

## Responses

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### Microbiosocial: What if the Holobiont was the Starting Point, not the Endpoint?

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The introduction to the special issue “In Relation to Microbes” by Hafstein, Karlsson and Kinnunen ends with the statement: “unlike our universities, life itself is interdisciplinary” (p. 10). With this comment, the editors remind us that when studying social microbes and cultures of cultures (Brives et al. 2021), we should not limit our gaze by disciplinary silos and methodological boundaries because the “world out there” does not. Universities are organized around disciplines in teaching and recruitment, yet how the materiality of microbes and the social practices that shape and are shaped by them defy such traditions. The comment by the editors could well be interpreted as an invitation and mandate to collaborate across disciplines when studying microbes. For one, it would be impossible to know exactly what microbes are where without the methods of science, culturing, metagenomics, etc. However, instead of following this line of argument in this commentary, I will make a conceptual intervention following their statement about the nature of relations. What I take from their comment is that reality is *messy* and constantly changing through an *unruly process of multiple agencies*. Reality is *microbiosocial* and all creatures are more

than one; *holobionts*.

Holobiont is a term that describes interdependence and the coming together of more than two species. These may depend on one another in more or less mutually beneficial relations (Chiu and Gilbert 2015). *Holos* in Greek means all, *biont* stands for the unit of life. By definition, holobiont is an intermingling of many, rather than the idea that there is something like an independent singular species that happens to be the companion of another. As such, the entity of analysis is the co-mingling, and neither is without the other. In social sciences, literature tells us humans with their gut microbes are holobionts (Benezra 2023; Lorimer 2019). To paraphrase fermentation analyst Maya Hey (personal communication 2024), let us call us *humans\** from now on. Biologists remind us that such relationality is not just ammo for the deconstruction of anthropocentrism but that various other nonhuman animals and critters form holobiontic combinations (Theis et al. 2016). The idea of the holobiont begins to break down the idea of bounded species and introduce the need to pay attention to the relations and what happens “in between.”

The articles in the special issue support the editors’ comments in the introduction that life is interdisciplinary in multiple ways. If holobiont were the starting point, rather than the endpoint, what would it look like?

Ögmundardóttir and Bragason write beautifully about human-compost-soil-microbe-plant assemblages. Cassa’s expansive analysis of the multiple kinds of microbes tinkered with permaculture gardeners brings attention to insect-food-garden-human-lactobacilli webs. Corporeal analysis by Kinnunen

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powerfully paves the way to sensory ways of knowing microbes and the olfactory sense-bokashi-human-food waste-microbe relations. Sturludóttir and Pétursson tune into microbes in their analysis of car-sourdough starter- bread-baker-microbe-hand-kitchen-flour-water symbioses. Studying food preservation, Foltz elaborates on preserves resulting from orchard-plum-human-lactobacillus relations. Moreover, Birgisdóttir, Karlsson, and Pétursson describe a dietary intervention that concerns memory-ferment-taste-human interactions.

The long, awkward lists of actors bring our attention to the relations, the *dashes* in between. They also drive us up against the limitations of social scientific concepts. In the development of disciplines during the evolution of sciences at universities, task divisions have developed such that what people do has been reserved for social scientists. In contrast, matters of the body and the environment have been reserved for biomedical scientists and biologists. While this is a crude generalization, and the work of STS scholars and medical and environmental sociologists and anthropologists have brought the divide into question, it is nevertheless reflected in the terminology available to social scientists to talk about matters of microbiosocial. I argue that binaries of social vs. biological, nature vs. culture, human vs. animal, etc., are redundant in the face of what microbes show us about the complex relations of embeddedness. To this effect, I invite the community of scholars interested in thinking with microbes to critically examine the limits of our concepts and tune into the needs of a microbiosocial world that is “interdisciplinary” and made of holobionts. When the world is microbiosocial and made of holobionts,

to make sense of the complex relations of embeddedness without the dashes, what other terms do we need?

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