into soil leads some informants to ask critical questions about other man-made infrastructures and systems, such as those relating to waste management which didn't seem to match and even damage this "bioinfrastructure" of the soil. Thus, throughout the process of breakdown, infrastructural breakdown is brought to the center of attention.

But let's look a little closer at infrastructure, slow and maybe even a little fast. The Kilpisjärvi Collective introduces the term "withnessing" in their Introduction to the book *With microbes* as a way of knowing microbes and their relationships with humans, how these two organisms entangle, embody and accompany each other (The Kilpisjärvi Collective 2021, 18). This term stresses the importance of employing a multiplicity of methods and approaches to studying human-microbe relationships and interaction, because conventional research methods are inadequate, being anthropocentric, hierarchical and denying microbes the agency they truly have. Withnessing, on the other hand, "is about knowledge as situated, immersed and partial" (The Kilpisjärvi Collective 2021, 24). To withness the symbiosis of microbes and humans one has to "focus on practices and processes, rather than outcomes only" (The Kilpisjärvi Collective 2021, 25) and these include the participants, tools and devices employed when and where the interaction takes place. The composting box, heap, container or whatever vessel we use to shelter and feed our microbes and their animal companions is a prime example of such a site. The composting site is an infrastructure like no other, with an endlessly creative and changing design, depending on who, why, where, and when is involved, constantly influenced and shaped by both human and microbial actors. The researcher becomes an integrated part of the withnessing that takes place in and around the compost, where sharing of everything is inevitable and the withnessing becomes the only approach possible to perceive and understand its magic.

Fortunately, for the study of composting, there is an increasing interest in infrastructures of all kinds in the social sciences and humanities. The authors of this article have benefited greatly from that in their search for suitable theoretical tools to understand composting as a symbiotic relationship and project, where humans and more-than-humans meet on non-hierarchical ground with a culture of care and curiosity as their guiding light. We end this theoretical contemplation with some remarks inspired by Kinnunen and Valkonen (2022) from their chapter "Approaching Infrastructural Being," where they convince the suspicious reader that infrastructures are not only possible sites to find, where humans and microbes interact, but even necessary ones to witness such interactions. This is because these infrastructures have an ability to unite different temporalities, materialities, cultures and disciplines—the absolutely necessary components of 21st century research for a world that desperately needs new approaches to tackle the new normal of climate change and other environmental challenges. The composting infrastructures where humans meet their microbial and other other-than-human collaborators, in the common project of turning organic materials

into soil, are sites where the individuality and boundedness of those involved are challenged. As Kinnunen and Valkonen (2022) state, infrastructures are socio-material technologies, sites of power-struggles and they are

> naturecultural entanglements in which humans are not just rational users or designers of technologies acting upon their environment, but their bodies and practical ways of dwelling are also being shaped in the process referred to as infrastructuring. (Kinnunen and Valkonen 2022, 19-21)

The composting process disturbs the perceived permanence and stability of smoothed out infrastructures where established hierarchies, with the human on top, are turned upside down. In the compost heap, matter transforms according to its own infrastructures and temporalities, not the human one.

Method

The methods used for collecting the data on which this text is based were qualitative, consisting of an ethnological questionnaire that was made available to the public through the web interface of Sarpur,[1] a culture-historical database and information system for the museum sector in Iceland. Qualitative questionnaires are a well-established research method that Audun Kjus and Line Grønstad describe as a kind of interview where the conversation takes place in letter form. In recent years, these surveys have increasingly been conducted online (Kjus and Grønstad 2014), as is the case with this research. Other methods, producing supportive data to the answers of the questionnaire, were semi-structured interviews with people who compost and/or are somehow linked to composting practices and projects, as well as participation in online groups on social fora, such as Facebook, where the researchers took part in conversations and recruited interviewees. We also used the snowballing method to find new interviewees, asking participants to put us in contact with people they knew were practicing composting. The data was gathered between 2021 and 2023, and the questionnaire is still open so additional material will be analyzed for the next step in the project. Last but not least, it bears noting that both authors are ardent composters and that participant observation, both of self and others, is a vital part of the information gathered.

The questionnaire, written in Icelandic, consists of over 40 questions and subquestions in 5 theme-related chapters and people are asked to answer as many as they want (see Appendix 1 for details), often resulting in detailed first few answers with the latter part of the questionnaire less well answered. This is of course not always the case, fortunately, and the answers are rich with ideas and information, often nuanced and eye-opening to read, code and analyze. What we present here is just a fraction of what the ca. 140 participants expressed, selected according to the themes we chose to follow. Respondents were given the option to state their name, residence, place of birth, age, etc., but many didn't or only revealed their identity partially. We don't use their names when quoting them directly since the exact identity of the participants is

not a focal point in this research, whereas we sometimes mention the age, gender, occupation, etc. of the participants if these seem significant in any way for interpreting the answers, not least when respondents used these factors themselves to explain their ideas and practices. The 14 interviews gave us a chance to probe deeper while giving our interviewees freedom to tell their compostories in their own way, after having asked some specific questions. The interview questions are listed in Appendices 2 and 3.

The Multiple Faces of Composting: From the Personal to the Global and Everything in Between

In this chapter, we present, describe and analyze some of our findings from the questionnaire and interviews carried out in the compost work-package of the Symbiosis research project. We divided the themes that emerged from the respondents' answers into several subchapters which show the profound existential, ethical, social, physical and psychological effects that composting and relating to soil in general has on the practitioners.

The Importance of Composting: Why and Where Does it Come From?

Composting organic materials from the home is deeply personal. Many respondents expressed this view by comparing the practice, for instance, to yoga, meditation and mindfulness, and describing it as a way to connect to nature. The answers expressing these views were phrased in various ways: composting fulfils an "inner need and interest in nature"; it "is the best meditation, to dig through the compost, seeing waste become valuable material"; and "I do yoga and like to grow my garden, my animals and my children. I think it's all connected," to name only a few. Engaging with the organic material, noticing the transformation from waste to valuable matter, had, for some, a spiritual dimension that brought well-being and was connected to growing, whether it was in your garden, other beings, or yourself. It allows one to follow one's values and connect to something greater than oneself: "My composting started out of a strong desire to make good use of all resources. Reduce household waste and live in greater harmony with the environment." Taking care of what you leave behind and treating it as something valuable, as a resource instead of a waste, was seen as a way to build a spiritual relationship with the environment.

Along with this spiritual, or ideological, motivation for composting, people also mentioned pragmatic reasons for taking good care of resources and starting to compost, such as having direct access to good soil and a fertilizer for gardening and forestry, but commonly in reference to environmentalistic aspirations: "... the household's need for soil is high and soil is quite expensive, and it is not environmentally friendly to import soil into the country." The respondents sometimes articulated their desire to see themselves as living sustainably. The act of consumption in our affluent part of the world is fundamental to that, since hardly anything we do to satisfy our basic needs is not bought in some way, directly or indirectly: "I have always been interested in sustainability and nature conservation. I also consider myself exceptionally practical,

which means I can't bear to see resources wasted". Composting was generally aligned by respondents with good and/or ethical use of resources and a sustainable lifestyle. To make your own soil instead of importing it to an island in the middle of the Atlantic was generally considered to make sense, both from an economic standpoint and an environmental and ecological one.

Interaction with other humans around and through composting—neighbors, family, workmates, people in compost groups to which respondents belong, etc.—were for many somewhat important, although the majority said that the relationships with these other humans weren't very important for their composting. They didn't really care about what opinions others had of it, nor did they talk much about it with others. Communication with others about composting was mostly to seek and to give information and advice. Some examples of how this was expressed are the following: "Discussions with like-minded people have often been interesting, but I have not been in the business of spreading any gospel. I don't care what other people think, I'm doing this for me"; "Support outside the home doesn't really matter to me other than that more people start turning garbage into gold—that should matter to all of us"; and lastly: "[I] haven't done much of it in general. To be honest, I haven't bothered, the discussion becomes so surreal when this kind of thing comes up." The personal aspect of composting is once again brought up and it has a link to self-care. It was rewarding to engage in composting and support from others didn't seem to be of importance; what was of importance was that others took care of the organic material instead of wasting it, seeing it as a resource. Still, most didn't want to preach composting, maybe due to "surreal" responses.

Some, though, made an effort to affect others: "I have also introduced composting to friends and family—spreading the gospel is part of it all." The significance of the organic material led this individual to influence more people to start composting. Calling it the 'gospel' suggests a spiritual and playful undertone and stories about how some people use every opportunity they have to talk about their compost and ask others about theirs do the same: "my wife laughs a little at me when I fall into long conversations with my friends about composting" and "I like to talk about composting and have even let guests at a dinner party sniff my trash! Kind of strange behaviour for sure but I was in awe of Bokashi." The wonder of transforming organic waste into compost makes these informants communicate with others in a way that some might consider odd.

It is interesting to note how others' opinions or complaints weren't important for the composters: "I think there is generally little understanding and interest in composting. It takes work. I think my neighbors think I'm a little weird for always messing around in the yard." It seemed that the composters would continue whatever others had to say about it. People also described how the practice of composting has rendered them unable to stop; however else their lives have turned out in terms of facilities and lifestyle, they mentioned they will continue for as long as they possibly can, or: "until I become organic waste and am composted." This strong bond with the compost and composting frequently came up: "I have felt bad about not being able to compost. I find it hard to accept having to put organic with other general household waste …

Soil is approximately the only thing I miss after I moved to an apartment building." Another informant wrote: "When I moved, I moved the compost (the green plastic bin) with me, with all the ingredients. I couldn't think of leaving it behind." Dedicated composters had a personal connection with the compost they took part in creating. It was not something to be left behind and it had a negative effect on the environment if they were forced to stop practicing it.

More-than-Human Relations: Material Knowledge and Hands on Learning

Some respondents noted tacit knowledge as an important factor in acquiring good compost. Knowing with the hand, experimenting, and learning by doing were of the essence. Many talked about getting a feel for the material through hands-on experience that accumulated through years of involvement: "it's not just something standard. You need to think and do experiments." Relations with the organic material, how it breaks down and composts, and hands-on learning by doing takes us from the technical to the sensual, where you learn to trust your senses to judge the composting process, here expressed thus by one of the participants:

> To understand the compost, I use texture and smell. Good compost is light, porous and with a lot of organic material, it smells nice but not sour, that happens if the material is too wet. Before I measured the heat in the heap, but I've stopped doing that.

Quantifying and measuring what is in the compost in terms of nutrition doesn't necessarily show the quality of the material; intuition and observation gives the whole picture:

> I once sent a sample to Hvanneyri [The Agricultural University of Iceland] for testing, but it was from a growing bed where I had added my compost. But I quickly learned to trust my own feeling based on smell and texture. I also knew exactly what went into the compost. My compost is the best nutrition for the crop.

In addition, people often used an emotional, sensual or even romantic language to describe their relationship to the compost heap or the organisms involved in the breakdown of the organic material: "First and foremost it's just love for the environment. Nothing is as romantic as the smell of the compost, the steam that rises from a warm heap on a cold day." The responses repeatedly mention a connection to the material itself, the soil or the compost, and sensuality runs through it all: "I connect strongly with the soil when I work with the compost, smell the soil, feel the texture and see how the plants benefit from receiving compost. In that way I feel like I can sense Mother Earth." The soil had an affective presence. Many believe that touching, feeling and smelling the soil, actively engaging with it and witnessing the transformative composting process contributes to good health: "it's hard to describe that connection, but I feel they do me good directly and indirectly. Through the soil and knowing about the healthy soil life around me. I like touching soil and smelling it."

Trust is another issue that many respondents mention in connection with the process of composting, that is, what happens in the compost after they put the organic matter there. They said they trusted the process and had faith that everything would take place as expected without their meddling in it or having to worry about or monitor it. They said they trusted Nature; she would have her way and do what was necessary to create fertile compost: "It just takes care of itself with the help of water and sun and the industrious earthworms who surely have an army of tiny creatures with them." This trust is fundamental and interesting, not least when we consider the context of culture and society in which the respondents live: the composting they do takes place in one of the most affluent countries in the world which is industrialized, highly technological, individualistic and where people expect most of their lives to be under control–predictable, safe and managed. As one informant commented, "compost heaps are great behavioral training for people who think they can control everything in their lives. You have to trust the process." Composting teaches you, or trains you, to let go of this tendency to be in control all the time; ultimately it sets you free, which is the reward for letting go: "Composting and gardening are very good for mental well-being. Calms the mind, gives you freedom because there are no rules about how your garden is supposed to be. It's like the only area of life where one finds complete freedom of choice." The compost heap seemed to offer a safe space and a relief from worrying from not being in control–things will turn out as they should because Nature sees to it in this collaborative project of withnessing.

More-than-Human Relations: Caring, Communicating, Interacting and Imagining the Soil Community

People had many stories to tell when asked about their interaction with the more-than-human organisms involved in composting and who live off or in the compost mass, such as mice, birds, earthworms, insects and other small animals, and last but not least microbes. Their focal points ranged from acknowledging the presence of microbes to total ignorance of any organisms of that sort. Some found it extremely difficult to imagine a relationship, feelings towards or interaction with microbes: "I try to answer this seriously even though the questions are getting stranger and stranger. The microbes do their thing and I do mine. We don't interfere with "each other"." This informant talked about himself and the microbes as separate beings that didn't cross paths, at least not on a conscious level. Some respondents characterized the questions that dealt with human-microbial interactions and relations as "very strange," "spaced out" and "ridiculous."

But we also got answers from people who clearly did experience an affective relationship with microbes: "I often feel some kind of a connection with the microbes. Or manage to tune in to some wave and perceive them better. It's a bit like buzzing or dizziness maybe. … A moment when one gets a feel for ecology and is able to read processes in the environment." This kind of an expressive response, however, was more of an exception in the questionnaire materials. The interviews, on the other hand, gave opportunities to ask in more detail about more-than-human relations and

one dry toilet enthusiast described how he related to microbes:

> I began to understand the context of the microbes—that microbes are a big part of the biosphere. They perform more than half of the photosynthesis that happens on earth. And microbes are not only on the surface, they are found at ten kilometers depth. Microbes are everywhere and we are partially microbes.

With regard to his dry toilet and composting the dry toilet material, this interviewee then added: "To be able to do this you have to study it and just be part of those microbes. And recognize yourself as them. They are the basis of life." Microbes were a crucial part of his lifestyle and his understanding of ecology, and it was clear from his response that an awareness of microbial life and of his relationship with microbes was both essential to his practice of composting and something that came about through composting.

Many questionnaire respondents were more aware of micro life in the form of insects and smaller animals like mice, rather than the microbes or fungi: "I don't want to kill bugs and I apologize to the earthworms if I accidentally hurt them … I'm most worried about putting a shovel or fork in a mouse nest though, that would be horrible." Most informants that described a relationship with the more-than-human organisms in the composting process seemed to form a stronger alliance with worms or other beings that they can see with their bare eyes, rather than with microbes. All micro-life is not equal, though, as some respondents poisoned mice but welcomed birds and earthworms to the compost. More-than-human relations were thus not unconditional, for in some cases unwanted beings, such as rodents, were excluded: "Once mice came into the box after I threw away a lot of bread. Then we got pest control to come and poison. I haven't seen any mice since." And another example:

> Mice have burrowed under the bin, but in the winter, I always put mouse poison right next to it, luckily, I haven't come across a dead body in the compost. … A very welcome guest is a blackbird who stays in here during the winter, he is often seen around the compost bin.

Some of the answers framed microbes and other non-human actors as companions to be cared for, as "good neighbors that deserve some kind words and thoughts every now and then". One might even cook for them, like a woman whom we interviewed who confessed that unconsciously she was sometimes more concerned about what leftovers might benefit the compost heap rather than what the household members might prefer: "I realized I had sometimes been cooking for my compost pile. Something like, "yeah, it's missing ..." you know. Then I'll just make a good vegetable broth [laughs]. And then, suddenly: "Yeah, was I doing that?!"" Caring for the life in the compost will reward you later: "If you are dealing with any living beings then you need to show them care. Your plants, your carrots–and if you do, everything grows and thrives." Thus, the caring narrative took on many forms, and metaphors were abundant:

> I often think about composting as farming with animals that I can't see but I know the animals need oxygen, nourishment and moisture. And I notice the fruit of their labor when I see this fine soil that they have made. … I admire their work, it's quiet like the way of life … My role is to make sure the animals live in a good environment, just as a dairy farmer knows he has to take good care of his cows.

Although this quote conveys humility and respect for the course of life and brings forth labors that Puig de la Bellacasa (2014) maintains most humans do not recognize, it also conveys the imbalance of power that the divide between man and nature implies, where humans are in control and microbial beings are harnessed as cattle, rather than seeing them as allies or relatives in the bioinfrastructure of the soil.

Regeneration: What Goes Around Comes Around

A fascinating finding of both the questionnaire and the interviews is how widespread the understanding of composting as a creative process is. Descriptions of people creating something when composting–when remnants of food and plant parts turn with time into black, fertile soil–often involve both the creation of the composting facilities and the compost material itself. Respondents describe how they make the compost structure, all the way from choosing the site and designing the structure to building the composting container out of wood or buying a plastic one. Some provide wonderful details with obvious joy and satisfaction. One describes the practice as "an outlet for creativity and a little hands-on science." This creating is an important part of the process; the composting itself may be described as its culmination and the heap of living soil as its product. Many also described in detail their composting activities, how they watered the material when it was dry, how they stirred it to mix the different ingredients and to increase the airing for better results, how they moved the compost from one compartment of the container to another as it changed with time, and so on. All described this as a labor of love; as labor that doesn't make people tired in the conventional way, even if it is sometimes physically straining, but gives satisfaction and leaves one content. This creative act gave them energy and tranquility. This creative force even extends to new generations: "When I have managed to engage the children, e.g. to garden and they are using their own compost, I think that gives something extra," and, "I consider myself to be growing human beings as well." Spreading awareness, skill and knowledge encourages relational thinking and doing and keeps the cycle going.

A relationship with these residual substances and the organisms involved in the decomposition includes creation, since the decomposition of organic matter is a prerequisite for life on earth: "What fascinates me the most is seeing the transformation, from "rubbish" to fertile soil, the vegetation grow and to participate in the cycle that takes place. I do this because it gives me so much." To take part in this cycle is nourishing both mentally or spiritually, as mentioned earlier, and physically: "I also enjoy seeing the cycle of organic matter that I've managed to collect and transform. Last but not least, my worms are fattening up well in this energetic compost which has pro-

duced beautiful fish. Which are eaten with freshly picked potatoes." While this may seem like an anthropocentric view, it describes the cycle in which all living things live, and humans are no exception:

> I think the biosphere is almost like one big compost bin. All nutrients are recycled. Nothing is left out. You are always welcome at the microbes. They will always return you to where you belong. For you are dust, and to dust you shall return. I shudder at the thought of space travel and Mars and the Moon because what happens to the bodies that die out there? They will never be returned.

The scale is massive, from the underground to the planetary. The worldview of the compost bin as a microcosm to the planet's macrocosm is presented with microbes as a force that in the end of a lifespan transforms the human body to where it belongs, to where it came from, back to the Earth.

Responding to Failing Infrastructures

Composting brings forth stories about climate change responses and failing infrastructures. Moreover, the stories suggest ways to take responsibility for our own personal waste and testify to a longing for a society that does the same. Some informants mentioned that their composting was a response to consumption patterns, pollution and climate change; it is their contribution to mitigation and to making good use of resources by not throwing away and wasting the precious materials that food scraps in fact are: "I prefer to call it a product rather than waste, since it's important to keep the cycle going. The food you eat comes from the Earth and this way I can do my best to return what I took."

As mentioned earlier, some informants expressed a desire for sustainable consumption, not only in their personal life but especially on a societal level. Food waste reduction in general was also connected to the large-scale effects of wasting food in our affluent world. For example, one respondent claims to be "overwhelmed by the consumption and alienation in most aspects of society" while another notes "how ridiculous it is to put all the trash together in a plastic bag and put it in a landfill, in no way sustainable and just completely crazy." Respondents agree that current waste infrastructures and the social norms associated with them do not support practices of sustainable consumption and composting:

> I have a strong aversion to food waste and am a hardcore dumpster diver. I even take food from there just to throw it in the compost bin. The ethical use of resources is important to me. And so is my connection to my environment. … I can't believe that all this food just goes to landfill?

Concerns about consumption and wasted food include a criticism of the conventional waste collecting system, where organic leftovers are thrown into landfills while soil and fertilizers are then bought in a store.

Landfills are the most common method for getting rid of organic waste in Iceland, problematic as this form of disposal wastes resources and emits greenhouse gases. Respondents consider composting, either at home or in facilities managed by the country's municipalities, as a solution to that. The rewards for improving a failed system by composting are to receive fertile soil without much expense, an economic argument seen as important on both a personal and a societal level. Landfills were considered particularly wasteful, given that soil erosion is a massive environmental problem in Iceland (Ólafur Arnalds 2008), a subject of heated debate about the islanders' responsibility for keeping the ecosystem functioning and in a similar shape as it was before humans settled the country twelve hundred years ago: "We live in the largest man-made desert in Europe. And have one-fifth of vegetation cover from the time of settlement. But still, we think we are environmentally friendly." But soil erosion is not only a local issue: "I find it sad that these valuables just end up in the trash especially since soil erosion is one of the biggest threats to the planet." Many were critical of society for not taking better care of its valuables. Some say they use their compost to improve the soil on eroded pieces of land, often situated on their private summer house lots or their family's farmland.

This critique of society becomes even clearer when considering the organic material that goes down the drains, from our toilets, away from humans to other locations where it becomes a source of pollution: "What I find serious is how much valuable fertilizer goes through the drains and out to sea. Where it becomes pollution instead of being used for necessary land-reclamation."

> There is active soil erosion, and nothing is being done about it. Instead of using this great product it's driven all the way to Reykjavík. And it's more or less all from tourists from abroad. It's either disposed of at a landfill or pumped out in Faxaflói. At our expense. I just think it's so stupid. … By dumping our products to Faxaflói we are polluting what used to be the best fishing grounds in Iceland.

Through a composting process that involves human and microbial action, the problematic waste can be turned into a valuable resource, a treasure that fertilizes the soil. This argument is a critique of modern waste disposal systems, on the one hand, and of chemical soil fertilization on the other. Composting in general, whether of garden or kitchen leftovers or, indeed, of humanure, goes against the grain of linear thinking and the commercial logic of contemporary Western society. As such, it involves a degree of activism, articulated to varying degrees by the people who responded to our questionnaire or gave us interviews. Composting is to create for the soil but also to create an alternative to an economic and environmental regime whose ultimate product is landfill.

Conclusion

We end with the wise words of Puig de la Bellacasa (2019) when she describes what our relationship with soil does to us, embracing the boundless life that relationship

includes and brings to existence, our life too, among the countless others:

> [H]uman-soil relations also (re-)animate in the sense of *raising spirits up*. From the lure of wonderful soil biological worlds and its teeming wonder, to the embodied hope of eco-poietic everyday soil care and joyful sensual proximities, in the promise of a composted afterlife, these stories speak of joy, hope and possible versions of humanness other than the world destroyer. (Puig de la Bellacasa 2019, 403-4)

Whether the participants in the study were conscious of their microbial co-composters or not, more often acknowledging their somewhat bigger invertebrate collaborators, the entirety of the composting site is impossible to be perceived and understood without witnessing everyone involved—from the zillions of microbes inhabiting the place to the neighbor's dog who comes regularly to sniff out the latest food rests and leave his urinary calling card. Like every ecologically vital process, it encompasses both the scales of size and time that go beyond human cognition. The composters realize that, eventually letting go of their modernistic anthropocentric urge to be in control of everything and everybody to trust the process instinctively. And the reward is imminent: joy, hope, creativity; physical exercise, better health; togetherness with nature; contentment, harmony, loss of sense of time and place that relieves one of stress and worry; company with one's family, neighbors, friends; endless material for storytelling and educating; saving money, usefulness; participation in environmentally friendly behaviour and climate change activism—and the list goes on.

One more theme that has to be mentioned because it goes beyond anything the researchers expected to find in a practice that involves humans and other-than-humans in making soil out of food rests: composting brings the existential issue of the inevitability of death to the consciousness of the composter in such a way that it becomes natural, understandable and even poetic and beautiful. Composting also enables us to see life on Earth collapse with life on other levels, whether in outer space or inside every one of us, humans, microbes and all those in between. When you think about it, perhaps the metabolic infrastructure of composting your organic waste, and ultimately yourself, should be the only one we build; any other is just a temporary illusion between when we're born and when we die.

Notes

1 *Sarpur*. See, https://sarpur.is/Svarsnid/Grunnupplysingar.aspx?SpurningaskraID=2314665

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Appendix 1

The questionnaire consists of five chapters with a various number of questions, divided thus:

Chapter 1: Description of composting and composting facilities.
• Describe the composting you practice. • What kind of organic waste do you compost? • What do you not compost and why? • How long have you practiced composting? • What kind of facilities do you have for composting and how have you created them? • What have been the main challenges and how has your composting unfolded? • Can you describe the process from the gathering of the organic waste until it has transformed into soil? Examples would be what you do (seasonally, every day, weekly, monthly, etc.), where and how the organic materials are collected and stored, the participation of others in the home?

Chapter 2: Reasons, attitudes and experiences.
• What led to your practice of composting? • Where did the interest come from? • Did you become interested suddenly or gradually? • What was your first encounter with composting? • Has your life focus and attitudes changed since you started composting organic waste? • Can you give examples? • Have you experienced any changes since you started composting? Examples would be changes in well-being, behaviour and interests. • If so, could you describe these changes or give examples? • Does the composting practice have any connections with other interests or activities that you have? How? • Have you gotten acquainted with other people through composting? • Have you introduced it to others? • Has it led to conflicts? • What do your neighbors say? Can you give examples? • Do you experience support or criticism of your composting? Does it matter to you?

Chapter 3: The symbiosis of humans and microbes.
• Do you somehow evaluate the organic matter during the composting process and after it has composted? • How do you evaluate it? • Do you do some kind of measurements on the compost (based on smell, texture, looks or some other qualities)? • How do you envision the composting process in the mass/container? • What organisms do you think are involved and what role do they have? • Do you talk or think about the microbes in the compost process? How? • Have you given them names, or do you know of others who have done that? • Do you feel some kind of connection to the microbes? • Do you feel that you or the microbes are in charge of the process? • Are you worried about unwanted or harmful microbes?
Chapter 4: Information gathering and output.
• Where and how have you gathered knowledge about composting? Please include links to websites. • Are you a member of organizations or groups who focus on this issue? • Have you shared this knowledge with others? • On which occasion and how? • If “no”, why not?

Chapter 5: And finally.
● Do you envision continuing composting organic material? ● Is there something you want to add that has not been addressed already? ● What is your occupation? ● What is your education? ● Do you have any comments about this questionnaire?

Appendix 2

The interview questions used in the qualitative interviews about composting, directed at individuals and families, were the following:

1) How do you utilize organic waste? Where do you do that – inside or outside?
2) Do you both use organic waste from the garden and kitchen? If you use only one and not the other, then why? What material exactly do you use?
3) Please describe the whole process [ask people to take you to their composting area and show you how they do the composting; the physical activities involved, which tools they use, etc.].
4) Who participates and in which manner (family members, neighbors etc.)?
5) When did you start composting and how did it come about?
6) What do you do with the composted soil? Do you do any kind of measurements or evaluations of the compost? What do they consist of?
7) What problems or difficulties have you encountered in the process?
8) How do you talk about composting, for instance with relatives, neighbors, friends, workmates, etc.? How do they, in turn, talk about the issue?
9) Are you a member of any organizations or groups around the issue?
10) Does your composting relate to other interests and then which ones and how?
11) How did you seek information about composting initially and where did the idea come from?
12) How do you envision the composting process – the decomposition and transformation of the organic material? What happens inside the compost container/mass? Which organisms are involved and what role do they play, for instance microbes? Do you talk about them and then how?
13) Do you do anything else that involves microbes, such as making skyr, sourdough bread, kimchi, beer and so on?
14) Is there anything you want to add?
15) Would you allow me to talk with you again, for instance for more detailed information about your composting?

Appendix 3

The interview questions used in the qualitative interviews about composting and having a dry toilet, directed at individuals and families, were the following:

1) For how long have you had a dry toilet?
2) What kind of toilet do you have? How does it work?
3) Where did the idea come from? Did you do research before you decided on getting one?
4) How has it been? Have there been any problems?
5) Have you made any changes? Is there anything you would like to change?
6) Why do you use this solution?
7) Could you imagine having this kind of a toilet in your home?
8) How do visitors react to this?
9) Do you talk about such toilet solutions with others? How is it received?
10) Has anyone criticized this solution or commented on it?
11) Is there anything to watch out for? (Bacteria)
12) What do you do with the toilet waste?
13) How is the process?
14) What do you do with the compost?
15) Do you know which microbes are involved in the process of breaking down the organic material?
16) Have you monitored the decomposition process? Do you do any measurements?
17) Where does the knowledge of microbes come from? But the interest? What did becoming interested in microbes change for you?
18) Do you know of anyone else with a toilet like this?
19) Are you in any groups regarding this? But composting?
20) Have attitudes changed in society towards dry toilets? What about attitudes towards composting?