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Myra J. Hird

Volatile Bodies, Volatile Earth: Towards an Ethic of Vulnerability

For several decades, the social sciences and humanities have been engaged in an intensive exploration of the relationships between human and nonhuman, culture and nature. Of late these explorations have (re)turned to "materiality" and "the object," in part because of a perceived over-indulgence in linguistic and cultural themes. A new generation of relational-material ontologies—developed by, for instance, feminist philosophers of science such as Vicki Kirby, Elizabeth Wilson, Karen Barad, and Donna Haraway, and speculative realists such as Graham Harman, Iain Hamilton Grant, and Quentin Meillassoux—are leading current critical reflections on the Western nature-culture bifurcation.

Research assembled within the "relational materialities" rubric begins from the now fully established premise that other-than-human entities have agencies of their own. This assertion is coupled with the oft-repeated claim that the natural and social mutually constitute, produce, and construct each other. As Bruno Latour writes, "Forces cannot be divided into the 'human' and 'nonhuman' [...] It is not a question of *nature* [...] *Natures* mingle with one another and 'us' so thoroughly we cannot hope to separate them and discover clear, unique origins to their powers" (1988, 205–6). In this way, relational-material analyses cleave to a notion of the social as composed of a heterogeneous multitude of entities, not all of them human or human-created. And because of this, scholars urge a cautious approach to the ways in which we assemble our world through techno-scientific developments (Clark 2011; Kriebel et al. 2001).

These relational-material analyses raise significant and timely questions about pressing global concerns such as ozone holes, global warming, pathogen outbreaks, waste management, biodiversity, and the like. They offer a cogent way to better understand the dynamic, reassembling relations within and between entities. At the same time, I want to press the relational-material ontology further in light of two convergent observations. Firstly, whereas analyses tend to focus on dynamic relations involving humans and other-than-human entities, the urgent contemporary issues listed above take us into regions where everything is not mixed with people (Clark 2011). That is, when we consider the dynamism and volatility of Earth's billions-old epochs, we are soon

confronted by millennia of causal and contingent activity before humans' appearance (Meillassoux 2010). Moreover, there are a multitude of ongoing and dynamic relations that do not involve humans; relations that humans are not even aware of. That is, entities do not need human mediation in order to act: humans are not always and indelibly directing the (only) flow of communication, interpretation, and meaning (Hird 2009).

My research develops a *microontology* of sociable life on Earth, which attends to the majority of relations on our planet: those amongst microbes (Hird 2009). Referring to the "unseen majority," William Whitman, David Coleman, and William Wiebe (1998) estimate there are about 5×10^{30} bacterial cells on Earth, and another estimated 10^{18} bacteria circulating in the atmosphere attached to dust. Making up the majority of organisms on Earth, bacteria evince the greatest organismal diversity and have dominated evolutionary history (Dexter Dyer 2003). Millennia before the appearance of animals, bacteria invented all major forms of metabolism, multicellularity, nanotechnology, metallurgy, sensory and locomotive apparatuses (such as the wheel), reproductive strategies and community organization, light detection, alcohol, gas and mineral conversion, hypersex, and death (Margulis 1981). As such, bacteria are von Helmholtz's "less glamorous backstage machinery that actually produces the show" (CBC 2008).

Indeed, some scientists have begun to move beyond characterizations of microbial activity as strictly passive or pathogenic. These studies describe bacteria as complex, adaptable, versatile, and communicative. From elaborated sensory systems, bacteria developed complex communication, including individual bacterial interpretation of information provided by other bacteria (micro-level), leading to complex patterns of (macro-level) behavior. Bacteria become multicellular by "forming communities of 10^9 to 10^{12} organisms capable of complex communication strategies in which differing environments are perceived, analyzed, and described to members of the community in order to formulate the best adaptive response" (Ben-Jacob 1994, 46). Through activities such as quorum sensing, biofilm formation, and sporulation, bacterial communities "perform collective sensing, distributed information processing, and gene-regulation of individual bacteria by the group" (Ben-Jacob 2003, 1300). What is more, bacteria communicate with different kinds of bacteria, and even with animals.

The microontology I am developing pushes relational-material approaches to consider the vast majority of relations within the biosphere as independent of, and largely indifferent to, human input. It also pushes us to observe that our symbiotic relationship with bacteria is obligate for humans (that is, essential to our survival) but not for bacteria. As Carl Woese observes, "if you wiped out all multicellular life forms off the face of the earth, microbial life might shift a tiny bit. . . . If microbial life were to disappear, that would be it—instant death for the planet" (quoted in Blakeslee 1996, 1). In other words, rather than the rather "flat ontology" (Clark 2011, 45) that relational-material analyses cleave to, whereby humans and other-than-human relations are *co-produced,* this microontology recognizes the relationship between humans and microbes as one of *radical asymmetry* (Hird 2010). That is, while bacteria are largely indifferent to our thriving, we are utterly dependent upon the teeming assemblages of dynamic microbes that make up and maintain both our corporeality and our biosphere. As Graham Harman puts it, "all reality is political, but not all politics is human" (2010, 118).

My current research project—at the early stage of formulation—is concerned with developing an *ethics of vulnerability* that begins with entangled relationality, radical asymmetry, and the inherent violence of indissoluble openness (Diprose 2002). I am developing this ethics through two phenomena: metabolism and recycling. Both are sites of particular human *vulnerability.* While all plants and animals on earth are metabolically defined as consumers (we must use already available organic and inorganic compounds), bacteria evolved earth's metabolic production economy: phototrophs convert solar energy; chemotrophs convert chemical energy; lithotrophs gain electrons from elements (such as hydrogen and sulphur) or simple organic compounds (such as water and hydrogen sulphide); and organotrophs convert complex organic substances (such as proteins in dead biomass and carbohydrates in grasses and grains). Through the recycling of organic and inorganic matter—Tyler Volk (2004) refers to the biosphere's incessant recycling as a "waste world"—bacteria provide a hospitable environment in which plants and animals may thrive. As such, waste management sites, and particularly landfills, are sites of concentrated anaerobic metabolizing, a process that produces methane, carbon dioxide, and so on—contaminants that are generating increasing concern and that connect the geo-, bio-, and lithospheres. Metabolism and bacterial recycling therefore provide excellent case studies in the uneven, or spiked,

nature and culture ontology (Haraway 2008). Human vulnerability to these phenomena suggests a cautious approach that enjoys some resonance with the emphasis of environmental science's "precautionary principle" on decision-making in the face of uncertain risks.

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