

*HOMO MICROBIS:
THE HUMAN MICROBIOME,
FIGURAL, LITERAL, POLITICAL*
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"Our Self Portrait: the Human Microbiome," Joana Ricou, 2011. Oil on canvas, two panels 16 x 16 in.
Image courtesy Joana Ricou.

How do biologists imagine the human being these days? The Human Microbiome Project, inaugurated in 2008 and sponsored by the United States National Institutes of Health, tells us that human bodies are mostly microbial—mostly made up of microbial ecologies: "Within the body of a healthy adult, microbial cells are estimated to outnumber human cells ten to one."¹ What does this mean?

In "The Human is More than Human," a mind-unwinding essay in his 2013 book, *Cosmic Apprenticeship*, science writer Dorion Sagan provides an uncanny take on our microbial constituents, delivering friendly and fiendish facts about human biological heritage: we are threaded through, more than we know and have known, with microscopic companion species and stranger strains.² No longer merely the lineal descendants of previous generations of earlier hominoids, anthropoids, mammals, chor-

- 1 The Human Microbiome Project, Overview: <http://commonfund.nih.gov/hmp/overview.aspx>
- 2 Dorion Sagan, *Cosmic Apprenticeship: Dispatches from the Edges of Science* (Minneapolis, MN: University of Minnesota Press, 2013). This essay of mine developed from a conversation with Sagan at the 2011 meetings of the American Anthropological Association. A video of that conversation can be found here: <http://www.culanth.org/?q=node/509>.

dates, animals, and so on, we humans are sideways mash-ups—Frankensteins—made up of a welter of teeny microbial friends and enemies. The traces of relic viruses and companion microbes are embedded in our genomes, our cells, ourselves. Microorganismic relations survive and thrive in our blood and guts.

We could call the viral, microbial, and fractal figure of this multiplied body that Sagan describes something like "Occupy *Homo sapiens*." Sagan exhorts us to reenvision ourselves as the 90 percent—the 90 percent microbial, that is ("there are," he writes, "ten of 'their' cells in our body for every one of 'ours'"³). The remaining 10 percent of our putatively "human" cells are over-esteemed in his view, dominating our vision of human nature for far too long.

It is an arresting figure, this entity that we could name *Homo microbis*.

I want to zoom in on some of the rhetoric that Sagan winds into his accountings of this figure. Next to the *figure*, then, the *literal*. Sagan writes of the thickness of our microbial complement that, "we literally come from messmates and morphed diseases."⁴

But what is it that "literally" means?

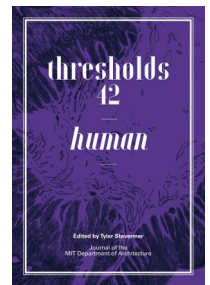
The OED tells us that "literal" is originally theological: "Of or relating to the 'letter' of a text."⁵

Taking things literally, then: that which is "literal" points us to *text*, to more representation, and not, perhaps, to the ultimate materiality of things, as we often use the word "literally" to mean.

So: what are the "letters" of the organismic text that describes the swarm of tiny critters that make up *Homo microbis*?

Well, the letters of this text come to us from the binomial nomenclature of Swiss botanist Carolus Linnæus, who in the 1750s established the two-termed form *Genus species* to designate living things, as in, e.g., *Homo sapiens*. This Latinate system of naming is the one that Sagan calls upon in his essay to describe our microbial familiars. He tells readers about microbial critters with mouthful names like *Campylobacter jejuni*, *Toxoplasma gondii*, *Candida albicans*, and *Convoluta roscoffensis*, organisms that variously swarm our insides and outsides. Sagan quotes Clair Folsome as offering that humans are a "seething zoo of microbes."⁶

- 3 Sagan, 19.
- 4 Ibid.
- 5 Definition 5 a. of "literal," Oxford English Dictionary, online edition, accessed April 18, 2013.
- 6 Folsome, quoted in Sagan, 18.



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In a kind of oblique support of Sagan’s argument, though, one might point out that there is actually nothing “literal” at all about names like *Toxoplasma gondii*, *Candida albicans*, or *Campylobacter jejuni*. The meanings in the genus names writhe against their staid Latin boxiness. If to be literal means to be “free from metaphor, allegory, etc.,” these are literalities that are *not at all* literal—they teem with rhetoric. Think, then, about the “literal” translation of these microbial binomials:

Campylobacter jejuni: twisting, fasting stick
Toxoplasma gondii: crescent shape from the gundi rodent
Candida albicans: a glistening whiteness
Convoluta roscoffensis: rolling-around thing from Roscoff, Brittany

These Latinate heterogeneities in view, one might now revisit the Latin *Homo sapiens*. Are “we” humans still “thinking man,” or is it time for the “human” to be renamed?

Renaming *Homo sapiens* has been, no surprise, a language game of long vintage in political philosophy. There have been many offerings, most prominently:

Homo faber (making man), elaborated by Hannah Arendt in 1958 to draw attention to human creativity, but with earlier precedents and mentions from Appius Claudius Caecus, Benjamin Franklin, Karl Marx, Henri Bergson, and Max Frisch.⁷

Homo ludens (playing man), celebrated by historian Johan Huizinga in 1938, but named earlier by Friedrich Schiller in 1795. Other candidates have been *Homo amans*, *Homo reciprocans*, *Homo oeconomicus*, *Homo grammaticus*...

These all do different sorts of work, though all make some cultural activity the subject of the species slot. What I have called *Homo microbis* is a strange folding back, a strange back-to-the-biological move. My own playful splice here might be seen as part of the same historical moment that has lately given us such forms as the “biological feminism” of Elizabeth Wilson, in which Wilson mines new biological knowledge for critical resources with which to think and unthink naturalizations and denaturalizations of gender.⁸ This biophilia is part of the same historical moment as Icelandic pop star Björk’s 2011 album, *Biophilia*, in which she sings:

7 Hannah Arendt. *The Human Condition* (Chicago: The University of Chicago Press, 1958).

8 Elizabeth Wilson, *Psychosomatic: Feminism and the Neurological Body* (Durham, NC: Duke University Press, 2004).



Cover art from Björk’s *Biophilia*, Polydor Records, 2011. Image courtesy Björk Management.

*Like a virus needs a body, as soft tissue feeds on blood, some day I’ll find you — one day I’m there. Like a mushroom on a tree trunk, as the protein transmutes, I knock on your skin—and I am in.*⁹

What are the politics—and not just the aesthetics—of this moment? The politics of Sagan’s reading of the microbiome are clear: a call to reposition, to rethink, to defamiliarize the “nature” upon which we have believed human biological being to rest. I would like to join Sagan in making explicit the political dimension of this *figure* of the multiply biological.¹⁰

Anthropologist Heather Paxson says that the ascendancy of the microbe—in public health, in food politics, and in many other places—is more than noticing new non-human natures. It is *microbiopolitics*, “the creation of categories of microscopic biological agents; the anthropocentric evaluation of such

9 Björk, “Virus,” *Biophilia* (Polydor, 2011).

10 I am indebted in my thinking about the idea of the “figure” to science studies scholar Donna Haraway. In *Modest_Witness@Second_Millennium.Female_Man@_Meets_OncoMouse™: Feminism and Technoscience* (New York: Routledge, 1997), Haraway writes that “[f]igurations are performative images that can be inhabited. Verbal or visual, figurations can be condensed maps of contestable worlds” (11). Figures — or, for her, in this passage, figurations — are things like the Christ figure, the atom bomb, the fetal sonogram, entities that gather up the concerns, longings, anxieties, and hopes of a people. The microbiome, I am suggesting here, is a new figure on the landscape of biology, gathering up new ideas about species, disease, and community.

agents; and the elaboration of appropriate human behaviors vis-à-vis microorganisms engaged in infection, inoculation, and digestion.”¹¹ Paxson’s term is a union of the *microbial* with the *biopolitical*, where the biopolitical is a concept, following Michel Foucault, that describes how politics has come in the last two-ish centuries to operate through the substances and sensibilities of biology (take *eugenics*, those programs of human breeding or genocide aimed at transforming populations so as to be in line with political and social ideologies, as the most extreme, negative example of biopolitics. More subtle forms might include particular genres of prenatal testing and counseling. More benign versions might include some kinds of socialized health care).

Taking off from Paxson’s microbiopolitics, I want to fuse biopolitics with a term from evolutionist Lynn Margulis, *symbiogenesis*, which she coined to encapsulate the idea that evolutionary biological novelty emerges not just from Darwinian descent with modification, but also through the symbiotic fusion of different kinds of cells and organisms (as with, for example, the mitochondria in our cells, which were once free-living, oxygen-respiring bacteria).¹² The term I suggest, *symbiopolitics*, refers to the densely political relations among many entangled living things—not just microbial—at many scales. Symbiopolitics is the politics of living things coexisting, incorporating, and mixing with one another.

But let me say more about politics—and offer that a clear politics of the “human” do not necessarily follow from re-descriptions of the biological. Such politics can be progressive, retrogressive, liberatory, oppressive, strange, and familiar—all at once.

On the side of the strangely familiar, take, for example, some recent scientific work that writes *race* into the microbiome. In a 2012 piece entitled “The Interpersonal and Intrapersonal Diversity of Human-Associated Microbiota in Key Body Sites,” we read, as if in a Lovecraftian story in which old legacies won’t go away, that it is possible to characterize the microbiomic diversity of Caucasians, African Americans, Hispanics, and Asians (Native Americans are absent, a relief in some ways, though for the wrong reasons). The authors of this piece suggest that, “The vaginal communities of Asian and Caucasian women were more often dominated by lactic acid-producing *Lactobacillus* species than those of Hispanic and African American women” but then

11 Heather Paxson, “Post-Pasteurian Cultures: The Microbiopolitics of Raw-Milk Cheese in the United States,” *Cultural Anthropology* 23(1)(2008): 15-47, at 17.

12 Lynn Margulis, ed., *Symbiosis as a Source of Evolutionary Innovation: Speciation and Morphogenesis* (Cambridge: MIT Press, 1991).

do not tell us how those categories were selected or defined (though one imagines they derive from a clumsy attempt to be “inclusive” of human diversity, figured through US census categories), why they might matter, or, importantly, which direction the causal arrows might go—leaving the reader to fall back on phantasmatic notions of these categories as somehow foundationally biological. This is a microbiomization of race.¹³

Would it make sense to take a more sophisticated approach and ask how social categories like race and processes like racism—and its attendant stresses, deprivations, health disparities (and, in some cases privilege)—can reach into people’s biologies and reshape their microbiomes? Only up to a point. As Jonathan Kahn (personal communication) suggested to me, this would simply add up to “the molecularization of environmental influences on race.” Another problem with this sort of corrective is that it itself participates in reifying “the microbiome,” as though it is a thing rather than a description.¹⁴

Or take the politics of sex and gender (Recall the *Homo plus* formulations I mention above. Why never *Femina sapiens*?¹⁵).

Thinking about gender, consider some of the new “facts of life” to which Sagan alerts his readers, “facts” that tangle with sex/gender and the transgression and unwinding of that binary. Take for example his suggestion that,

*Multiple insect species transform because of Wolbachia bacteria. The genus is nearly ubiquitous in insect tissues. Too big to fit within the sperm of insects, infective Wolbachia can confer parthenogenesis on insect populations, that is, transform a population with two genders into one that is all females, this of course to the advantage of the “selfish” bacteria, as the sperm bottleneck impedes their propagation. By disabling the gender-bending bacteria, antibiotics can make separate species of jewel wasps interbreed again.*¹⁶

I am not so certain, though, that “gender” is the right optic to describe the dynamic in motion here. Rather than saying that

13 See Luke K. Ursell, BS Jose C. Clemente, Jai Ram Rideout, Dirk Gevers, J. Gregory Caporaso, and Rob Knight, “The Interpersonal and Intrapersonal Diversity of Human-Associated Microbiota in Key Body Sites,” *Journal of Allergy and Clinical Immunology* 129(5)(2012):1204-1208, at 1206-1210.

14 Thanks to Alondra Nelson and Hannah Landecker for helping me think this through.

15 Or almost never. The one instance I’ve found is in the name of a Colombian feminist studies journal from 1982 (Bogotá, Colombia: Centro de Documentación y Comunicación Feminista).

16 Sagan, 23.

Wolbachia are “gender-bending,” we might rather say that they are *sex-bending*.¹⁷

Why *sex* rather than *gender*? Because we should not make “gender” always and everywhere reduce to “sex” and be about reproduction.

I think here of a critique delivered by queer and trans theorist Eva Hayward of the work of sociologist Myra Hird in *The Origins of Sociable Life*, a book that seeks to draw sociological lessons from the doings of microbes. In that book, Hird advances the idea that “gender” might be used to refer to “features that bring organisms together to share DNA and/or reproduce” — which mode of thinking about the matter then presses her to suggest that “The mushroom *Schizophyllum commune* has 27,000 genders, encoded by ‘incompatibility genes’ that come in many versions (alleles) on different chromosomes.”¹⁸ Hayward argues that Hird’s framing here makes gender into a simple proxy for sex—not heterosex, to be sure, but still sex as reproduction.¹⁹ Calling on the work of Kath Weston, Hayward goes on to say that “binary ontologies of sex–gender are not necessarily destabilized by the addition of a third—or even a fourth or fifth.”²⁰ As Weston shows in her 1996 text on lesbian identity and community, *Render Me, Gender Me*, gender—whether butch, femme, or studmuffin—can attach to race, class, nation; that is, to many things other than reproduction.²¹

Rather than gender-bending—or, for that matter, sex-bending—it might be useful to consider what “Eva Hayward and Lindsay Kelley call ‘tranimals’—enmeshments of *trans* and *animals*, critters that cross or queer normative sex and gender configurations.”²² Think, for example, of sequentially hermaphroditic fish or of coral. Sympathetically symbiopolitical, I offer that *trans*- can do lots of biological and social work, unwinding the naturalization of both sex and gender (Sagan mentions another figure with which it might be useful to think: the mixture of the plant and the animal, the *planimal*, of which the example he gives is a green slug that produces chlorophyll²³).

17 See S. Eben Kirksey and Stefan Helmreich, “The Emergence of Multispecies Ethnography,” *Cultural Anthropology* 25(4)(2010): 545-576, particularly at 559.

18 Myra Hird, *The Origins of Sociable Life: Evolution after Science Studies* (London: Palgrave Macmillan, 2009), 100-101.

19 Eva Hayward, “FingeryEyes: Impressions of Cup Corals,” *Cultural Anthropology* 25(4)(2010): 577-599, note 11.

20 See Kath Weston, *Gender in Real Time: Power and Transience in a Visual Age* (New York: Routledge, 2002).

21 Kath Weston, *Render Me, Gender Me: Lesbians Talk Sex, Class, Color, Nation, Studmuffins...* (New York: Columbia University Press, 1996).

22 Kirksey and Helmreich, 559.

23 Sagan, 24.

Just to confuse things productively, let me offer another confounding sex/gender swirly: fetal microchimerism. As Laura Fugazzola, Valentina Cirello, and Paolo Beck-Peccoz describe it in a *Nature Reviews Endocrinology* article from February 2011, “Fetal cell microchimerism is defined as the persistence of fetal cells in the mother after birth without any apparent rejection. Fetal microchimeric cells (FMCs) engraft into the maternal bone marrow for decades after delivery and are able to migrate to blood and tissues.”²⁴ This means that women who have been pregnant have been biologically—or, more precisely, cellularly—remodulated by their fetuses. Pretty interesting, but does it *mean* anything in itself? Should it remind us of the Wari of Peru, noted by anthropologists for a kinship system in which incorporation of kinspeople—though the food they give, and sometimes, through such practices as mortuary cannibalism—makes relation? Or, as one colleague worried to me, might a biologically reductionist account of fetal microchimerism just be used to naturalize or newly justify feminist psychologist Carol Gilligan’s 1982 essentialist claim that women are more relational than men?²⁵

The biology, as astonishing as it is, does not tell us what it will mean.

Why do accounts like those of Dorion Sagan have the purchase they do on contemporary readerships in popular science and critical theory alike? Why the interest in multispecies, interspecies, and transspecies now? Why is this erosion of human organismic integrity exciting to some social scientists and humanists (to say nothing of natural scientists)? Why this biological “posthumanism” now? Sagan suggests that the “nonhuman” is coming into view because of the increasing stress on planetary resources by the human species. In this context, he suggests, we would do well to recognize that “the human is more than human.” But I would add that we must recognize an additional fact—that “biology” does not speak for itself, about humans or nonhumans. The biological is more than biological.

24 Laura Fugazzola, Valentina Cirello, and Paolo Beck-Peccoz. “Fetal microchimerism as an explanation of disease,” *Nature Reviews Endocrinology* 7(2011): 89-97, at 89. For a social analysis, see Martin, Aryn, “Microchimerism in the Mother(land): Blurring the Borders of Body and Nation,” *Body & Society* 16(3) (2010):23-50. Thanks to Lynn Morgan for alerting me to this work.

25 Carol Gilligan, *In a Different Voice: Psychological Theory and Women’s Development* (Cambridge: Harvard University Press, 1982).