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Your Shell on Acid: Material Immersion, Anthropocene Dissolves

STACY ALAIMO

Who is the “anthro” of the “Anthropocene”? In its ostensible universality, does the prefix suggest a subject position that anyone could inhabit? While the term *Anthropocene* would seem to interpellate humans into a disorienting expanse of epochal species identity, some accounts of the Anthropocene reinstall rather familiar versions of man. Feminist theory, long critical of “man,” the disembodied, rational subject, and material feminisms, which stress inter- or intra-actions between humans and the wider physical world, provide alternatives to accounts that reiterate man as a bounded being endowed with unilateral agency. And while the geological origins of the term *Anthropocene* have spawned stark terrestrial figurations of man and rock in which other life-forms and biological processes are strangely absent, the acidifying seas, the liquid index of the Anthropocene, are disregarded, even as billions of tiny shelled creatures will meet their end in a catastrophic dissolve, reverberating through the food webs of the ocean. Thinking with these aquatic creatures provokes an “ecodelic,”¹ scale-shifting dis/identification, which insists that whatever the “anthro” of the “Anthropocene” was, is, or will be, the Anthropocene must be thought with the multitude of creatures that will not be reconstituted, will not be safely ensconced, but will, instead, dissolve.

ANTHROPOCENE VISION

As *Anthropocene* joins *climate change* and *sustainability* as a pivotal term in public environmental discourse, it may be useful to consider how the novel category becomes enlisted in all too familiar formulations, epistemologies, and defensive maneuvers—modes of knowing and being that are utterly incapable of adequately responding to the complexities of the Anthropocene itself. Feminist theory, especially material feminisms and posthumanist feminisms, offer cautionary tales, counterpoints, and alternative figurations for thinking the Anthropocene subject in immersive onto-epistemologies. Whereas a critical posthumanism contests the human as a conceptual apparatus that underwrites ordinary practices of exploitation, the concept of the Anthropocene testifies that *Homo sapiens* has “achieved” an exceptional feat, that of epoch-making planetary alteration. Take the title of Will Stefan, Paul J. Crutzen, and John R. McNeill’s article “The Anthropocene: Are Humans Now Overwhelming the Great Forces of Nature?,” which concludes that “human-kind will remain a major geological force for many millennia, maybe millions of years, to come.”² The hand-wringing confessions of human culpability appear coated with a veneer of species pride. To think of the human species as having had a colossal impact, an impact that will have been unthinkably vast in duration, on something we externalize as “the planet” removes us from the scene and ignores the extent to which human agencies are entangled with those of nonhuman creatures and inhuman substances and systems.

As the capitalist rapacity of the few and the subsistence needs of the many result, unintentionally, in the vast obliteration of ecosystems and the extinction of species, modes of acting within economic, technological, and environmental systems, such as quotidian acts of consumption, seem worlds apart from the aesthetically rendered scenes that deliver a spectacular view of manufactured geographies to spectators positioned outside the action. The epistemological position of the “God’s-eye view” that Donna Haraway critiqued in “Situated Knowledges” dominates many of the theoretical, scientific, and artistic portrayals of the Anthropocene. Ironically, at the very moment that the catastrophes of the Anthropocene should make it clear that what used to be known as nature is never somewhere else (even the bottom of the sea has been

altered by human practices), the “conquering gaze from nowhere,” the “view of infinite vision,” the “God trick” of an unmarked, disembodied perspective reasserts itself.³ Yet the ostensibly infinite perspective excludes so much. Claire Colebrook, in *Death of the PostHuman*, argues that the “very eye that has opened up a world to the human species, has also allowed the human species to fold the world around its own, increasingly myopic, point of view.”⁴ Strangely, this humanist myopia may manifest as visual tropes that view the world at sanitized distances. And “the world” in these images is an eerily lifeless entity, devoid of other species, as if the sixth great extinction had already concluded.

Prevalent visual depictions of the Anthropocene emphasize the colossal scale of anthropogenic impact by zooming out—up and away from the planet. Andrew Revkin’s essay in the *New York Times*, “Confronting the Anthropocene,” begins with a photo of a glowing spider-shaped blob of gold against darkness, with the following caption: “Donald R. Petitit, an astronaut, took this photograph of London while living in the International Space Station.”⁵ *National Geographic*’s story “Age of Man,” written by Elizabeth Kolbert, begins with a rather dystopian aerial photo of Dubai, in which the vivid aqua waterway only highlights the otherwise utterly brown, bleak cityscape.⁶ The *Encyclopedia of Earth* begins its entry on “Anthropocene” with a cylindrical map (flat and rectangular), showing “the earth at night, demonstrating the global extent of human influence.”⁷ The blog *The Anthropocene Journal* sets out a stark, but at least nongendered, cluster of terms in its subtitle: “People. Rock. The Geology of Humanity.”⁸ Despite the subtitle “The Geology of Humanity,” with its ambiguous “of,” which could intermingle humanity and geology, the images shown on the “State of the Art” posting, for example, detach the spectator from the scene. Moreover, the blog’s banner image features a globe, as if seen from space, showing North America lit up in yellow and blue capillary-like lights. Félix Pharand-Deschênes, listed as an “anthropologist and data visualizer,” created this image as well as other similar images that appear on his Globaïa website.⁹ Scrolling down his “Cartography of the Anthropocene” page, one encounters a series of globes, each with patterns formed by lines marking roads, cities, railways, transmission lines, and underwater cables.¹⁰ The patterns of bright blue or shimmering gold lines that span the planet demonstrate the expansiveness of human habitation, commerce, and transportation networks, marking human travel, transport, and activity

against a solid background that obscures winds, tides, currents, and the travels of birds, cetaceans, or other creatures. Nonhuman agencies and trajectories are absent.

Where is the map showing the overlapping patterns of whale migrations with shipping and military routes? Or the sonic patterns of military and industrial noise as it reverberates through areas populated by cetaceans? Or established bird migration routes, many of which have been rendered inhospitable to avian life? The movements, the activities, the liveliness of all creatures, except for the human, vanish.¹¹ And, once again, in the dominant visual apparatus of the Anthropocene, the viewer enjoys a comfortable position outside the systems depicted.¹² The already iconic images of the Anthropocene ask nothing from the human spectator; they make no claim; they neither involve nor implore. The images make risk, harm, and suffering undetectable, as toxic and radioactive regions do not appear, nor do the movements of climate refugees. The geographies of the sixth great extinction are not evident. The perspective is predictable and reassuring, despite its claim to novelty and cataclysm.

David Thomas Smith's photography is introduced on the ArtStormer site with an epigraph by A. Revkin: "We are entering an age that might someday be referred to as, say, the Anthropocene. After all, it is a geological age of our own making."¹³ The singular human agency, as well as the possessive phrase "our own," is notable. What sort of subject could have produced a geological age? Betsy Wills introduces the photographs, which, unlike the images of the globe, depict merely a particularly processed portion of the earth, using highly mediated data: "Composited from thousands of digital files drawn from aerial views taken from internet satellite images, this work reflects upon the complex structures that make up the centres of global capitalism, transforming the aerial landscapes of sites associated with industries such as oil, precious metals, consumer culture information and excess. Thousands of seemingly insignificant coded pieces of information are sown together like knots in a rug to reveal a grander spectacle."¹⁴ These constructions are grand spectacles indeed. The swirling baroque designs captivate. They urge viewers to shift scales and recognize how small alterations of the landscape may be multiplied into geographical immensity (Figure 5.1). This immensity, however, is safely viewed from a rather transcendent, incorporeal perspective, not from a creaturely immersion in the world.

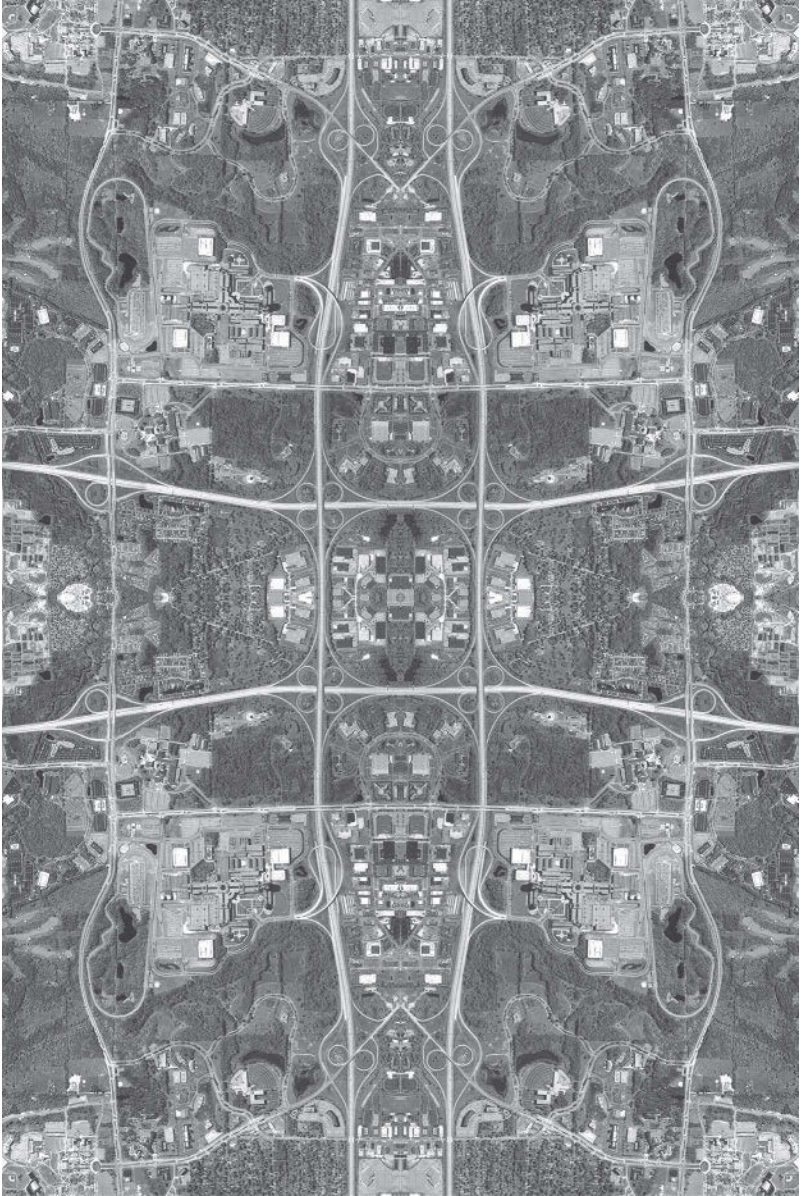


FIGURE 5.1. David Thomas Smith, 1000 Chrysler Drive, Auburn Hills, Michigan, United States, 2009–10. Image courtesy of David Thomas Smith. Copyright David Thomas Smith.

Moreover, although trees are visible, for the most part these landscapes are devoid of life; they depict hard, flat surfaces, planetary puzzle pieces. The aesthetic is one of order and symmetry within complexity, suggesting the possibility of and desire for exquisite, intricate manipulations. Despite the scaling up, these are, to contradict Mina Loy, tame things despite their immensity,¹⁵ as the world is rendered into a kaleidoscopic vision you may hold in your mind like a toy in your hand. The super-symmetrical structure of Smith's photos, however, with double mirror images, in which everything in the top half is repeated in the bottom half and everything on the left is repeated on the right, presents an implicit critique of the scale of human transformation of the earth by dramatizing a claustrophobic enclosure in a world that, in its predictable repetitions, becomes all too human, all too structured. Smith's work encapsulates the problematic of the Anthropocene, as its aesthetic seduces with its precise symmetries and the prospect of mastery, but ultimately confines the viewer in a place devoid of surprises. Brilliantly, its aesthetic pleasures are the selfsame as its critique, as its visual delights repeat in solipsistic symmetries. It may be fitting to invite Patricia Johanson, an environmental artist, into this discussion: "I believe human beings are increasingly threatened and impoverished by the relentless conversion of every scrap of territory for our own limited and temporary uses."¹⁶

ABSTRACT FORCE

The concept of the Anthropocene, with its geological reference and its undifferentiated "anthro," retreats to a simple equation of "man" and "rock," an oddly stark rendition when one considers that current biophysical realities can only be approached through scientific captures of a multitude of intersecting biological and chemical, as well geological, transformations, which intermesh human and natural histories. Even though the concept of the Anthropocene muddles the opposition between nature and culture, the focus on geology, rather than, say, chemistry or biology, may segregate the human from the anthropogenic alterations of the planet by focusing on an externalized and inhuman sense of materiality.¹⁷ Dipesh Chakrabarty's momentous essay "The Climate of History" raises essential questions about the nature of the human, some of which, in my view, turn on the conception of species

identity, corporeality, and agency. Chakrabarty's first thesis in this essay is "Anthropogenic Explanations of Climate Change Spell the Collapse of the Age-Old Humanist Distinction between Natural History and Human History."¹⁸ Despite the collapse of distinctions, Chakrabarty brackets humans as biological creatures—our own corporeality as living beings becomes eclipsed by the enormity of our collective geological alterations. He writes, "Human beings are biological agents, both collectively and as individuals. They have always been so. There was no point in human history when humans were not biological agents. But we can become geological agents only historically and collectively, that is when we have reached numbers and invented technologies that are on a scale large enough to have an impact on the planet itself."¹⁹ While we could read the phrase "biological agents" as meaning that humans *are* biological *and* act on the biological, the phrase "geological agents," which follows, delimits the first phrase to imply that humans have had an effect on biological entities—not that we are ourselves interwoven into living and nonliving trans-corporeal networks. Moreover, the distinction between biological and geological agency is not tenable, because biological and chemical transformations flow through the world in multiple and messy ways. And, of course, the origin of so many Anthropocenic alterations—the colossal output of carbon—is a matter of chemistry and, on epochal time scales, biology, as fossil fuels issue from decomposed organisms. The essay "The New World of the Anthropocene," published in *Environmental Science and Technology* by Jan Zalasiewicz and colleagues, states that "far more profound" than the "plainly visible effects . . . on the landscape" "are the chemical and biological effects of global human activity," including the rise of CO₂ levels, the sea level rise, the acidification of the oceans, and the sixth great extinction.²⁰ Attending solely to the lithic imports delusions of separation and control that have no place in the global biological, chemical, and geophysical intra-actions of the Anthropocene. Yet Chakrabarty subordinates "man's" interactions with "nature" to a new paradigm in which humans become a geological force when he asserts, "For it is no longer a question simply of man having an interactive relation with nature. This humans have always had, or at least that is how man has been imagined in a large part of what is generally called the Western tradition. Now it is being claimed that humans are a force of nature in the geological sense."²¹ While the idea that humans have become a

“force of nature in the geological sense” may seem to merge humans with something called “nature,” the abstract formulation of the “force” reinstalls “man” as a disembodied potency, outside the nature he would alter. Thinking human as “force” represents a retreat from the radical risk, uncertainty, and vulnerability of the flesh, as humans are rendered strangely immaterial. This immateriality, then, also creates an impasse for thinking in terms of species identity.

Chakrabarty’s fourth thesis results in an impasse: “The Cross-Hatching of Species History and the History of Capital Is a Process of Probing the Limits of Historical Understanding.”²² Drawing on Gadamer, Chakrabarty contrasts “historical consciousness” as a “mode of self-knowledge” with what he claims would be an impossible achievement, “self-understanding as a species”:

Who is the we? We humans never experience ourselves as a species. We can only intellectually comprehend or infer the existence of the human species but never experience it as such. There could be no phenomenology of us as a species. Even if we were to emotionally identify with a word like *mankind*, we would not know what being a species is, for, in species history, humans are only an instance of the concept species as indeed would be any other life form. But one never experiences being a concept.²³

I would like to address this question rather indirectly by shifting from Gadamer and broadening the framework to include a range of theories and perspectives on species-being. While the question of “who is the we” is always at play, and will become more complicated, to say humans have never experienced themselves as a species seems mistaken. It is hard to imagine that indigenous peoples would not have elaborated, within their cultures and traditional ecological knowledges, a sense of what it is to be human within a multispecies world. Elizabeth DeLoughrey in “Ordinary Futures: Interspecies Worldings in the Anthropocene” draws on Maori models of epistemology, for example, to offer an “alternative mode of understanding climate change than Dipesh Chakrabarty’s argument that our awareness of ourselves as geological agents cannot be understood ontologically.” In the Maori mode that she describes, the subject is incorporated “into planetary networks of kinship” in which “knowing and being are constitutive and interrelated.”²⁴ In the

West, Darwin's *Descent of Man* intensified a species consciousness even as it intermingled the human with other creatures as progenitors and kin. Even those who deny evolution proclaim a particularly *human* exceptionalism, which could itself be understood as a form of species identification, albeit with religious rather than scientific origins. Furthermore, contemporary environmental discourses address humans as one species among other species, seeking to ignite an ethical or political sense of being part of a community of descent that is only intensified by the recognition of human culpability so readily available in the Anthropocene. More quotidian relations with other species could also be said to characterize phenomenologies embroidered with species recognition. Species is certainly a concept, but it is a concept that is as substantial and as close at hand as one's own morphology. One does not need to read Darwin to notice the ways in which one's body is similar to and different from the bodies of other living creatures. Natural history museums, zoos, television programs, or face-to-face encounters with wild or domestic animals spark a sense of species identity that is not singular but is generated from a sense of species in relation. Exhibit A may well be that of people comparing their own hands to the fins of whale or dolphin skeletons displayed at a natural history museum—kinship inscribed in the bones. Donna Haraway's work, from *Primate Visions* to *The Companion Species Manifesto* to *When Species Meet*, attests to multiple modes of cross-species encounters, relationships, and phenomenologies that can be understood as modes of species consciousness, in which humans are both embodied creatures dwelling in their own present moments and creatures able to imagine vast historical narratives such as the coevolution of humans and canines. As Haraway states, "the temporalities of companion species comprehend all the possibilities activated in becoming with, including the heterogeneous scales of evolutionary time for everybody but also the many other rhythms of conjoined process."²⁵

Chakrabarty's assertion that no one ever "experiences being a concept" is also strange, given the body of scholarship focusing on how those who inhabit marked identities and subjectivities, those who have been cast outside the Western conception of "man" or "the human," have negotiated, resisted, and transformed identity categories and subject positions. Feminist theory, postcolonial theory, critical race studies, and cultural studies offer numerous accounts of the relation between

subjects, identity categories, and other concepts such as “woman,” for example, from Monique Wittig’s claim that lesbians are not women because woman is a structural relation to man to Gayatri Spivak’s notion of strategic essentialism. The vertiginous intellectual work required to “be a concept” is evidenced by W. E. B. Du Bois’s theory of “double consciousness,” Frantz Fanon and Homi Bhabha’s conceptions of mimicry, the feminist practice of “consciousness-raising,” and Judith Butler’s notion of “gender trouble.”²⁶ A Lacanian theorist may contend that one always experiences oneself as something akin to a concept, in that the mirror stage testifies to the fundamental misrecognition of self as coherent whole, despite gaps and contradictions. These are, for the most part, politicized modes of knowing and being, not “pure” or abstract species consciousness, to be sure. Rory Rowan puts it quite well: “Anthropos can be understood not as a pre-constituted identity but rather as the object of political contestation in the struggle to define the terms of future human existence on the planet.”²⁷ Rowan’s sense of the “Anthropos” as concept within the terrain of political struggle places the term where it belongs, in the messy space where science, history, cultural identities, and politics coincide. Ultimately, whatever it may mean to think oneself as a species will be inextricably bound up with other, more local identities and cultural conceptions rather than separate from them. The Anthropos, despite the predominant visualizations that obscure local contexts, could provoke a sense of species identity quite different from the lofty Western, capitalist humanism, with the recognition that every member of the species is at once part of long evolutionary processes, a member of a species that has had a staggering impact on the planet, and an inhabitant of a particular geographic, social, economic, and political matrix, with attendant and differential environmental vulnerabilities, culpabilities, and responsibilities.

One of Chakrabarty’s most significant provocations is that thinking the human species as geophysical force—more on that later—precludes attention to social justice. Ian Baucom notes Chakrabarty’s “quite stunning turn to the concept of species; to a new thinking of freedom for human life in its biological totality; to a mode of universalism apparently antithetical both to his preceding philosophy of history; and to what Gayatri Spivak has called the practice of postcolonial reason.” He adds, “Confronted with the arriving and coming catastrophes of climate change, freedom can no longer be conceived of as the freedom of difference against the power of the globalizing same.”²⁸ Baucom captures

the crux of the matter here, as the enormity of global environmental crises would seem to call for human collectivity that trumps all other differences. Jamie Lorimer notes that as a “growing body of critical work makes clear, scientific invocations of a planet-shaping Anthropos summon forth a responsible species—or at least an aggregation of its male representatives. A common ‘us’ legitimates a biopolitics that masks differential human responsibilities for and exposures to planetary change.”²⁹

This should give us pause, especially because scientific discourse gains legitimacy precisely through its free-floating “objectivity.” Scientific neutrality lends itself to a mode of popularization that cleanses the term *Anthropocene* from any entanglement with political genealogies, specificities, and identities. Indeed, the visual depictions of the Anthropocene discussed earlier do just that by scaling up so that human poverty, drought, flooding, or displacement is obscured from sight and the viewer is not implicated, nor is someone potentially affected by climate disasters or slow violence.³⁰ Sylvia Wynter’s work, although too complex to be adequately discussed here, is nonetheless invaluable for this debate. In the discussion between Wynter and Katherine McKittrick, titled “Unparalleled Catastrophe for Our Species? Or to Give Humanness a Different Future: Conversations,” Wynter states, commenting not on Chakrabarty’s question about who the “we” is but instead on Jacques Derrida’s 1968 talk “The Ends of Man,” which concluded with the same question:

The *referent-we* of man and of its ends, he implies, is *not* the *referent-we* of the human species itself. Yet, he says, French philosophers have assumed that, as middle-class philosophers, their *referent-we* (that of Man2) is isomorphic with the *referent-we* in the *horizon of humanity*. I am saying here that the above is the single issue with which global warming and climate instability now confronts us and that we have to replace the ends of the *referent-we* of liberal monohumanist Man2 with the ecumenically human ends of the *referent-we in the horizon of humanity*.³¹

Wynter contends that to deal with climate change requires “a far-reaching transformation of knowledge,” which includes the very definition of the human as such,³² which she herself offers throughout her dazzlingly original theoretical work. Alexander G. Weheliye states,

“Wynter’s large-scale intellectual project, which she has been pursuing in one form or another for the last thirty years, disentangles Man from the human in order to use the space of subjects placed beyond the grasp of this domain as a vital point from which to invent hitherto unavailable genres of the human.”³³ Wynter’s project, disentangling man from the human, may address the quandary of the Anthropocene in that it suggests that multiple “genres” of the human may be inhabited, which means that the term *Anthropocene* does not require a new sort of univocal “man.” Environmentalisms; movements for environmental justice, climate justice, and social and economic justice; along with struggles for indigenous sovereignty will no doubt emerge from particular, local formulations of the human, which may or may not be linked with the Anthropocene. In *Friction: An Ethnography of Global Connection*, Anna Lowenhaupt Tsing argues that “universals are effective within particular historical conjunctures that give them content and force. We might specify this conjunctural feature of universals in practice by speaking of engagement. Engaged universals travel across difference and are charged and changed by their travels. Through friction, universals become practically effective.”³⁴ As an engaged universal, the species identity of the Anthropocene would not be free floating but instead conjunctural. How will the Anthropocene travel, and what sort of friction will those travels entail? Will the politically forged and conjuncturally specific conception of the Anthropos enable new modes of struggle for social justice, environmental justice, climate justice, biodiversity, and environmentalisms?

One of the most intriguing concerns that Chakrabarty puts forth is the idea that the Anthropocene means reckoning with humans as a “force.” Some of his concerns, I would suggest, could be addressed by a more material conception of the human and a less unilateral sense of agency. He writes,

But if we, collectively, have also become a geophysical force, then we also have a collective mode of existence that is justice-blind. Call that mode of being a “species” or something else, but it has no ontology, it is beyond biology, and it acts as a limit to what we also are in the ontological mode.

This is why the need arises to view the human simultaneously on contradictory registers: as a geophysical force and as a political

agent, as a bearer of rights and as author of actions; subject to both the stochastic forces of nature (being itself one such force collectively) and open to the contingency of individual human experience; belonging at once to differently-scaled histories of the planet, of life and species, and of human societies.³⁵

The shift from the abstract “geophysical force” to “species” is jarring, given that species—a biological category—is said to have “no ontology” and to exist “beyond biology.” I agree that the human must be apprehended “simultaneously on contradictory registers” and scales; indeed, this is something that my conception of trans-corporeality, which is grounded in environmental justice and environmental health movements, seeks to do. And as Rowan suggests, stressing the Anthropos as an object of political contestation, rather than as an already fossilized term, allows for differentiation of particular groups of humans, along the lines of culpability and exploitation, distinguishing, say, indigenous Amazonian peoples whose lands have been destroyed by oil companies from those who benefit from oil company revenues, or middle-class U.S. citizens driving automobiles from the citizens of Pacific islands being driven from their homes by rising sea levels. Thinking the human as a species does not preclude analysis and critique of economic systems, environmental devastation, and social injustice. In fact, if we shift from the sense of humans as an abstract force that acts but is not acted on to a trans-corporeal conception of the human as that which is always generated through and entangled in differing scales and sorts of biological, technological, economic, social, political, and other systems, then that sort of human—always material, always the stuff of the world—becomes the site for social justice and environmental praxis.

In “Brute Force,” Chakrabarty writes, “But to say that humans have become a ‘geophysical force’ on this planet is to get out of the subject/object dichotomy altogether. A force is neither a subject nor an object. It is simply the capacity to do things.”³⁶ Feminist theory, science studies, and environmental theory have long critiqued the subject-object dualism, often by underscoring the strange agencies of the entities considered inert objects. New materialisms emphasize materiality as agential, stressing the entanglements and interactions between humans and the nonhuman world. Interactive material agencies may be dispersed and nearly impossible to trace, delimit, or scientifically capture, but that

does not mean they evaporate. Claiming that a force is neither subject nor object, however, seems to dematerialize said force when, in fact, the Anthropocene results from innumerable human activities, activities that humans have engaged in as ordinary embodied creatures and as rapacious capitalists and colonialists. The force is not as abstract as it would seem, because the activities, the processes, and the results are not at all immaterial and not at all mysterious. Humans are not gravity.³⁷ Perhaps the term “force” leads us astray. Chakrabarty notes, “A force is the capacity to move things. It is pure, nonontological agency.”³⁸ Just because the scale of humans as a “geological force” is so immense, nearly unthinkable from the minuscule moments of everyday life, does not mean that it is an entirely different entity. It is a matter of scale, not a difference of kind. Human beings, who eat, who heat and cool their homes, who plug in their electronic devices, who transport themselves and their goods, who use fossil fuels in their everyday lives, and who may or may not reckon with an environmental consciousness, are, ultimately, part of this supposedly “nonontological agency.” Moreover, other accounts of the Anthropocene, such as that of Zalasiewicz and colleagues, cited earlier, stress its biological and chemical dimensions—which are even more difficult to conceive as an abstract or pure force, apart from the messy interactions of material beings and the stuff of the world.

The Anthropocene suggests that agency must be rethought in terms of interconnected entanglements rather than as a unilateral “authoring” of actions. Jessi Lehman and Sara Nelson argue in “After the Anthropocene,” for example, that “humanity’s agency as a geological force confronts us not as a product of our supposedly unique capacity as humans for intentional action (as described by Marx, 1867, in his comparison of the architect and the bee), but as an unintended consequence of our entanglements with myriad non-human forces—chief among them fossil fuels. The Anthropocene therefore simultaneously expands and radically undermines conventional notions of agency and intentionality.”³⁹ Similarly, Derek Woods in “Scale Critique for the Anthropocene” contends that “assemblage theory is necessary to move beyond the notion that the ‘species’ is a geologic force,” proposing that the “scale-critical subject of the Anthropocene is not ‘our species’ but the sum of terraforming assemblages composed of humans, nonhuman species, and technics.”⁴⁰ Woods’s argument is convincing, especially in that it addresses one of the ironies or paradoxes of the Anthropocene: “The

present is a moment of human disempowerment in relation to terraforming assemblages.”⁴¹ That is certainly the case, as processes have been set in motion that will have devastating effects for thousands of years. And yet, in the face of this shattering disempowerment, some groups of humans will, nonetheless, persist in attempting to do something. Modes of thinking, being, and acting may arise from a political recognition of being immersed in the material world, as they contend with the conceptual challenges of shifting time scales and traversing geocapitalist expanses where one’s own small domain of activity is inextricably bound up with networks of harm, risk, survival, injustice, and exploitation. Some activist practices, such as personal carbon footprint analysis and other “micro-practices of everyday life,”⁴² already exemplify the attempt to understand the human as a geophysical “force,” through politicized modes of knowing and acting that are immersed and contingent rather than disembodied.

IMMERSED, ENMESHED SUBJECTS

To counter the dominant figurations of the Anthropocene, which abstract the human from the material realm and obscure differentials of responsibility and harm, I propose that we think the Anthropocene subject as immersed and enmeshed in the world. In contrast to Globaia’s “Cartography of the Anthropocene” maps discussed earlier, Nicole Starsielski’s multimedia project *Surfacing*, for example, portrays undersea fiber-optic cable systems in such a way that “the user becomes the signal and traverses the network.”⁴³ The user is immersed in technologies, marine spaces, geographies, landscapes, and histories: “You begin on the coast, carried ashore by undersea cable. From your landing point, you can traverse the Pacific Ocean by hopping between network nodes. You might surface at cable stations where signal traffic is monitored, on remote islands that were once network hubs, and aboard giant ships that lay submarine systems.”⁴⁴ The design deliberately frustrates attempts to gain a bird’s-eye view or to escape, as the user is always positioned, always inside the system. And many of the photographs of particular places where the user surfaces, such as Vung Tau, Vietnam, or Papenoo, Tahiti, reflect a human scale, the ordinary perspective of a person with a camera. The photo of Pacific City, Oregon, places the viewer behind a

worker operating heavy machinery and only slightly above the muck of the drilling site. While this beautifully designed project is not explicitly about the Anthropocene, it nonetheless encourages its users to experience the sort of built, global systems that have become emblematic of the Anthropocene—but in an immersed, never omniscient position. The project does not simply scale up into representations that afford transcendence but instead demands scale shifting and imaginative encounters with human and nonhuman agencies. Similarly, describing her book, Starosielski writes, “Rather than envisioning undersea cable systems as a set of vectors that overcome space, *The Undersea Network* places our networks undersea: it locates them in this complex set of circulatory practices, charting their interconnections with a dynamic and fluid external environment.”⁴⁵ By doing so, it offers “what might be an unfamiliar view of global network infrastructure,” which brings “geographies back into the picture” and reintroduces, perhaps, an “environmental consciousness, to the study of digital systems.”⁴⁶

The immersed subject of trans-corporeality reckons with the Anthropocene as an intermingling of biological, chemical, and climatic processes, which are certainly neither simply “natural” nor managed by human intention.⁴⁷ The trans-corporeal subject emerges from environmental health and environmental justice movements, including the citizen-scientists who must discern, track, and negotiate the unruly substances that move across bodies and places. Thinking the subject as a material being, subject to the agencies of the compromised, entangled world, enacts an environmental posthumanism, insisting that what we are as bodies and minds is inextricably interlinked with circulating substances, materialities, and forces. Rhonda Zwillinger’s photographic volume *The Disposessed* could be read as an example of trans-corporeal inhabitations of the Anthropocene.⁴⁸ Zwillinger documents how people with multiple chemical sensitivity (MCS) attempt to fashion less toxic living spaces, portraying the human as co-extensive with the built landscape of consumerism, where everyday objects, the domestic, and the desert landscape become scrambled and menacing. In one photo a woman sits under her carport, surrounded by the stuff that should be within a home—her bed, computer, and so forth—cluttering the space, which is neither indoors nor outdoors but a hybrid zone. This stuff, the ordinary things of late-twentieth-century human habitats, has unexpected, injurious agencies for those with

MCS; they penetrate the person, harming physical and mental health. Zwillingger's photos offer an intimate, tangible, and everyday—rather than philosophically abstract—sense of Anthropocene scale shifting, as they ask us to imagine the domestic as linked to toxic networks of industrial production, consumer use, and disposal. They call the viewer to trace the invisible, interactive material agencies that cross through bodies and places rather than removing the human from the scene. Set in the vast desert landscape, the makeshift and often confining living arrangements of those with MCS radiate outward in all directions, linking human homes to undomesticated but nonetheless contaminated landscapes. Zwillingger depicts the toxic Anthropocene as unnervingly commonplace.

In Colebrook's brilliant and disturbing essay "Not Symbiosis, Not Now: Why Anthropogenic Climate Change Is Not Really Human," she contends, "The figural and critical truth of the Anthropocene is that just as there is no pure earth [that] might be reclaimed, so there is no thought that is not already contaminated and made possible by the very logic of man that ecology might seek to overcome."⁴⁹ Specifically, Colebrook points to recent theoretical turns that coincide with material feminisms and feminist posthumanisms, "these turns 'back' to bodies, matters, historicity, ecology and the lived," calling them "reaction formations or last gasps."⁵⁰ She asks, "What if all the current counter-Cartesian, post-Cartesian or anti-Cartesian figures of living systems (along with a living order that is one interconnected and complex mesh) were a way of avoiding the extent to which man is a theoretical animal, a myopically and malevolently self-enclosed machine whose world he will always view as present for his own edification?"⁵¹ Since my conception of trans-corporeality qualifies as an anti-Cartesian figure of "living systems" as a "complex mesh," Colebrook's contention stings. And yet I wonder whether, as a feminist theorist, her use of "man" here intentionally allows for the possibility that feminist theories may somehow depart from the modes of thought produced by man as a "myopically and malevolently self-enclosed machine," even as they function within "already contaminated" thought. Although this is not the sort of contamination she had in mind, I would pose the trans-corporeal onto-epistemologies of those with MCS as an alternative to the self-enclosed theories of the world, as people with MCS register material agencies of substances that can never be imagined as external and that demand

both an experiential and theoretical grappling with the precise ways in which self and world are intermeshed.

While it is one thing to conceptualize how toxins circulate through bodies and environments, it is another for humanities scholars and artists to conceptualize humans as enmeshed with something as rigid as a rock. Some scholarly and artistic engagements with the geologic shift scale in ways that are intimate and generative. In *Stories of Stone: An Ecology of the Inhuman*, for example, Jeffrey J. Cohen writes, “This book is something of a thought experiment, attempting to discern in the most mundane of substances a liveliness. Despite relegation to a trope for the cold, the indifferent and the inert, stone discloses a queer vivacity, a perilous tender of mineral amity.” Cohen posits a “human-lithic enmeshment” as he analyzes the ecomaterialisms of the Middle Ages and contemporary theory, noting that stones “erode the boundary that keeps biological and mineral realms discrete.”⁵² The editors of the beautiful collection *Making the Geologic Now: Responses to Material Conditions of Contemporary Life* define their concept of the “geologic turn” with reference to practices that involve “exposure and visceral response to actual event-ness, or to change or forces.”⁵³ Making “a geologic turn,” they say, entails recalibrating “infrastructures, communities, and imaginations to a new scale—the scale of deep time, force, and materiality. . . . We do not simply observe [the geologic] as landscape or panorama. We inhabit the geologic.”⁵⁴ And the geologic inhabits us. Ilana Halperin, an artist described as having “deep love of geology,” writes in her essay “Autobiographical Trace Fossils” how the “boundary between the biological and geological can begin to blur.”⁵⁵ Referring to “body stones,” such as gall- and kidney stones, she states, “In the body, each stone is a biological entity, and once out of the body it belongs to the realm of geology.”⁵⁶ Kathryn Yusoff argues for a “‘geological turn’ that takes seriously not just our biological (or biopolitical) life, but our geological (or geopolitical) life, as crucial to modes of subjectification in the Anthropocene.” She investigates what she terms “geologic life,” “a mineralogical dimension of human composition that remains currently undertheorized in social thought.”⁵⁷ Stephanie LeMenager in *Living Oil: Petroleum Culture in the American Century* explores museums, photography, literature, and other cultural productions as she documents an immersed, intimate, and unsanitized sense of dwelling in the Anthropocene: “We experience ourselves, as moderns and most especially as

modern Americans, every day in oil, living within oil, breathing it and registering it with our senses. The relationship is, without question, ultradeep.⁵⁸ As different as these projects are, none of them extracts the human from the world; instead, they conceptualize the human as intermingled with the lithic and the inhuman—the energy, matter, and temporalities of the geologic.

YOUR SHELL ON ACID: ANTHROPOCENE DISSOLVES

Notwithstanding the lively and generative thinking with stones, geologic life, and petrocultures, by Cohen, Yusoff, LeMenager, and others, I would like to contribute another sort of figuration of the Anthropocene that is aquatic rather than terrestrial. It is vital to contemplate the Anthropocene seas, not only because marine ecosystems are gravely imperiled but also because the synchronic depth and breadth of the oceans present a kind of incomprehensible immensity that parallels the diachronic scale of anthropogenic effects.⁵⁹ The deep seas, once thought to house “living fossils” that terrestrial time left behind, are in fact home to sea creatures who live at a slower pace, within the cold, dark, and heavy waters. Oceanic depths, especially, resist the sort of flat mapping of the globe that assumes a “God’s-eye view.” The view of the earth from space reveals merely the surface of the seas, a vast horizontal expanse that is rendered utterly negligible when one considers the unfathomable depths and three-dimensional volume of the rest of the ocean. To begin to glimpse the seas, one must descend rather than transcend,⁶⁰ be immersed in highly mediated environments that suggest the entanglements of knowledge, science, economics, and power. Whereas the human alterations of the geophysical landmasses of the planet can be portrayed as a spectacle, the warming and acidifying oceans, like the atmospheric levels of CO₂, cannot be directly portrayed in images but must be scientifically captured and creatively depicted. The depths of the ocean resist flat terrestrial maps that position humans as disengaged spectators. Marine scientists must, through modes of mediation, become submerged, even as persistent Western models of objectivity and mastery pull in the opposite direction.⁶¹ The substance of the water itself insists on submersion, not separation. Even in the sunlit, clear, shallow waters that divers explore, visibility is never taken

for granted, nor does distance grant optimal vision. The oceans prefer a sense of the planet as a place where multiple species live as part of their material environs. As human activities change the chemical composition, the temperature, and the alkalinity of the waters, marine creatures also change.

Lesley Evans Ogden in “Marine Life on Acid,” published in *BioScience* in 2013, explains that the term *ocean acidification* was coined only in 2003, yet this problem has already become known as “climate change’s evil twin.”⁶² She explains what is happening:

The ocean is a massive carbon sink estimated to have absorbed one-third of all the CO₂ produced by human activities. The tracking of carbon concentrations in the ocean, which began in the mid-1980s, has indicated that concentrations of CO₂ are increasing in parallel with the growing amount of this gas in the atmosphere. Short-term and long-term cycles continually exchange carbon among the atmosphere, the ocean, and land. CO₂ reacts with seawater to form carbonic acid, but as a weak acid, carbonic acid almost immediately dissociates to form bicarbonate ions and hydrogen ions. The increasing concentration of hydrogen ions makes seawater more acidic.⁶³

Ogden notes that the ocean is “now nearly 30 percent more acidic than it was at the beginning of the industrial era” and that finding “a comparable acidification event” entails “going back 55 million years.”⁶⁴ Research on how the shift in alkalinity affects sea life and ecosystems is only just beginning, but already a strange array of effects have been captured. Acidification makes the eggs of the red sea urchin not as quick as they need to be in blocking out a second sperm, resulting in inviable embryos; the tiny plankton *Ostreococcus tauri*, which is normally one micrometer, enlarges to one and a half micrometers with increased CO₂, which means that some creatures dependent on it for food may no longer be able to eat it.⁶⁵ The alteration of ocean alkalinity even causes confusion and destructive behavior in fishes—which is fascinating in its scrambling of biosemiotics with pH levels. Even more dramatically, the increasingly acidic seas are dissolving the shells of sea animals. Nina Bednaršek has documented the thin, partially dissolved shells of pteropods, tiny marine snails, which are “important as food for other

zooplankton, fish, and marine mammals.”⁶⁶ Many marine species, from krill to whales, depend on the pteropods, or sea butterflies, for food. If pteropods disappear from the polar and subpolar regions (to focus on just two regions), “their predators will be affected immediately”: “For instance, gymnosomes are zooplankton that feed exclusively on shelled pteropods. Pteropods also contribute to the diet of diverse carnivorous zooplankton, myctophid and nototheniid fishes, North Pacific salmon, mackerel, herring, cod and baleen whales.”⁶⁷ Pteropods are also important “biogeochemically,” as part of the carbon cycle, when their shells sink to the ocean floor after their demise.⁶⁸ Considering how these creatures are crucial not only for the food web that sustains a multitude of other marine species but also as a carbon sink underscores the swirling, intimate interrelations between matters of biology, ecology, geology, and chemistry.

Whereas increasingly acidic seawater is itself difficult to represent in compelling ways, aesthetically entrancing images of dissolving shells of marine animals may enlist concern for ocean acidification. Nina Bednaršek’s beautiful micrographs of two pteropod shells, one intact and one in the process of dissolving, appear in Ogden’s article “Marine Life on Acid,” but they also appear in the National Resource Defense Council’s online magazine *On Earth*, the National Climate Assessment report, and the online technology publication *Ars Technica*.⁶⁹ Time-lapsed videos or photographs set in a series depict these dissolves in palpable manners. One striking panel of five images showing the pteropod shell dissolving at zero, fifteen, thirty, and forty-five days, by David Littschwager, which *National Geographic* owns the rights to as a stock image, appears on the National Oceanic and Atmospheric Administration website and on many other sites, including that of the Ukrainian Science Club.⁷⁰ Interestingly, in these images, the actual fleshy creature that inhabits the shell is absent. The empty shells suggest that the animals did not survive, but they also may invite viewers to imagine taking up residence there, within the precarious abodes. The design of the shells, the spirals that swirl with a continual, smooth transformation between what is inside and what is outside, suggest the contemplation of our own bodies as intertwined with our surroundings.

Video depictions of dissolving shells are even more irresistible than the photographs. Julia Whitty includes Tim Senden’s video of an X-ray micro-computed tomography (CT) of a shelled pteropod *Limacina*

helicina antarctica in her essay “Snails Are Dissolving in Acidic Ocean Waters,” published in *Mother Jones* (Figure 5.2). The silent, twenty-two-second black-and-white video, which depicts a spinning, spiral, white shell, its edges dissolving into a transparent cloud, is rather entrancing, inviting a kind of mind-altering contemplation.⁷¹ The beauty and fragility of the rotating shell are difficult to abandon. The brief black-and-white video is addictive. Highly mediated, depicting the shells of creatures rather than their fleshy bodies, these images nonetheless make claims on their viewers, seducing us to mobilize concern in scale-shifting modes.

The Tasmanian artist Melissa Smith, who creates art about the effects of climate change, has made several works featuring the pteropod within her Dissolve and Dissolve II series, including *Dispel*, a stunning 2:30 video animated by the same Tim Senden who produced the black-and-white video discussed in the previous paragraph. The name *Dispel* suggesting both dispersion and vanishing, the video shows a milky and translucent shell against a vibrant red background. Smith describes the video: “This work is emotively charged both visually and aurally. The cascading image of an X-ray micro-CT scanned pteropod shell, rotates and reveals its beauty before falling away to its demise. The soundtrack extends the viewer’s perception of the visual to evoke an even deeper sense of loss.”⁷² The video begins with the shell gently falling into the frame of the camera and slowly, hypnotically rolling across the screen. Then it gets closer to the viewer, both encompassing the viewer, pulling her gaze in and through the spiral, but also allowing her to see through the transparency. The shell’s extraordinary fragility is accompanied by mournful cello and piano music. In the end, revolving still, it disappears, white vanishing into red, as the shell spirals into smaller dimensions. The red background, signaling urgency, collides with the somber music and slow, mesmerizing rotations. The viewer’s experience shifts from being a spectator to being ensconced to being part of the dissolve, left hovering within the red.

These shells, bereft of their fleshy creatures, without a face, nonetheless evoke concern, connection, empathy. While a gory scene depicting the living creature meeting its demise would separate the human spectator from this already distant form of marine life by sensationalizing it or rendering it abject, the elegant minimalist aesthetic of the shell lures us into a pleasurable encounter that nonetheless gestures toward

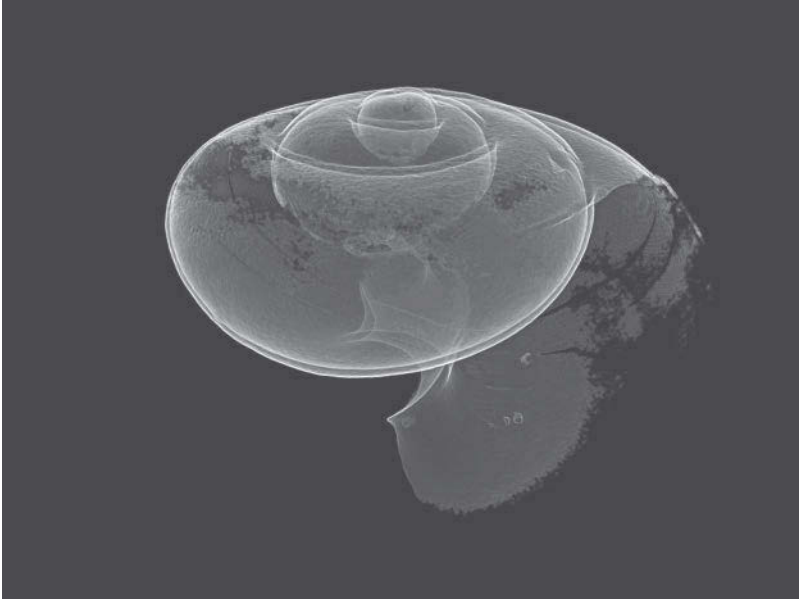


FIGURE 5.2. Video still from an X-ray micro-CT of a shelled pteropod *Limacina helicina antarctica*. Image courtesy of Tim Senden and the Australian National University CT Lab.

the apocalyptic. Within the contemporary digital landscape in which ocean creatures are posed in highly aesthetic ways, by environmental organizations, scientists, and popular media, the shells take up their place in the virtual gallery of aesthetic marine pleasures, haunted by the missing fleshy life.⁷³ To say they call us to contemplate our own “shells”—or bodily and psychic boundaries—on acid suggests something akin to a psychedelic experience. The spiral shells, especially when they are spinning around in the video versions, do, in fact, suggest the spiral as the icon of altered states. This mode of engagement, this type of attention, often involves a “dissolution between” the human and the “outside world,” as Wikipedia tells us: “Some psychological effects may include an experience of radiant colors, objects and surfaces appearing to ripple or ‘breath,’ colored patterns behind the closed eyelids (eidetic imagery), an altered sense of time (time seems to be stretching, repeating itself, changing speed or stopping), crawling geometric patterns overlaying walls and other objects, morphing objects, a sense that one’s thoughts are spiraling into themselves, loss of a sense of identity

or the ego (known as ‘ego death’), and other powerful psycho-physical reactions. Many users experience a dissolution between themselves and the ‘outside world.’⁷⁴ Intrepid viewers may dis/identify in the dissolve, simultaneously identifying with the shelled creature and contemplating the dissolution of boundaries that shore up human exceptionalism, imagining this particular creature’s life and how extinction will ripple through the seas.

This dissolution between the human self and the world suggests what Richard M. Doyle, in *Darwin’s Pharmacy: Sex, Plants, and the Evolution of the Noösphere*, defines as an “ecodelic insight,” “the sudden and absolute conviction that the psychonaut is involved in a densely interconnected ecosystem for which contemporary tactics of human identity are insufficient.”⁷⁵ Although Doyle is not writing about the question of scale in terms of the Anthropocene, his conception of the ecodelic may be useful for forging environmentally oriented conceptions of the Anthropos, not as a bounded entity, nor as an abstract force, but as manifestation: “And in awe we forget ourselves, becoming aware of our context at much larger—and qualitatively distinct—scales of space and time. And over and over again we can read in ecodelic testimony that these encounters with immanence render the ego into a non sequitur, the self becoming tangibly a gift manifested by a much larger dissipative structure—the planet, the galaxy, the cosmos.”⁷⁶ I am interested in how the ecodelic erodes the outlines of the individual self in “encounters with immanence” that provoke alluring modes of scale shifting. The problem here, however, is that contemplative or psychedelic practices have an association, in Western culture at least, with a navel-gazing, spiritual transcendence—the exact opposite of the sort of materially immersed subjectivity I think is necessary for environmentalism. Recasting Doyle’s scenario by imagining the anthropogenically altered, acidified seas, rather than the perfect, ethereal expanses of the cosmos (descending rather than transcending), may provoke a recognition of life as always immersed in substances and chemistries that are, within the Anthropocene especially, neither solid nor eternal. More difficult to contend with, however, is that the ecodelic figuration of the dissolve may be useless in terms of social justice and climate justice, in that it does not provoke consideration of differential human culpabilities and vulnerabilities. And yet, as a vivid image of slow violence, it could be taken up as a mode of dis/identification and alliance for particular groups of people

who are contending with other sorts of invisible environmental harm. In her essay on the New Zealand Maori writer Kerri Hulme, Elizabeth DeLoughrey states that Hulme's stories "suggest that experience of embodied thought allows for merger with other species." DeLoughrey argues against apocalyptic fiction, however, and the figuration of the dissolve is rather apocalyptic. But other similarities resonate, such as her reading of Hulme's "narrative merger with fossils (and later the sea)" as "an encounter with deep planetary time that renders an interspecies relationship."⁷⁷

As one figuration of the Anthropocene among many others that are possible, the exquisite photos and videos of dissolving shells may perform cultural work, portraying the shift in alkalinity as a vivid threat to delicate yet essential living creatures. Whereas the predominant sense of the Anthropocene subject, en masse, is that of a safely abstracted force, the call to contemplate your shell on acid cultivates a fleshy posthumanist vulnerability that denies the possibility of any living creature existing in a state of separation from its environs. The image of the diminutive creature, with its delicate shell dissolving, provokes an intimacy, a desire to hold and protect, even as we recognize that such beings hover as part of the unfathomable seas. The scene of the dissolve demands an engaged, even fearsome activity of scale shifting from the tiny creature to the vast seas. In *The Posthuman*, Rosi Braidotti challenges us to imagine a vital notion of death: "The experiment of de-familiarization consists in trying to think to infinity, against the horror of the void, in the wilderness of non-human mental landscapes, with the shadow of death dangling in front of our eyes."⁷⁸ Arguing not for transcendence but instead for "radical empirical immanence," she contends that "what we humans truly yearn for is to disappear by merging into this generative flow of becoming, the precondition for which is the loss, disappearance and disruption of the atomized, individual self."⁷⁹ Envisioning the dissolve, then, can be an immanent, inhuman or posthuman practice.

In the era of the sixth great extinction, it is not difficult to discern the shadow of death. Marine life faces many other threats in addition to acidification, including warming waters and the ravages of mining, drilling, ghost nets, shark finning, and industrial overfishing. Marine habitats are riddled with radioactive waste, toxic chemicals, plastics, and microplastics, all of which become part of the sea creatures that, not unlike Beck's citizen in risk society, lack the means to discern

danger and the impermeability that would exclude it. Contemplating your shell on acid is a mode of posthumanist trans-corporeality that insists that all creatures of the Anthropocene dwell at the crossroads of body and place, where nothing is natural or safe or contained. To ignore the invisible threats of acidity or toxins or radioactivity is to imagine that we are less permeable than we are and to take refuge in an epistemological and ontological zone that is somehow outside the time and space of the Anthropocene. Those humans most responsible for carbon emissions, extraction, and pollution must contemplate our shells on acid. This is a call for scale shifting that is intrepidly—even psychedelically—empathetic rather than safely ensconced. Contemplating your shell on acid dissolves individualist, consumerist subjectivity in which the world consists primarily of externalized entities, objects for human consumption. It means dwelling in the dissolve, a dangerous pleasure, a paradoxical ecodelic expansion and dissolution of the human, an aesthetic incitement to extend and connect with vulnerable creaturely life and with the inhuman, unfathomable expanses of the seas. It is to expose oneself as a political act, to shift toward a particularly feminist mode of ethical and political engagement.

NOTES

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1. Richard Doyle, *Darwin's Pharmacy: Sex, Plants, and the Evolution of the Noösphere* (Seattle: University of Washington Press, 2011).

2. Will Stefan, Paul J. Crutzen, and John R. McNeill, "The Anthropocene: Are Humans Now Overwhelming the Great Forces of Nature?" *AMBIO: A Journal of the Human Environment* 36, no. 8 (2007): 618.

3. Donna J. Haraway, "Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective," in *Simians, Cyborgs, Women: The Reinvention of Nature* (New York: Routledge, 1991), 188, 189.

4. Claire Colebrook, *Death of the PostHuman: Essays on Extinction*, vol. 1 (Ann Arbor, Mich.: Open Humanities Press, 2014), 22. This passing reference to

Colebrook's work should by no means imply that it can be readily encapsulated. Indeed, I think her extensive, bold, and often disconcerting work on the concepts of extinction and the Anthropocene makes her the preeminent philosopher of these emerging fields of thought.

5. Andrew Revkin, "Confronting the Anthropocene," *New York Times*, May 11, 2011, http://dotearth.blogs.nytimes.com/2011/05/11/confronting-the-anthropocene/?_php=true&_type=blogs&_r=0.

6. Elizabeth Kolbert, "Age of Man," *National Geographic*, March 2011, <http://ngm.nationalgeographic.com/2011/03/age-of-man/kolbert-text>.

7. "Anthropocene," *Encyclopedia of Earth*, September 3, 2013, <http://www.eoearth.org/view/article/150125/>.

8. Owen Gaffney, "State of the Art," *Anthropocene Journal*, October 1, 2013.

9. Ibid. The posting shows artwork and data visualizations by Félix Pharand-Deschênes, David Thomas Smith, Stephen Walter, Jason deCaires Taylor, Radhika Gupta, John Stockton, and NASA's Landsat program.

10. "Cartography of the Anthropocene," 2013, <http://globaia.org/portfolio/cartography-of-the-anthropocene/>.

11. Jamie Lorimer makes a similar argument, calling for attention to what he terms "nonhuman mobilities": "Tracing networks maps the geographies of intersecting lines through which landscapes are to be reanimated and by which their difference is threatened. . . . An attention to animals' geographies—thinking like an elephant, an insect, or even a molecule—can help attune to the diverse ways in which nonhuman life inhabits the novel ecosystems of an Anthropocene planet." See Lorimer, *Wildlife in the Anthropocene: Conservation after Nature* (Minneapolis: University of Minnesota Press, 2015), 177, 176.

12. Take, by contrast, Nicole Starosielski's multimedia project *Surfacing*, a digital map of underwater cable systems in which "the user becomes the signal and traverses the network." See Starosielski, "Surfacing: A Digital Mapping of Submarine Systems," *Suboptic*, 2013, 3. *Surfacing* will be discussed later.

13. Betsy Wills, "Anthropocene': Aerial Photography by David Thomas Smith," March 15, 2013, <http://artstormer.com/2013/03/15/anthropocene-aerial-photography-by-david-thomas-smith/>.

14. Ibid.

15. "There is no Space or Time / Only intensity, / And tame things / Have no immensity." Mina Loy, "There Is No Life or Death," in *The Lost Lunar Bae-deker: Poems of Mina Loy*, ed. Roger L. Conover (New York: Farrar, Strauss and Giroux, 1997), 3.

16. Patricia Johanson, quoted in Xin Wu, *Patricia Johanson and the Re-invention of Public Environmental Art, 1958–2010* (Surrey, U.K.: Ashgate, 2013), 155.

17. One of the sections to follow will discuss remarkable exceptions that enmesh the human with the lithic.

18. Dipesh Chakrabarty, "The Climate of History," *Critical Inquiry* 35 (Winter 2009): 201.

19. Ibid., 206–7.

20. Jan Zalasiewicz, Mark Williams, Will Steffen, and Paul Crutzen, "The New World of the Anthropocene," *Environmental Science and Technology Viewpoint* 44, no. 7 (2010): 2229.

21. Chakrabarty, "Climate of History," 207.

22. *Ibid.*, 220.

23. *Ibid.*

24. Elizabeth DeLoughrey, "Ordinary Futures: Interspecies Worlding in the Anthropocene," in *Global Ecologies and the Environmental Humanities: Post-colonial Approaches*, ed. Elizabeth DeLoughrey, Jill Didur, and Anthony Carrigan (New York: Routledge, 2015), 354.

25. Donna J. Haraway, *When Species Meet* (Minneapolis: University of Minnesota Press, 2007), 25.

26. W. E. B. Du Bois, *The Souls of Black Folk* (Mineola, N.Y.: Dover, 1994); Frantz Fanon, *Black Skin, White Masks* (New York: Grove Press, 1967); Homi Bhabha, *The Location of Culture* (New York: Routledge, 2004); Judith Butler, *Gender Trouble: Feminism and the Subversion of Identity* (New York: Routledge, 1999).

27. Rory Rowan, "Notes on Politics after the Anthropocene," *Progress in Human Geography* 38, no. 3 (2014): 449.

28. Ian Baucom, "The Human Shore: Postcolonial Studies in an Age of Natural Science," *History of the Present: A Journal of Critical History* 2, no. 1 (2012): 4. Many thanks to Sangeeta Ray for sending me this essay.

29. Lorimer, *Wildlife in the Anthropocene*, 3.

30. "Slow violence" is of course Rob Nixon's term from *Slow Violence and the Environmentalism of the Poor* (Cambridge, Mass.: Harvard University Press, 2011). Nixon points out the painfully ironic timing of the "the grand species narrative of the Anthropocene," which is "gaining credence at a time when, in society after society, the idea of the human is breaking apart economically, as the distance between affluence and abandonment is increasing." He asks, "How can we counter the centripetal force of that dominant story with centrifugal stories that acknowledge immense disparities in human agency, impacts, and vulnerability?" See "The Great Acceleration and the Great Divergence: Vulnerability in the Anthropocene," *Profession*, March 19, 2014, <https://profession.commons.mla.org/2014/03/19/the-great-acceleration-and-the-great-divergence-vulnerability-in-the-anthropocene/>.

31. Sylvia Wynter and Katherine McKittrick, "Unparalleled Catastrophe for Our Species? Or to Give Humanness a Different Future: Conversations," in *Sylvia Wynter: On Being Human as Praxis*, ed. McKittrick (Durham, N.C.: Duke University Press, 2015), 24. I should note that this brief inclusion of Wynter's brilliant work does not address the many ways in which its original conceptions clash with other models of environmental and feminist science studies and material feminisms in this book, for example, her idiosyncratic definition of the "biocentric" and her use of Darwin. Wynter critiques the idea that humans are "purely biological beings," arguing instead that humans are hybrid creatures of

both “mythoi and bios” (34, 31). Critical posthumanist and animal studies scholars, including myself, would not agree with this human exceptionalist argument that denies nonhuman beings their own modes of culture. Wynter plainly states, for example, “As far as eusocial insects like bees are concerned, their roles are genetically *prescribed* for them. Ours are not” (34). Such rigid distinctions are problematic not only for posthumanists but also for new materialists, in that it is problematic to draw a sharp line between biological embodiment and culture, given their many intra-actions. Even genetics can no longer be seen as encapsulated within the “biological” because epigenetics means that social, political, and environmental factors alter bodies. See, e.g., Shannon Sullivan, *The Physiology of Sexist and Racist Oppression* (Oxford: Oxford University, 2015).

32. Wynter and McKittrick, “Unparalleled Catastrophe for Our Species?”

33. Alexander G. Weheliye, *Habeas Viscus: Racializing Assemblages, Biopolitics, and Black Feminist Theories of the Human* (Durham, N.C.: Duke University Press, 2014), 24.

34. Anna Lowenhaupt Tsing, *Friction: An Ethnography of Global Connection* (Princeton, N.J.: Princeton University Press, 2005), 8.

35. Chakrabarty, “Climate of History,” 14.

36. Dipesh Chakrabarty, “Brute Force,” *Eurozine*, October 7, 2010, <http://www.eurozine.com/articles/2010-10-07-chakrabarty-en.html>.

37. I am grateful to Karen Barad’s critique of this sentence, during the October 2014 SLSA conference, and her suggestion that I consider the (hypothetical) graviton particle. The graviton has confused me, however, because, if the graviton does exist, it would be a particle but would have no mass. So by saying that “humans are not gravity,” I intend to critique Chakrabarty’s mystification of humans as an abstract force. Reading a bit of physics, including Barad’s work, does not leave me with the sense that even gravity is not gravity in that it may not be an immaterial force but instead remains a bit of a mystery. Barad states, “Constructing a quantum theory of gravity means understanding how to apply quantum theory to the general theory of relativity. This has proved exceedingly difficult.” By contrast, it is not so difficult to demonstrate the many ways, from agriculture to automobiles to acidification, that humans have brought about the Anthropocene. Karen Barad, *Meeting the Universe Halfway* (Durham, N.C.: Duke University Press, 2007), 350. There is a very good chance that my thin understanding of physics caused me to misunderstand Barad’s critique.

38. Dipesh Chakrabarty, “Postcolonial Studies and the Challenge of Climate Change,” *New Literary History* 43, no. 1 (2012): 13.

39. Jessi Lehman and Sara Nelson, “After the Anthropocene: Politics and Geographic Inquiry for a New Epoch,” *Progress in Human Geography* 38, no. 3 (2014): 444.

40. Derek Woods, “Scale Critique for the Anthropocene,” *Minnesota Review* 83 (2014): 134.

41. *Ibid.*, 140.

42. Rosi Braidotti, *Transpositions* (Cambridge: Polity, 2006), 278.
43. Starosielski, "Surfacing," 3.
44. Nicole Starosielski, Erik Loyer, and Shane Brennan, "Surfacing," <http://www.surfacing.in/>. Starosielski's book is *The Undersea Network* (Durham, N.C.: Duke University Press, 2015).
45. Starosielski, *Undersea Network*, 2.
46. *Ibid.*, 2–3.
47. Stacy Alaimo, *Bodily Natures: Science, Environment, and the Material Self* (Bloomington: Indiana University Press, 2010).
48. See *ibid.*, 119–25, and Rhonda Zwillinger, *The Dispossessed: Living with Multiple Chemical Sensitivities* (Paulden, Ariz.: Dispossessed Project, 1998).
49. Claire Colebrook, "Not Symbiosis, Not Now: Why Anthropogenic Climate Change Is Not Really Human," *Oxford Literary Review* 34, no. 2 (2012): 198–99.
50. *Ibid.*, 193.
51. *Ibid.*
52. Jeffrey J. Cohen, *Stories of Stone: An Ecology of the Inhuman* (Minneapolis: University of Minnesota Press, 2015), 6, 62.
53. Elizabeth Ellsworth and Jamie Kruse, eds., *Making the Geologic Now: Responses to Material Conditions of Contemporary Life* (Brooklyn, N.Y.: Punctum Books, 2013), 152.
54. *Ibid.*, 25.
55. Ilana Halperin, "Autobiographical Trace Fossils," in Ellsworth and Kruse, *Making the Geologic Now*, 156.
56. *Ibid.*
57. Kathryn Yusoff, "Geologic Life: Prehistory, Climate, Futures in the Anthropocene," *Environment and Planning D: Society and Space* 31, no. 5 (2013): 780.
58. Stephanie LeMenager, *Living Oil: Petroleum Culture in the American Century* (New York: Oxford University Press, 2014), 6.
59. For another figuration of the Anthropocene ocean, see DeLoughrey's "Ordinary Futures," which reads New Zealand Maori author Keri Hulme's speculative fiction by way of deep seabed mining, proposing that "we might read Hulme's oceanic imaginary in line with a cultural politics that destabilizes the state claims of the Foreshore and Seabed Act (and the Marine and Coastal Area Bill), a way of narratively imagining a relationship to the oceanic through ordinary modes of merger and submersion—an adaptive, interspecies hermeneutics for the rising tides of the anthropocene" (367).
60. See Stacy Alaimo, "New Materialisms, Old Humanisms; or, Following the Submersible," *NORA: Nordic Journal of Feminist and Gender Research* 19, no. 4 (2011): 280–84.
61. Take, for example, James Cameron's *Aliens of the Deep* (2005), a documentary about deep-sea exploration that repeatedly supplants the seas with the planets. The deep seas are cast as the perfect practice arena for space explorers, marine biology is said to be a good starting point for astrobiology, and the samples from

the ocean are the “next best thing” for the planetary scientist to examine. The ethereal trumps the aqueous; the transcendent transcends the immanent. Marine biologist Dijanna Figueroa’s compelling and informative discussion of symbiosis in riftia (giant tube worms), for example, is followed by a cut to Cameron telling a scientist, “The real question is, can you imagine a colony of these on [Jupiter’s moon] Europa?” Stacy Alaimo, “Dispersing Disaster: The Deepwater Horizon, Ocean Conservation, and the Immateriality of Aliens,” in *Disasters, Environmentalism, and Knowledge*, ed. Sylvia Mayer and Christof Mauch, 175–92 (Heidelberg, Germany: Universitätsverlag, 2012).

62. Lesley Evans Ogden, “Marine Life on Acid,” *BioScience* 63, no. 5 (2013): 322.

63. *Ibid.*

64. *Ibid.*, 328.

65. *Ibid.*

66. *Ibid.*, 323.

67. James C. Orr et al., “Anthropogenic Ocean Acidification over the Twenty-First Century and Its Importance to Calcifying Organisms,” *Nature*, September 29, 2005, 685.

68. Ogden, “Marine Life,” 323.

69. Jason Bidel, “Our Climate Change, Ourselves,” *On Earth* (blog), May 6, 2014, <http://www.onearth.org/articles/2014/05/national-climate-assessment>; National Climate Assessment report, U.S. Global Change Research, 2014, <http://nca2014.globalchange.gov/downloads>; Scott K. Johnson, “Sea Butterflies Already Feeling the Sting of Ocean Acidification?,” *Ars Technica*, November 27, 2013, <http://arstechnica.com/science/2012/11/sea-butterflies-already-feeling-the-sting-of-ocean-acidification/>.

70. NOAA, “What Is Ocean Acidification?,” <http://www.pmel.noaa.gov/co2/story/What+is+Ocean+Acidification%3F>; Richard A. Kerr, “Ocean Acidification: Unprecedented, Unsettling,” 2010, <http://nauka.in.ua/en>, originally published in *Science*, June 18, 2010, 1500–1501.

71. Julia Whitty, “Snails Are Dissolving in Acidic Ocean Waters,” *Mother Jones*, November 2012, <http://www.motherjones.com/blue-marble/2012/11/first-evidence-marine-snails-dissolving-acidic-waters-antarctica>. Tim Senden of the Department of Applied Maths at the Research School of Physics and Engineering, Australian National University, produced this video, which is available on YouTube at <https://www.youtube.com/watch?v=48qr1TFqelc>. Information about complex technologies and procedures of the X-Ray CT Lab is available at <http://www.anu.edu.au/CSEM/machines/CTlab.htm>.

72. Melissa Smith, “Climate Change as Art,” *Australian Antarctic Magazine* 25 (December 2013), <http://www.antarctica.gov.au/about-us/publications/australian-antarctic-magazine/2011-2015/issue-25-december-2013/art/climate-change-as-art>.

73. Jellyfish and other gelatinous creatures, for example, have been portrayed as “art” in museum exhibits, coffee table books, videos for relaxation, and scientific

and popular websites. See Stacy Alaimo, “Jellyfish Science, Jellyfish Aesthetics: Posthuman Reconfigurations of the Sensible,” in *Thinking with Water*, ed. Janine MacLeod, Cecilia Chen, and Astrida Neimanis, 139–64 (Kingston, Ont.: McGill-Queen’s University Press, 2013).

74. Wikipedia, “Lysergic Acid Diethylamide,” http://en.wikipedia.org/wiki/Lysergic_acid_diethylamide.

75. Doyle, *Darwin’s Pharmacy*, 20.

76. *Ibid.*, 21.

77. DeLoughrey, “Ordinary Futures,” 365.

78. Rosi Braidotti, *The Posthuman* (Cambridge: Polity, 2013), 134.

79. *Ibid.*, 136.