

Mapping Microbial Selves

Field Notes from a Dirty Parenting Project

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Abstract

Microbes exist everywhere on, in and around us. They are both ubiquitous and largely invisible, at least until they make their presence, or absence, felt. Recent years have seen a heightened sensitivity to microbial threats in the wake of the COVID-19 pandemic and widespread concerns about antimicrobial resistance (AMR) to antibiotics. At the same time, there is also a growing interest in the microbiome as a source of ‘wild immunology’. From this viewpoint, the human body is comprised of, embedded within, and dependent on its exposure to an ecosystem of microbes, and the absence of such exposure is linked to the development of auto-immune conditions such as Crohn’s disease and ulcerative colitis. Inspired by an emerging body of work in the humanities and social sciences which looks to engage with so-called lay knowledge and understandings of microbial forms (including bacteria, viruses, and fungi) and processes (such as contagion or digestion), this Field Note explores the piloting of ‘body mapping’ as a research method to engage with families to explore their collective understanding of their children’s microbiome.

Keywords

Microbiome, Body mapping, Family, Nature/culture, Expertise.

Introduction

Recent years have seen a growing interest in the notion of the microbiome as a source of ‘wild immunology’, which suggests a view of the human body as comprised of, embedded within, and dependent on its exposure to an ecosystem of microbes (see e.g., Lorimer 2016, 2020; Yong 2016); simultaneously, we also find a heightened sensitivity to microbial threats in the wake of the COVID-19 pandemic and widespread concerns about antimicrobial resistance (AMR). Much of the scholarly work responding to these trends emphasises the role of expert knowledge and scientific research in shaping microbial norms—distinguishing the ‘good’ germs from the ‘bad’—and in determining appropriate forms of biopolitical response (Benezra 2020; De Wolfe et al. 2021; Mansfield and Guthman 2015).

Yet there is also an emerging body of work which looks to engage with so-called lay knowledge and understandings of microbial forms and processes, in settings ranging from shrimp farms in Bangladesh (Hinchliffe, Butcher, and Rahman 2018) to living and labouring soils in France (Granjou and Phillips 2019) to domestic kitchens in Oxford (Greenhough et al. 2018). Inspired by this work, and our collective experiences and expertise in the fields of more-than-human geography, health geography and multispecies ethnography, this Field Note and these photographs explore the piloting of the ‘body mapping’ method as a way to engage with UK families to explore their collective understanding of their children’s microbiome. In particular, through this research method, we asked families to reflect on the idea of ‘dirty parenting’, a term coined to capture the emerging idea that exposure to dirt (and its associated microbes) carries health benefits as well as risks (see e.g., Finlay and Arrieta 2016; Gilbert and Knight 2017).

Body mapping in research and public engagement

We wanted to understand how families made sense of the different and often conflicting advice they received through popular science accounts, science reporting and public health messaging about microbial life in the context of the United Kingdom. Our objective was to use body maps to elicit knowledge acquired not only from public health and medical advice, but also absorbed as part of our participants’ professional training, passed down as family cooking and cleaning tradition, or gleaned from watching children’s television. We also encouraged participants to reflect on more intimate bodily experiences of catching colds, sanitising hands, or taking pro- or anti-biotics. While we recognise the setting for our pilot workshop—a museum—shaped the kinds of publics we engaged with, our hope in the longer term is to use this method to work with families from a range of different UK communities.

As part of the 2021 ESRC Festival of Social Science, we invited families visiting the Pitt Rivers Museum in Oxford to engage in a body-mapping exercise exploring their children's microbiome. Body mapping is a technique where participants are invited to create a life-sized map of their body based on their perceptions and experiences of a particular topic, guided by a set of questions or prompts. An arts-based practice, it lends itself to accessing sensory experiences, embodied ways of knowing and exploring relations between self, body and world, and can serve to both create and disseminate knowledge, including knowledge about health and disease and the experience of living with viral infection (cf. Boydell 2021). In previous research projects, we have followed microbiome scientists into their laboratories (Lorimer 2019), brought metagenomic analyses and technologies into peoples' homes (Greenhough et al. 2018; Lorimer et al. 2019), and used body mapping to understand individuals' experiences of their health (Jokela-Pansini 2022, 2021). In this new encounter, we move these forms of scientific expertise and domestic experience from the field to the museum.

The museum as a setting lends itself to participatory research because it actively encourages visitors to become involved (Simon 2010; Vincent 2014). Museums, including the Pitt Rivers, often work closely with communities to engage with local knowledges and issues of social change (Vincent 2014). Building on earlier research that has framed the museum as a contact zone (Clifford 1997), we staged encounters with visitors that involved improvisation, play, and mutual learning through interaction. Donna Haraway describes multispecies contact zones as spaces where lively figures illustrate 'mortal world-making entanglements' (2008, 4). The bodies of individual participants enlivened our field site and enabled us to map relationships from other contact zones—especially domestic spheres—where microbial species meet. In so doing, we sought to break down the distinction between the 'field' and the museum, building on earlier methodological experiments that used artworks and artifacts to destabilise established ways of talking about nature and culture (Kirksey et al. 2014; Marcus 2000).

Body maps can be drawn individually or collectively, and the participants usually discuss their maps at the end of the process with the facilitators and the other participants. Distinctive about our body-mapping process was our choice to work with families, as opposed to individuals, thereby positing their children's microbiome as a collective project whilst (hopefully) avoiding allocating it as any one person's responsibility. Importantly, we also recognise that for the most part, we were working with middle-class families—like us, drawn largely from a relatively affluent UK university city and towards a family-focused series of events linked to the theme of 'the environment'. That said, body mapping—with its emphasis on creative expression over more formal interviewing practices—has the potential to generate conversations across diverse communities and contexts. This is reflected

in work using body mapping with migrants and refugees, people living with physical and mental illnesses, and other marginalised or vulnerable groups, and in various geographic regions, including South Africa, Canada, Italy and Australia (Boydell et al. 2021; Brett-MacLean 2009; Dew et al. 2018; Gastaldo et al. 2012; Harries and Solomon 2018, Pizzolati 2022). In contrast to more top-down dissemination approaches to sharing microbial knowledge, body mapping also works to engage the participants in data collection and in deciding what is important from their perspectives (see also Jokela-Pansini 2021).

Testing and development

First, we organised a test body-mapping workshop with our own family members, which we used to refine our methods, choice of materials and questions. Our activity was focused on families, so we asked each family to draw around (at least) one of their children to create a body outline, which they could then annotate in response to our series of prompts (Figure 1). We hoped the activity would grant us access to what people knew and thought about the microbes that lived in, on or around them. Each family was provided with a pack of craft resources, including pens, stickers, and old magazines, amongst other materials (Figure 2). We also provided participants with an information sheet which included both the instructions to produce their map and a set of resources/links to current writing and thinking around the microbiome and human health (Figure 1). In producing the information sheet, we consulted with colleagues working in the field of human microbiome science to verify the accuracy of our claims with respect to the microbiome and our choice of supporting materials. In selecting and introducing this supporting information, we tried to represent a diversity of perspectives. We were mindful of the need to be respectful and open to diverse ways of knowing and thinking about human-microbe relations, and to present this information in an accessible way to both parents and their children with little or no previous knowledge about microbiomes.

Dirty parenting? Exploring 'good' germs and 'bad' germs in your child's microbiome

Have you ever thought about how your body is a habitat for more than 100 trillion microbes? Some of these are essential to our health, such as the gut microbes which aid in the digestion of food. Others can cause us harm, such as the pathogenic microbes which cause disease. Many more are completely indifferent to us (as we largely are to them). In some cases, a microbe is friend or foe depending on the other microbes which surround it, for example, how many live there and how they interact with others. Some scientists use the term microbiome to describe a community of microorganisms living together in an environment (for example, the human gut).

The aim of this activity is to encourage you as a family to reflect on what you know about the microbes that live on, in and around you. We invite you to approach this with an open and creative mind – it's not a test – but if you want to find out more once you've made your map, please turn this sheet over for some recommended links and resources.

How to create your body map...

Step 1: We need a young (recommended age 4–10) volunteer to lie down on the sheet of paper you've been given. Using one of the markers, draw round the volunteer. Now you have the outline of your map.

Step 2: Does everyone know what a microbe is? Microorganisms are very tiny living things. They are so small that you need a microscope to see them. Some – like those that help us digest food – help to keep us healthy. Others can make us unwell.

Step 3: Now use the following questions as a guide to 'fill in' your map. You can use any of the materials provided, cut out or draw pictures, and add stickers or other craft materials and labels to represent different microbial habitats.

1. Which bits of your body do you think provide the best home for microbes? Can you draw some microbes onto your body map in these places? What do they look like?
2. Are these microbes good for you, bad for you, or completely indifferent to you? Add some signs to your map that indicate 'good' microbes or 'bad' microbes.
3. What kinds of effects do microbes have in your body? Add some labels or pictures that show what microbes can do.
4. How do microbes get into and out of your body? Label the entrances and exits where you think microbes gain access to the body.
5. Where do microbes come from and go to? Add some more pictures to the outside of your map showing different sources of microbes.
6. How can we encourage the good microbes and discourage or get rid of the bad ones? Add some labels or pictures to your map to show how we get rid of bad microbes and encourage good ones.

Once you've completed your map let one of our research team know. We'll be pleased to try and answer any questions, or point you towards places where you can find out more. You're welcome to take your map home with you, but we'd also (with your permission) love to take a photo of your map to help our colleagues and others working on the human microbiome understand what you think about your microbiome. Your views can help us explore similarities and differences between what scientists focus on and what people want to know, shaping the kinds of research questions we ask and the ways in which we share the findings of our research.

**Want to learn more about the human microbiome?
Try the following resources...**

Research on the human microbiome is very much an emerging field. There is a lot we don't know about microbes, and a lot of what we do know remains a matter for scientific debate and discussion. That said, the following resources offer a useful introduction to some key debates and themes.

The [Frontiers for Young Minds](#) website offers an accessible and family friendly response to some of the key questions we've posed today.

For a simple (under 2 minute) overview of the microbiome, as well as reports and resources outlining the opportunities and challenges of microbiome research for health, agriculture and food, environment, and biotechnology, visit the [Microbiology Society website](#).

For kids try these resources from [BBC bitesize on microorganisms](#).

Ed Yong is a well-known science journalist and author of *I Contain Multitudes* (2016 Ecco Press), a popular science guide to the microbes which live in on and around us. Listen to [Ed's TED talk](#).

[Rob Knight](#) is one of the leading researchers on the human microbiome, and co-author (with Jack Gilbert) of *Dirt Is Good: The Advantage of Germs for Your Child's Developing Immune System* (2017, St. Martin's Press). Listen to Rob's TED talk.

Sally Bloomfield is a Professor at the London School of Hygiene and Tropical Medicine and member of the International Scientific Forum on Home Hygiene. In this podcast she explores [changing approaches to germs and home hygiene](#) over the past 50 years.

Beth Greenhough, Jamie Lorimer and Maaret Jokela-Pansini are researchers based in the School of Geography and the Environment at the University of Oxford. Their work explores connections between human and animal health, the environment and the microbiome, and the different forms of knowledge and expertise people draw on to make sense of this. Find out about some of their projects: [Good germs, bad germs podcast](#) and [video on YouTube](#).

If you have any questions about this activity or the team's research please contact: beth.greenhough@ouce.ox.ac.uk. This research project has been reviewed and approved by an Oxford University ethics committee. The ethics reference is SOGE 1A2020-212. If, after contacting me with any concerns, you're still unhappy and wish to make a formal complaint, please contact ethics@socsci.ox.ac.uk.

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Figure 1: Images of our information and instruction handout.



Figure 2: Examples of the resource packs available for participants to use to create their body map.

While the primary aim of the exercise was public engagement, we anticipated it may also be an interesting opportunity to explore how body mapping could serve as a tool to better understand how families made sense of the different sources of information, ideas and guidelines on the human microbiome they had encountered. We therefore sought ethical approval from our university ethics committee and obtained verbal consent from participants to take images of the body maps they produced. We use these images to structure our reflections below.

Body mapping in the ‘field’

On a December Saturday at the Pitt Rivers Museum, we were briefed by museum staff and led to a re-purposed lecture room. Here we set out our supplies of old magazines, glue sticks, pens, fuzzy bobbles and other crafting materials. The bright floor matting and cuddly microbes the museum staff had supplied helped create a more playful feel in an otherwise formal education setting. Colleagues poked their heads around the door, curious about what we were up to, exchanging notes and pre-event nerves. We were in the midst of the COVID-19 pandemic and its traces were everywhere. In the masks on our faces, the bottles of hand sanitiser and anti-bacterial cleaner on the tables and next to each mat, the pre-event briefing and obligatory (for us) lateral flow tests. Even as we sought to open up our participants to microbial diversity and abundance, we found ourselves performing the biopolitical rituals of testing, wiping everything down with anti-bac, and keeping physical distance, that had become customary around us.

Parents came with some feelings of biophilia and also a sense of curiosity about microbial worlds. Some had come specifically to seek us out, drawn in by the festival's promotional materials. Others were introduced by museum staff, or attracted by the noise and sight of groups gathered around on the floor amidst colourful crafting materials. We were meeting under conditions of pandemic anxiety—the spectre of unseen coronaviruses hovered at the edges of the room—but even amidst these conditions parents were keen to nurture probiotic sensibilities. Knowledge was co-produced during the encounters that unfolded throughout the day. We greeted each family as they joined us, each of us acting as facilitators at one of the four stations, offering advice and suggestions when needed, but also stepping back to allow participants to explore and create on their own. Most participants spent between 30 and 45 minutes on their maps. When they had finished, we invited participants to talk through their maps with us, and (with permission) we took pictures of the body maps they had produced for our notes. We asked all families if they wanted to keep their body maps and most of them did.

We found body maps a useful conversation starter. They drew families into conversation with each other, and with us, questioning what they did and did not know about the microbes that surrounded them, and sensitising us, as researchers, to the familial co-constitution of microbiomes and microbial knowledges. For example, an invitation to think about 'which bits of your body provide the best home for microbes?' drew attention to practices of hygiene and cleaning; to the role of other senses (notably smell) in detecting microbial presence and absence; and to the importance of children's television in forming early microbial imaginaries. The materials too prompted thought and discussion: 'Do microbes resemble this fluffy ball? Or this dinosaur sticker?' Perhaps we needed to pay greater attention to how the material we provided shaped the discourses that emerged—to whether dinosaur stickers promote different conversations about microbes to, say, smiley faces. Not content with our representational attempts, some participants elected to draw their own, with some familiar coronavirus features (Figure 3).

The gut was central to our conversations with participants about microbes and featured in all our maps, colonised by microbes in the form of smiley faces and fluffy balls interspersed with fruits and vegetables (Figure 4). Articulating these embodied relations, participants drew on burgeoning and collective understandings of anatomy, as well as knowledges of microbes, expressed in discussions around where the gut sits, and how food (and microbes) travel through the body: 'How does the food get from your mouth to your gut?' prompted one parent. Some images featured detailed vascular or digestive systems, which

formed topographical features over which microbiome knowledges were overlaid and interspersed.



Figure 3: Section of a body map produced at our session, showing a child's interpretation of 'coronavirus'.



Figure 4: Section of another body map produced at our session, showing the human gut and its microbiome.

While we valued the knowledges and ideas participants shared with us, the mapping activity also staged conversations between our participants they had not had before. Some parents explained that other than telling their children to wash their hands, they had never had such an in-depth conversation with them about germs. Others were even surprised how much their children knew about where microbes were located and about the differences between 'good' and 'bad' germs.

One of our prompts engaged with this idea directly, asking participants, ‘How do you encourage the good microbes, and discourage or get rid of the bad ones?’ Children (and their parents) often associated the gut with ‘good’ germs and either drew or looked for images of yoghurt or healthy food to place on their map. In some conversations, hands, feet, nose and the genitals at first represented sites of ‘bad’ germs, but the families quickly started reflecting on the complexity of such a division.

The space outside the outline of the body played an important role as a site where participants reflected on (and drew or collaged images of) the places microbes come from and travel to. For example, Figure 5 features pets, food, images of playing outside, poop, and chickens as sources of microbes. Alongside our participants we flicked through magazines asking (pointing to some yogurt), ‘Is this a source of microbes?’ ‘Or this?’ (pointing to a large fluffy dog).

The pandemic made its presence felt in images of masks and hand sanitiser (Figure 6). ‘How do you keep out the bad germs?’ we prompted. ‘What am I wearing on my face?’ asked a parent. We learnt that it is surprisingly hard to find an image of a sink or hand-washing facilities in a magazine.



Figure 5: A participant's body map, showing the 'outside' space and its potential microbial reservoirs.

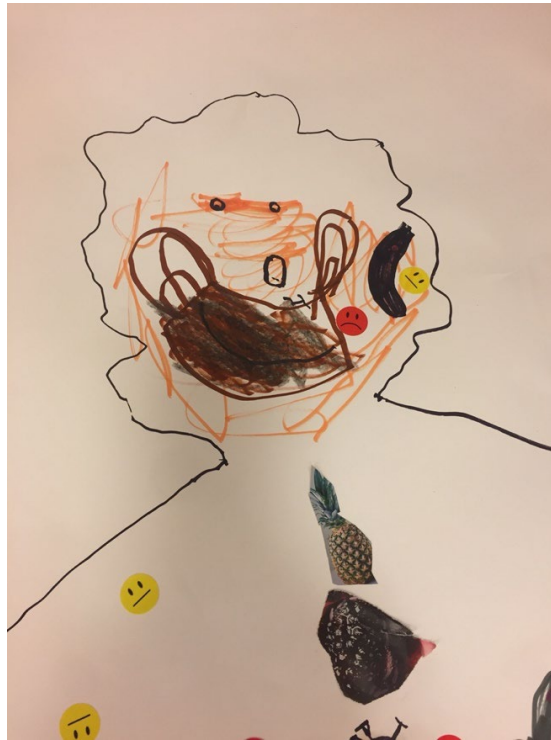


Figure 6: Another of the participants' body maps, in which the face is overdrawn with a face mask.

One mother confided that her daughter had germaphobia. After learning about germs at school, she had started obsessively washing her hands. The mother was there to see if she could expand the horizons of her daughter's imagination about unseen friends that might be helping her stay safe and healthy in the world. Maybe the young girl was shy, and was not initially interested in interactions with unfamiliar adults. However, eventually she lay down on the large sheet of paper, and let her mother trace the outline of her body (Figure 7).

As the outline of the girl was filled in with organ systems—the gastrointestinal tract, the heart, a brain, and a spine—the mother asked us probing questions. We talked about the phage viruses that are pervasive in the body—in the intestines as well as regions of the body previously thought to be sterile, like cerebrospinal fluid and the lungs. After stepping away, and letting a mother-daughter dialogue take place, we came back and found stickers of happy faces and neutral faces placed strategically within these organ systems and also on the surface of the skin. The girl finished the drawing by giving herself a thick mane of rainbow-coloured hair (Figure 7).

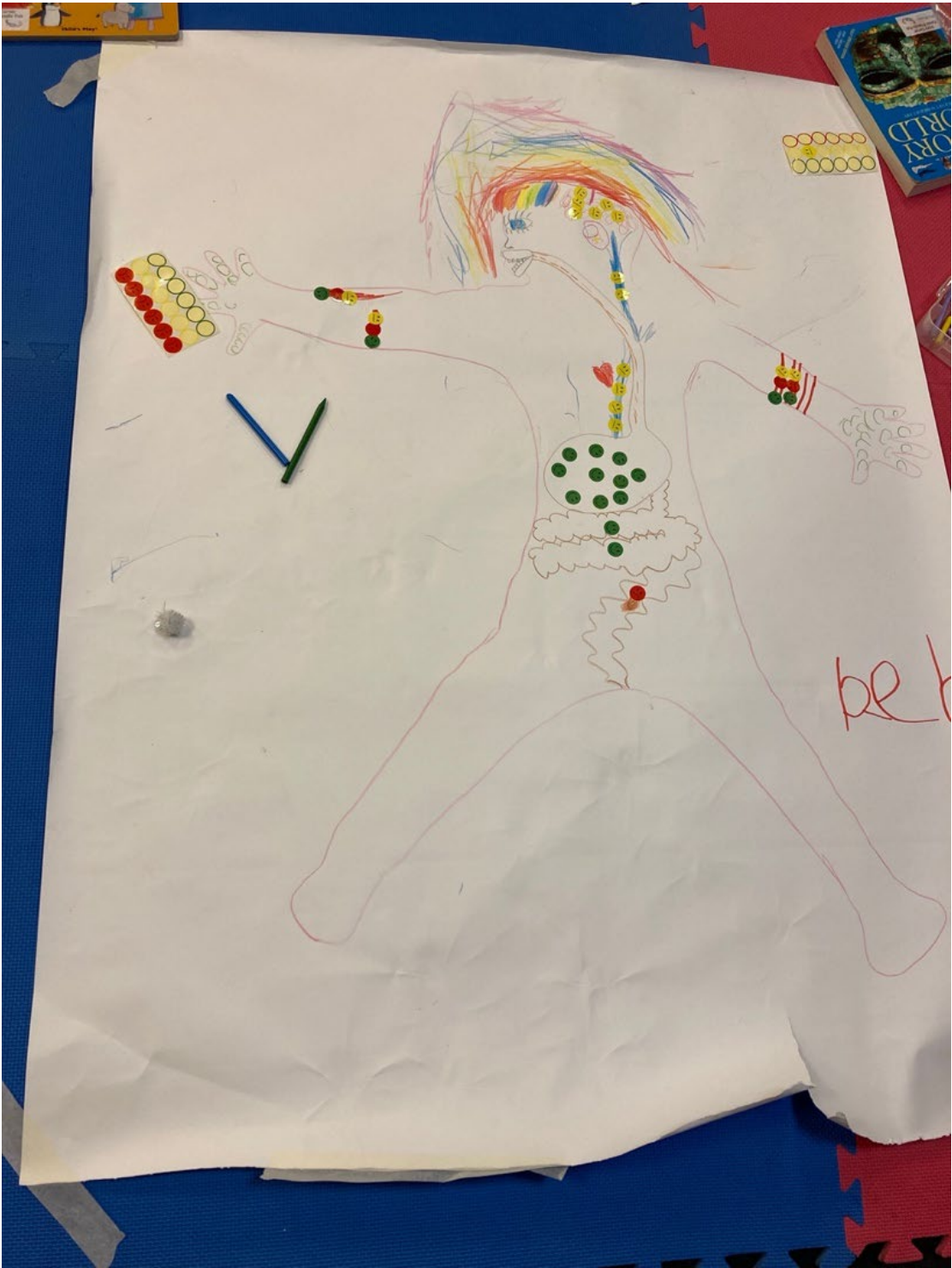


Figure 7: Body map featuring rainbow hair.

Reflections

In this first exploration of the work body maps can and might do in accessing everyday microbial worlds, body mapping served as a tool to generate curiosity and reflection. The challenge then comes when thinking through how to respond to such curiosity, something we found in other work engaging publics with microbial agency (Greenhough et al. 2018). The list of helpful links on the back of our handout provided only a partial response to this question. Yet this question in and of itself does important work, marking the line between what we as knowledge-makers wish and are able to communicate, and what the communities with whom we work wish to know. For those of us embedded in post-human scholarship and Science and Technology Studies (STS), it is an important reminder that sometimes 'it's complicated and uncertain' is not a good enough answer, albeit a fascinating starting point.

So, what might these field crafts and snapshots tell us about non-expert knowings of microbial ecologies? Mapping microbiomes demonstrated, for us, that our encounters with them can be collective activities, facilitating an exchange of ideas both within families and between academics and wider publics. The activity of making and sharing maps sparks conversations and creativity; it can both 'create and communicate knowledge' (Boydell 2021, xix). The images generated show bodies as richly textured topological spaces, threaded through with veins and arteries, guts and bones, and (as the spaces around our maps show) in constant conversation with their environment. Interestingly, while body mapping is often valued as a way of accessing embodied experiences and ways of knowing, our exercise constituted a curious reversal: the focus was mostly on knowledge *of* bodies rather than *through* them. As currently framed, the exercise told us less about what people felt through their bodies, and more what they felt and thought about them, channelled through a sense of what they thought might be microbially, biologically, medically and scientifically relevant (cf. Boydell 2021).

The value of this particular form of body mapping, then, lay in the space it opened up for families to talk about what it might mean to live with our microbial selves. For example, ideas around 'dirty parenting'—the immunological benefits of childhood exposure to dirt and germs (Finlay and Arrieta 2016; Gilbert and Knight 2017)—might be parsed through multiple other 'lay' understandings of and knowledges about the intertwining of human and microbial lives (cf. Greenhough et al. 2018). Through gentle encouragement, we invited participants to visualise the things they knew (and reflect on those they didn't), and to work together, sharing imaginaries and stories of their encounters with microbial worlds in order to rewrite, or at least nuance, dominant scientific discourses about both the

dangers of some (pathogenic) microbes and the probiotic opportunities offered by others.

Authorship statement

This is a co-authored piece, with each of the authors contributing equally in both the delivery of the workshop described and the writing up of these field notes.

Ethics statement

This event was reviewed and approved by the University of Oxford's Central University Research Ethics Committee (reference number SOGE 1A2020-212).

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Beth Greenhough is Professor of Human Geography and Fellow of Keble College, Oxford. Her research examines the social, cultural and ethical dimensions of using humans and animals as resources for biomedical research, and she is committed to foregrounding the interests and concerns of stakeholders, patients and publics in research design. She is co-editor of *Researching Animal Research* (MUP, 2024) and *Bodies Across Borders* (Ashgate 2015) and co-author of *Bioinformation* (Polity 2018) and *Health Geographies: A Critical Introduction* (Wiley-Blackwell 2017).

Maaret Jokela-Pansini is a research fellow of the School of Geography and the Environment and Keble College, Oxford. Her research focuses on body-environment relations and embodied experiences of health and wellbeing, environmental pollution, violence, and marginalisation. In her current projects, she studies women's experiences of Long Covid (UK) and residents' perceptions of environmental pollution in industrial areas in Southern Italy. She is dedicated to further developing body mapping as a tool of co-creation to engage with participants beyond academic spaces.

Eben Kirksey is Professor of Anthropology at the University of Oxford where he teaches Medical Anthropology and Human Ecology. He earned his PhD at the University of California, Santa Cruz, and helped found one of the world's first Environmental Humanities programs at UNSW Sydney in Australia. He is author of *Freedom in Entangled Worlds* (Duke, 2012), *Emergent Ecologies* (Duke, 2015), *The Promise of Multispecies Justice* (Duke, 2022) and *The Mutant Project* (Bristol University Press, 2020). Eben has helped curate art exhibits, including *The Multispecies Salon* which became a book (2014), *Chemical Species* (Princeton University), *Emergent Ecologies* (Brooklyn, New York) and *Species of Justice* (Oxford).

Jamie Lorimer is Professor of Environmental Geography and Fellow of Hertford College, Oxford. He researches public understandings of nature and how these come to shape health and environmental governance. Past projects have explored the histories, politics, and cultures of nature recovery, ranging across scales from elephants to the microbiome. He currently explores the probiotic turn that is underway in the Western world in which citizens and scientists are using life to manage life: reintroducing species to deliver desired functions and services. Jamie is the author of *The Probiotic Planet: Using Life to Manage Life* (Minnesota, 2020) and *More-than-Human* (Routledge, 2024).

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