

logical attunement to the world, and elaborates what could be described as a phenomenological ontology of plants. There can be no total account of this ontology as the encounter with each unfamiliar organism discloses a “unique quality” (167). Furthermore, Holdrege regards knowing itself as a participatory relation, through which the plant enters a new stage of development (appears in the human mind) and the scientist is transformed: “This is the lived overcoming of the object view of the world and the affirmation of the participatory nature of reality” (171).

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Rosamond Rhodes, Nada Gligorov, and Abraham Paul Schwab, eds. *The Human Microbiome: Ethical, Legal, and Social Concern*.
Oxford: Oxford University Press, 2013. 288 pages. ISBN: 978-0-19-982941-5 (hardback). US \$55.00

Reviewed by Nicolae Morar, University of Oregon

The Society for Science and the Public publishes (almost) every year in December in *Science News* its top twenty-five science stories of the year. In 2013, among numerous other science news pieces, like the carbon dioxide level passing a milestone (#10) or language learning starting before birth (#8), the dominating science news revolved around the discovery that our bodies are mostly made of microbes (#1). In addition, a number of editorials have pointed out this particularly thought-provoking view emerging from microbial biology. Roy Sleator notes, “bacteria occupy all surfaces of the human body with a combined microbial cell population ~10 times that of human cells, a fact which, in essence, makes us more microbe than man!”¹

1. R. Sleator, “The Human Superorganism—Of Microbes and Men,” *Medical Hypotheses* 74: (2010): 214.

I want to salute the visionary character of this book. A group of talented bioethicists, and their own Microbiome Working Group, has not just explored and anticipated the importance of the human microbiome in redefining key medical notions, but has recognized the remarkable paradigm shift that microbial biology is about to engender in the life sciences,² in bioethics more broadly, and likely in society writ large.

The book opens with a useful introduction, where Rosamond Rhodes sets the stage for the volume providing an overview of the project and of the interdisciplinary process by which various working groups have produced the subsequent chapters. This particularly successful collaboration between scientists and philosophers calls into question the relevance of the 'two cultures' model: sciences vs. humanities. In addition, the authors dispel the myth that philosophy is irrelevant to social debates since they have taken the time to provide a list of policy recommendations for each one of the topics they engage with.

The book is divided into seven chapters: an overview of human microbiome science (chap. 1), personal identity (chap. 2), property and research (chap. 3), privacy and confidentiality (chap. 4), research ethics (chap. 5), biobanks (chap. 6), and finally, public health and research on populations (chap. 7). The goal of each chapter is introduce the public to standard views about each area and to analyze the impact of human microbiome research on those models of thinking.

Chapter 1 is an overview of central views in microbial biology. It gives us a picture of the history of the field and a helpful update of the current state of research. Microorganisms are extremely important not only from an environmental perspective, i.e., oxygen production, nitrogen fixation, but also for our digestive and immune system since they perform functions that our body could not achieve on its own. The spectacular number of microbes and their ecological interaction with us has raised interesting questions about who we are as individual organisms.

Chapter 2 explores whether a microbial understanding of the human being would alter some common views on personal identity, personhood, and selfhood. Given the most frequently proposed criteria for personal identity (numerical and psychological), the microbial view of human organisms might require that our numerical identity is recaptured under the concept of super-organism or that understanding that 90% of our body is not human might "make a significant difference in how people see themselves in relation to the environment" (60). The authors, however, remain skeptical about the possibility of human microbiome knowledge to change the numerical and psychological conceptions of personal identity (58 and 60).

2. Maureen O'Malley and John Dupré's pioneering work in microbial biology (also supports this paradigm shift. For more details, see "Size Doesn't Matter: Towards a More Inclusive Philosophy of Biology," *Biology and Philosophy* 22 (2007): 155–91.

The argument in chapter 3 revolves around a series of cases that highlight the ethical difficulties concerning the question of property in life sciences. The Myriad Genetics is certainly a case in point. Patenting genes (which occur naturally in humans) significantly hinders biomedical research and limits individual access to important forms of diagnostic tests. Given this emerging microbial view of human organisms, the question becomes: how would considerations regarding ownership and patents affect microbial research and their medical applications? The authors argue that the “human microbiome will raise similar property issues” (72) to the ones we have been exposed to so far in life sciences. However, the authors also contend that the current divergence of opinion about ownership and property rights in life sciences shows that no framework can merely be applied to future research on human microbiome (101).

Based on recent evidence, “each individual’s microbiome reads as a biography, replete with revealing personal information” (107). Given this information, the task of chapter 4 is to address ethical and social issues regarding privacy and confidentiality. The chapter reviews the main philosophical approaches to confidentiality and privacy (bodily privacy, privacy as private sphere, and informational privacy) and provides an assessment of those concepts in light of the ways in which human microbiome research could produce new ways of obtaining information about individuals and groups. The authors claim that the concept of confidentiality is more suitable than the concept of privacy in biomedical research since the need to disclose patient information demands a robust series of safeguards on the healthcare provider’s end.

The next chapter covers core issues pertaining to human subject research as the bedrock of research ethics. Researchers should be aware of *both* the proper conduct when human subjects are involved (and the authors detail very clearly the conditions for high ethical standards: from informed consent, to justice, to favorable risk-benefit ratios, etc., 157–164) and also, the regulation process of developments in biomedical research (regulation of probiotics and phages). If the former defines ethics as a cohesive part of the scientific practice, the latter points towards a critical space where scientists could “address a lacuna” (171) and hold manufacturers accountable when claims about the efficacy of probiotics are not sufficiently back up by rigorous and accurate data.

The acquisition of data does not happen in a vacuum. It requires samples. And, the process of collection and use of samples demands storage places, i.e., biobanks. From the beginning of chapter 6, the authors point out that “the existing regulations that govern human subject research were not designed with biobanks in mind, and, at present, they cannot be meaningfully applied to human microbiome biobanks” (182). When biomedical research involves patients, its focus ought to be ultimately on the wellbeing of the individuals involved. However, when research is conducted on large populations in order to understand the interaction of genes, microbes, and the environment and

how those interactions impact their health and disease, new ethical protections are required. The authors suggest that the process of consent (instead of blanket or specified consent [204]) and increasing community consultation are important tools to prevent ethical shortcomings.

When health and disease are linked to population (or groups), new policies and ethical guidelines are required in order to account for the fact that clinicians do not focus in this case on one patient at a time. Chapter 7 examines the intricacies of ethical duties in public health settings and how those duties might be modified when they involve human microbiome research. The authors show how issues of public health microbiome policy could become morally problematic. Take the case of obesity. Recent studies suggest that the composition of microbial communities in our guts is correlated with how well we assimilate food, and thus, to a certain extent, with obesity. If such findings are supported by additional research and if obesity continues to be a priority in terms of public health, one question deserves our attention: how will microbiome research help us think differently about improving the health of obese people? Without offering final solutions to such complex problems, this chapter, along with a set of policy recommendations, is particularly helpful for any future debate on human microbiome population research.

I would like to suggest one minor limitation of this volume. I believe it takes a rather timid stance with respect to the findings emerging from microbial biology. While all the chapters are philosophically solid, it would have been refreshing to see their conclusions pushed further. For example in one of most interesting chapters of the book (if not the most interesting), "Personal Identity: Our Microbes, Ourselves," the authors spend time defining and assessing the two most famous criteria for personal identity over time, psychological and biological (or bodily) criteria. However, when the challenge of drawing a clear boundary between us and our (microbial) environment is introduced (59, also in reference to Dennett), the authors favor the superorganism hypothesis (59 and 65), which supposedly better explains the collective nature of our organism and the symbiotic relation between our microbial fellows and us. Recent work in microbial ecology suggests however, that our collective nature is better understood by thinking of ourselves as ecosystems *rather than* organisms or even superorganisms.³ The authors are probably not ignorant of this alternative explanatory hypothesis since Battin et al.'s (2009) claim that "individuals might not be distinct from their environment"⁴ is not foreign to a strongly ecological conception of ourselves. Pushing this line of argument would have been particularly thought-provoking because, as the authors rightly note (65), it calls into question the most common views of

3. B. Bohannon, "The Human Body as an Ecosystem," *TEDx Talk*, available at: <https://www.youtube.com/watch?v=Dfy2qYfUWE0>.

4. Battin et al., *The patient as Victim and Vector: Ethics and Infectious* (New York: Oxford University Press, 2009), 77

personhood and agency (e.g., Kant). Along with the feminist critique of autonomy, the ecosystem view of humans introduces a new way of relating to the world (where there is a strong emphasis on environmental and social constitutive elements of ourselves) and most likely the need for a new conception of our moral obligations.

It is often said that bioethics and research ethics are reactive disciplines since their own development is measured by the answers they provide to egregious ethical shortcomings. *The Human Microbiome* volume proves wrong those who hold such a belief. At its best, bioethics is not only relevant to understanding how new scientific findings challenge our most common assumptions, but also it anticipates and prevents future ethical deficiencies. This volume is a fine example of bioethics at its best.

Amanda Machin. *Negotiating Climate Change: Radical Democracy and the Illusion of Consensus*.

London and New York: ZED Books, 2013. 176 pages. ISBN: 978178032397 (paper). US \$34.95.

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In this interesting book, Amanda Machin takes agonistic theory, as championed by Chantal Mouffe, and applies it to the phenomenon of global climate change. Machin sees climate change not so much as a problem to be solved, but rather as a condition within which we must work, live, think, negotiate, and survive. (Here, she follows the important trajectories explored by Mike Hulme, among others.) On one level, the book makes for superb reading, especially for undergraduates who think they might already have arrived at a “solution” to the “climate change problem.” On another level, however, the book subverts some of its own premises and exposes some real concerns about the manner in which the academy engages—or fails to engage—an issue that many see as the most pressing challenge in the history of our species.

In the Introduction, Machin outlines her project and the basic line of her argument. If we are to have any chance of acting against climate change, she writes, then we must agree to disagree (2). We also need to understand that disagreement cannot be regarded as an impediment to decisive and collective action on climate change, but rather as a necessary condition for achieving it (4). Following Mouffe, Machin urges that a “conflictual consensus” (Mouffe’s famous, if slightly paradoxical, phrase) is required for us to navigate the fluctuating landscape of climate change. Ultimately, Machin urges, we must disagree in order to act. More on this notion in a moment.