Introduction: Open Ecologies

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WHAT is an open ecology? This collection of essays turns to the nineteenth century in order to weigh the legacy of its holistic conception of systems and to resurrect alternative discourses of openness, permeability, and indeterminate relation. If modern ecocriticism has sometimes been hobbled by a restrictively organic, harmonious conception of how ecologies work, we wager that a return to Victorian interrogations of natural and social collectives can furnish more open, less integrated models for how assemblages operate. The nineteenth century saw both the first acceleration of anthropogenic climate change and the birth of a host of sciences—economic, social, geological, energetic, and (yes) ecological—that now struggle to address the planetary implications of that acceleration. Our growing awareness that we are now living in the long tail of this conjuncture and at the birth of the Anthropocene has prompted a reevaluation of what we think we know about how nature and society work, and how they might work together. Indeed, such questions have come to dominate the relational turn in critical theory, as formulated by such theorists as Donna Haraway and Bruno Latour. Above all, the Anthropocene demands that we develop new ways of thinking about the collectives, both social and natural, imperial and ecological, that gave shape to our past and may yet determine the course of our future.

The "web of life" metaphor in ecological writing has often served to index a holistic model of the biosphere as a dynamically integrated system, a bounded assembly of parts that are woven together like the tissues of an organism. The literary ecocritic Timothy Morton has taken particular aim at the term, dismissing "organic metaphors favored by

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environmentalism," particularly the web of life and its mycological complement, the rhizomes of Deleuze and Guattari.[1] If, in Morton's account, the web of life smuggles organicism into our descriptions of how natural collectives operate, for many literary critics the web instead tends to naturalize social strictures, particularly of gender, labor, and race, giving a seemingly coherent texture to the ideology of literary artifacts. Perhaps the most famous example occurs in a quotation from George Eliot's *Middlemarch*—"I at least have so much to do in unraveling certain human lots, and seeing how they were woven and interwoven, that all the light I can command must be concentrated on this particular web, and not dispersed over that tempting range of relevancies called the universe"—which closes with the caution that "the fragment of a life, however typical, is not the sample of an even web."[2] In his skeptical account, D. A. Miller argues that the "web of characters' lives" serves to flatten internal distinctions and gives them a "binding coherence," and so serves the novel's "ambition to totalize its materials into a cohesive narrative formation."[3]

Yet accounts like this, despite their influence, misread the web metaphor: far from implying Eliot's investment in either organic holism or social integration, *Middlemarch*'s webs pull in the opposite direction—toward a deep skepticism about easy claims to unity or interconnectedness, and against an organicist, holistic worldview. (As evidence for this assertion, we would note that the word "web" is most often associated in the novel with deception, confusion, and misapprehension.) The word "web" appears ten times in the novel—eleven if we count the name "Webbe," which winks at the prevalence of the term. A review of the second installment, appearing in the *Athenaeum*, had already picked up on the web's importance to the novel as a metaphor for complication as much as integration: "At Middlemarch the web of life is tangling itself in its own way."[4] As Gillian Beer reminds us, the word contained a multitude of meanings for Eliot and for the Victorians generally: it could refer to the spider's web, a woven piece of cloth, family relations, even bodily tissues (the narrator explicitly cites Bichat's notion that living bodies "must be regarded as consisting of certain primary webs or tissues, out of which the various organs—brain, heart, lung, and so on—are compacted").[5] *Middlemarch*'s web exists, as Beer puts it, "not only as interconnection in space but as succession in time."[6] If Rosamond and Lydgate cooperate in "spinning . . . the mutual web" of their romance, they end up struggling against the resulting marriage bonds and the wider "entanglements of human action."[7]

Spun across some eight hundred pages, *Middlemarch*'s web of life seems to catch at the wider possibilities of what such structures can do. Spiderwebs, for example, are not simply nets but topologies of encounter between a wide range of species and materials, both living and inert. Spiders use them as signaling devices, as structural hinges, as communal habitats. Gossamers, they are mostly open space, interstices structured by dynamic lines of tension and adhesion. Spun from and between bodies, the web speaks to both interior relations and exterior filiations, the state of connection and the processes by which connections are formed, loci of cooperation and fields of intense competition and distress. Rather than simply a figure for social constraint or organic unity, the web figures a radical openness to the world and the complex vectors of its interactions. The present collection seeks to read this radical openness back into the notion of ecology itself and, in so doing, to open ecologies to the "tempting range of relevancies called the universe."[8]

As Beer, George Levine, and other critics have noted, Charles Darwin initiated this fundamental rethinking of the ontology of encounter, whether in terms of webs or ecologies of interaction. "Ecology" is a Victorian concept. Inspired by his careful reading of *The Origin of Species*, Ernst Haeckel coined the term in 1866 as a way to formalize the principle of systemic interaction that Darwin ascribed to nature.[9] In many ways, Darwin was the first modern to ask what an open ecology might mean—a radically new question, and one we are still catching up to. His contemporaries responded creatively, developing notions of ecology that were extremely wide-ranging and flexible, and applied to all interactions between living bodies, as well as their relation to the various organic and inorganic materials that constitute their environment. Most importantly, this early wave of ecological theory did not assume that these interactions were coherent, harmonious, or tightly integrated. It is time to reassess this more open, more mutable notion of ecology.

1. Escaping Closed Ecology

There are many reasons why modern readers tend to read ecology as inextricably associated with holism, even as we have grown skeptical of the benign cosmos proposed by natural theology. Chief among them is organicism. By "organicism" we refer to the doctrine that the universe—and its constituent parts such as ecosystems—is a holistic entity that resembles living organisms, particularly in having parts that function in relation to a greater whole. If the *Origin* detonated the

comfortable, comforting account of the relation between nature and humanity that was a central tenet of natural theology, then organicism provides an alternative way to assert the congruity of humanity and nature, and "the equivalence between natural and social processes."[10] Such organicism is perhaps the most important legacy of Romantic naturalism and philosophy.[11] Kant was its most influential theorist and defined organicism as the complete interdependence of part and whole, so that organs and organism serve each other reciprocally as means to ends.

Our sense of the Victorians as being particularly prone to organicist thinking is due to a myriad of factors: the legacy of Samuel Taylor Coleridge's distinction between organic and mechanical form; the persistence of organicist ideas in the work of such prominent Victorian sages as Thomas Carlyle and John Ruskin; and even the work of Karl Marx, who specifically criticized earlier political economists for failing to grasp the "organically coherent factors" that "each form of production produces," from "legal relations" to "forms of government."[12] Other crucial sources of this organicist perception have been reinterpretations of Darwin's work—which, as several of the essays in this collection will argue, sought to tame its more radical implications.[13] One of the most prominent popularizers of an organicist version of evolutionary theory was Darwin's and Eliot's contemporary, Herbert Spencer.[14] The generation of ecologists who followed Darwin and Haeckel, especially Frederic E. Clements and John Phillips, put heavy emphasis upon the integration of living creatures into a single organic system. The effect of this reception was to organicize ecological thought, effecting a harmonization of Darwinian nature that had a lasting influence on the ecological imagination, from Richard Buckminster Fuller's "Spaceship Earth," to James Lovelock's "Gaia" theory, to Arne Naess's "ecosophy."[15]

If, as Raymond Williams once noted, the "organic community" is generally imagined somewhere in the past, it yet remains very much alive in the way we imagine the systems—economic, ideological, and institutional—that hold societies together. John Kucich has explored how many of the social models that were bequeathed to us by the nineteenth century depend on the sense that collectives—from individual bodies and social forms to the larger economic and cultural systems within which they operate—display an organic integrity.[16] As Beer also explained, "organicism . . . from the late eighteenth century on has provided an immense literature as well as an ideological model for explaining individual development, social relations, the process of a work of art, the process of history, and the relations between diverse types of

knowledge within a society."[17] This is to say, organicism is not the purview of the nineteenth century alone. It continues to underwrite central literary methodologies, from Louis Althusser's influential account of ideological closure that perpetuates the life of socioeconomic systems to the "cultural integrity" of empire (Edward Said) or of late capitalism (Fredric Jameson).[18]

Most of our frameworks for thinking about social totalities are haunted by this sense that we are bound up within and mutually determined by larger systems of ideology, disciplinary institutions, and economic production, a secularized notion of closure within totality that is one of organicism's most lasting effects. We need not turn to the genealogy of new criticism to detail the many reasons why, as Mary Poovey, Elaine Freedgood, and Andrew Miller have pointed out, a presumption of organicism underwrites our procedures for studying literary form.[19] In the wider view of organicism's long afterlife, we should not be surprised by the uncanny alignment between Warren and Wellek's vision of art as that which "imposes an order, an organization, a unity on its materials"[20] and the strategy of suspicious or "paranoid" reading, which dismantles a given work's seeming integrity only to reconstitute it as an organ of some dominant ideology or system of norms. Whether we oscillate between surface and depth, suspicious or reparative reading, we're caught in a loop of organic integrity.

Yet if we look beyond the more specific problem of literary interpretation to the problem of organic holism broadly conceived, the ongoing crisis of environmental degradation illuminates what happens when organic theory is applied to the problem of the relation between society and the natural world. Organicism continues to condition how many major theorists of the Anthropocene imagine those interactions, from Jason Moore's account of "humanity-in-nature" as a "world-historical process" that constitutes an "organic whole," to Andreas Malm's claim, adapted from Marx, that the key problem with "fossil capital" is that it organizes private property as a prosthetic extension of human bodies, "open[ing] the wide earth for appropriation."[21] Whether that property takes the form of "a material, a machine, [or] a prime mover," Malm argues, "the individual [needs] them like she needs her own lungs, but they are outside of her body, caught by others in a net, versatile *and* off-limits, and so she may have no choice but to go via a master to access them: she is ensnared in property relations."[22] *Like* lungs but *outside* the body, *ensnared* but *off-limits*, we *go* but we go *without choice*: these are the double binds of the organic ecology, which produces integration at

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the expense of alterity and coherence at the expense of possibility. Tangled in this thought, we are caught in a web of life that has no limit, because there is nothing beyond it. The essays in the present collection argue that the literary archives of the nineteenth century can help us think our way out of this all-ensnaring entanglement, reviving more open literary forms, less determinate genres, and more flexible languages of relation.

The problem of closed entanglement is especially pronounced when we situate ecological thinking within wider political and economic histories of empire, economic world-systems, colonialism, and postcoloniality. Ramachandra Guha and Rob Nixon have given extended attention to the importance of recognizing an "environmentalism of the poor" that illuminates forms of environmental activism and ecological thinking outside the richest industrialized nations, while focusing on the uneven distribution of environmental degradation between the global North and global South.[23] This work is complemented by histories that have sought to place ecological thinking within the longer view of imperial domination, particularly within the British Empire. Richard Grove's classic *Green Imperialism*, in an account substantially extended by recent works from Peder Anker, Jim Endersby, and James Delbourgo, has explored how sites of colonial conquest and imperial trade built networks of observation and specimen collection, with profound impact on how ecologies were recognized and imagined.[24] Crucial work has been done by Kyle Powys Whyte and other Indigenous studies scholars to radically rethink the dynamics of such colonial encounters and their long-standing effects on both Indigenous peoples and ecosystems.[25] Moreover, Leilani Nishime and Kim D. Hester Williams's work on "racial ecologies" points to the racial implications of any discussion of ecology, insofar as "terms such as *nature* and *landscape* also subtend categories such as *self/other*, *Asian*, and *white*." This observation allows them to test how the term "ecology" might be opened up to "include[] urban environments and agricultural systems," which in turn can help us recognize the historical traffic between "racial identities and ecological space and place."[26] Rather than reinscribe a division between society and nature, a more open understanding of ecology encourages us to recognize their mutual entanglement. Yet by the same measure, open ecology does not resurrect the benign unities of natural theological or organic discourse; rather, it turns to those messy, contested, and often violent histories through which cultural and natural

systems continue to produce each other, those conflicted formations Bruno Latour describes as "nature-cultures."

Recent scholarship has turned to the literary archive of the long nineteenth century both as a register of imperial ecology and as a site of resistance to the seemingly inexorable mechanisms of global trade and environmental violence. In Siobhan Carroll's account, writers of the "Romantic century"—including many Victorians—explored literature's emphasis on "atopias": spaces on the verge of empire that "highlight[], and often seem[] to materialize resistance against, the spatial transformations that are characteristic of modernization."[27] And in their new collection, Nathan Hensley and Philip Steer seek to overcome the "false divide between environmental history and criticism of empire" by seeking out those literary forms that map the "unbearably intimate systems of entanglement" which constitute imperial economies both within and without the nation.[28]

Close attention to the ecological theory of the long nineteenth century, as these accounts demonstrate, throws into relief ecology's colonial and racial imbrications. When Ernst Haeckel formulated the new language of "ecology" in 1866, he intended it to reform the language of "economy" employed throughout *The Origin of Species*. Darwin's "economy" gathered a range of thinking, from the "animal economy" and "economy of nature" of Linnaeus and his grandfather, Erasmus Darwin; to the "political economy" of Malthus (discussed in John MacNeill Miller's contribution to this collection); to his own special emphasis on the "general economy" of natural systems, the "natural economy of land" that characterized environments, and the "economy of growth" that seemed to govern the development of specific organisms.[29] If Darwin's "economy" was a general term that gathered various phenomena to argue for a general principle of coordination within complex systems, Haeckel's "ecology" brought such thinking home, through its emphasis on the root term, the Greek word *oikos*. Haeckel defined *oikos* in his "Darwin-Buch," the *Generelle Morphologie*, as "household or housekeeping, living relations."[30] This notion of ecology emphasized comprehensive intimacy: both the "living relations" that subsisted between organisms but also the determinative importance of their interactions with the material environment.

The following generation of ecologists emphasized a dynamic sense of transformation in which house-*keeping* became home-*making*. Frederic Clements, drawing on turn-of-the-century fieldwork in the western United States, argued that the ecology of plant life should be studied

with an eye to the succession of organic "formations." Such a constellation of plants, Clements argued, should be recognized as "a complex organism, which possesses functions and structure, and passes through a cycle of development similar to that of the plant."[31] Drawing on Haeckel's etymology, Clements theorized this turn toward dynamic development as "ecesis," a process of invasive homemaking defined as the "series of phenomena exhibited by an invading disseminule from the time it enters a new formation until it becomes thoroughly established there."[32] This emphasis on "reaction and competition" was taken up by South African ecologist John Phillips, who became the most influential proponent of this developmental strand of organic ecology. Phillips notoriously seized on the language of invasion and succession, combining it with the holist theories of South African general and statesman Jan Smuts to argue that "groups, societies, nations, and Nature are *organic without being organisms*, are holistic without being wholes"; in other words, each was "a mass-entity with a *special destiny* to itself."[33] Behind this description of a manifest cultural and natural destiny playing out within the colonized environments of the American Southwest and South Africa we see the imaginary of settler colonialism. Perhaps the most insidious issue of organicism was the way its language has been used to imagine the integration of social and natural systems through racial and environmental domination.[34]

In the series of transformations by which economy evolves into domesticating ecology, and housekeeping becomes rapacious homesteading, we can both see the process by which more open notions of ecological interaction became enclosed within explicit and implicit formulations of imperial power, and also recognize the capacity of a return to the archive to read such transformations across the grain and in favor of more open, less imperialist alternatives. The long nineteenth century witnessed the emergence of both industrial capitalism and anthropogenic climate change, and the Victorians became increasingly aware of their complex and fragmentary impact on the world. Above all, the Victorians show why environmental theory cannot be addressed, as Hensley and Steer put it, without "widening the problem of ecological thought to imperial, and therefore political, scale."[35]

To think in terms of open ecologies is to return to a perception of the chaotic disaggregation of nature and society that characterized much earlier thinking about the world. In confronting the disjunction between new scales of natural and social analysis, many nineteenth-century writers worked to articulate more open notions of collective relation. The

Victorians recognized the earth as a discontinuous system, one that, as Tobias Menely and Jesse Oak Taylor explain, "includes not just the hydrosphere, atmosphere, biosphere, and lithosphere, but also diverse economies and energy systems, societies and symbolic orders."[36] This collection contributes to a wave of recent scholarship that, as Elizabeth Carolyn Miller has put it, explores "ecological relations with an eye to anthropogenic influence."[37] In the accounts that follow, the inhabitants of the nineteenth century, real and imagined, human and nonhuman, confront the radical openness of natural and social systems and the fraught condition of empire and global trade.

2. Breaking the Bank

Victorian literature is filled with wrenching accounts of what happens when visions of natural and social integration come apart at the seams. The papers in this issue contend that, far from monolithically asserting the tight interrelation of natural and social collectives under the banner of organicism, nineteenth-century writing teems with accounts of less organized, more open, and more radical encounters with sociability and natural systems. The recent flooding of the Svalbard Global Seed Vault—an arctic preserve designed to house the world's library of plant life for millennia—suggests we have not yet internalized the implications of this thought. When the vault was constructed, designers assumed the permafrost would be permanent. Instead, global warming triggered an unprecedented thaw of the arctic soil in which it was embedded. If, as one operator put it, the vault was "supposed to last for eternity," that eternity was constructed from a false sense of the temporal and physical integrity of the vault itself and of the world climate system.[38] The problem with closed concepts of ecology, like totalizing systems in general, is that they tend to freeze things in place, assuming a stability—whether truly fixed or unchanging in its repetition—that foreshortens the horizon of possibility. In a perverse reversal of Lyellian gradualism, the present becomes permanent. The Svalbard seedbank reminds us of something that Darwin emphasized long ago in his descriptions of the "tangled bank": ecologies do not have sharp boundaries or stable timescapes. They are fuzzy and mutable, existing in a permeable relation to their surroundings and to changing conditions.

One way to open ecology is to recognize it as a complex and evolving process rather than a stable state of things: in other words, to expand our notion of "openness" to include temporal as well as spatial metaphorics.

From this perspective, the Global Seed Vault can be seen as an attempt to arrest the unwieldy depredations of *spatial* openness—species crossing, uncontrolled hybridization, travel encounter—through the mechanism of *temporal* closure: arresting a moment (or series of moments) in time through an act of literal freezing. But all banks—from financial institutions, to seed banks, to the "entangled bank" of orchids that once existed near Darwin's home—are only relatively stable constellations that, in a longer view, partake of a messy historical life. In thinking ecology as an active system rather than a stable thing, we simply consider critically those strategies of formalization, abstraction, and simplification that arrest change. In energetic terms, abstraction performs a cooling down or congealing of ideas, institutions, and fields. As Sara Ahmed explains, this insight is central to Marx's account of how the commodity form "congeals" (and mystifies) labor, and so "expresses the false life of the commodity rather than the breath of history."[39] How might we exchange the false life of closed ecology for the hot breath of disorderly natural-cultural histories?

In turning our attention from cold order to hot mess, we are mindful of the critical energy—extractive and otherwise—that must be brought to bear to accomplish that task. Consequently, to open up is to return to those hot and messy moments when things are more labile and alternative possibilities more live. We recognize in this openness a different way of conceiving the internal boundaries of long-standing critical debates, such as the conflict, given accent in the "V21 Manifesto," between historicism, strategic presentism, and the critical adventure.[40] Such debates rely on a fixing of position—between an old way of doing things and a new, between the old historicism and a new relation to the present—that overwrites substantial complexity as well as the porousness and richness which characterize any designated method or school of thought. Even "bland antiquarianism"—as explored in recent accounts by Noah Heringman, James Turner, and Devin Griffiths—turns out to have been (and continues to be) a vibrant and critically sophisticated set of practices that contribute substantially to the commitments, methodologies, and epistemic virtues of the modern sciences and humanities.[41]

Beyond such debates, we suggest that period-based disciplines, like Victorian studies, have always practiced a kind of open historicism as well as an open presentism and an open criticism. Our emphasis on open methodologies aligns with the impulse, if not the language, of the postcritical turn, which has proven to be not so much a rejection

of critique as a refreshed investment in the interplay of critical stances and modes of reading. Elizabeth S. Anker and Rita Felski note that critique can be considered a genre, with typical strategies of argument.[42] So-called postcritical writing might also be said to take on particular forms: for example, a more gregarious mixture of critical frames. Another form, however, is a turn to a more aphoristic, inchoate, modular, and even atomistic collection of insights in preference to coherent and focused argument. (Here we would point to the more recent work of Haraway, Morton, and Maggie Nelson.)[43] The formal principle behind such aggregation seems to be that: (1) such modes of (dis)organization invite a variety of constellation, assemblage, and mixture in the act of reading, eschewing a single unitary formation; and (2) those aggregated bits are more easily disengaged and relocated to new environments, catching fire in the mental landscapes of other writers. Engaging our critical objects and our own critical writing as part of an open ecology of relations alerts us to the wider possibilities of critical interplay.

Indeed, our concern for "ecology" demands an embrace of this interplay, insofar as we are investing our critical gambit in thinking across the putative boundary between the sciences that study ecologies and the social forms that participate in them. As Jeffrey Jerome Cohen puts it, ecological thinking is characterized by tangling engagement:

> The earth is an open and untotalizable entity, complicatedly animate, constitutively entangled within bustling economic systems that include the biological and the inorganic, matter as well as force. Affective enmeshment is not an instantiation of the pathetic fallacy but a sympathetic universalism: ecology as intimate, the planet no longer an object content in its solitude but perilous in its continuity.[44]

In order to open up this thought, we have to conceive of ecology, like the earth, as an interdisciplinary, interperspectival object. It is complex, in part because the various ways we might interact with it and understand it are also complex. We do not take this as an attack on the substantial independence of the disciplines, or a sapping of the distinction between the sciences and the humanities, so much as an acknowledgment of the open interaction that already characterizes disciplines and of the important fact that the world they address is, at least in part, always shared. We misread the relation between the sciences and the humanities, and science and literature in particular, when we assume that distinction is all or nothing, whether of method or object.[45]

In engaging ecological concepts developed within the sciences, whether to read their history critically or to place them in relation to things like novels and poems, we rely on our capacity to give due attention to the differences between scientific and literary standards of evidence and explanation without presuming radical distinction. We seek to draw analogies that open up new possibilities for transdisciplinary contact but do not overwrite one object in terms of another. We take inspiration here from the work of anthropologist Anna Tsing, which continues to demonstrate the capacity of key concepts from the environmental sciences to help us grasp the mutual implication of human society and natural systems.[46] It is in this spirit that we turn to three concepts of open ecology that are reshaping modern environmental science: edge ecology, disturbance ecology, and the microbiome.

Edge ecologies are defined by the transition zone or *ecotone* between two relatively stable habitats, and they are characterized by their various *edge effects*—from increases or decreases in biodiversity to movements of habitat boundary and transformations in the inorganic and organic composition of the environment.[47] Classically, edge effects were studied by measuring changes in specific features as one moved across the edge, whether soil pH, or the penetration of light, or in the frequency of specific flora; initially, the assumption was that such elements would change continuously in one direction (i.e., monotonically). Subsequently, researchers found that such transformations are often nonmonotonic, especially in areas characterized by high habitat fragmentation, such as those that border human developments.[48] One lesson is that, when you add humans and their artifacts to the mix, edge effects are often unpredictable. We ask, then, what would it mean to consider the edge effects that subsist at the boundary between novels, between environments, between historical periods, even between characters? In the essays that follow, Devin Griffiths, Barbara Leckie, and Daniel Williams suggest Victorian writers were deeply concerned with such edge effects and the mutual implication of urban life and rural scene.

Disturbance ecology, a relatively newer field, studies how ecologies change in response to disturbances in their conditions; classic examples include droughts and forest fires, which may or may not be due to human intervention. Two features are of particular interest. First, ecologies change in sometimes radical, nonlinear, and unpredictable ways in response to relatively small and continuous changes in conditions. Second, the diversity of the ecology sometimes relies on such disturbances, as for instance the cohabitation of megafauna or the

dependence of many complex forest environments on periodic wildfires. Along these lines, how does nineteenth-century literature document such effects and think about their possibilities? Heidi Scott has already argued that depictions of environmental transformation in nineteenth-century poetry and fiction in fact "sketched out" the narrative modes that sustain the new "chaos ecology."[49] Conversely, what would it mean for a work of literature to have a nonlinear impact on its environment, and how can it change the conditions of possibility for other literary forms? John MacNeill Miller's contribution provides one example, exploring Harriet Martineau's *Illustrations of Political Economy*, and its influence on the social problem novel, as a response to the analytical complexity of Thomas Malthus's "proto-ecology." Another way to do this, taking a cue from Eric Gidal's Romantic "unconformities," is to turn attention toward the uneven transitions between social formations —in the lives of individual people and things, or among specific economic and energy regimes—that so often motivated Victorian literature.[50] Elizabeth C. Miller, Kyle McAuley, and Michael Tondre explore in this issue how Victorian writers addressed the uneven transition from energetic regimes based on the renewable energy of wind and currents to extraction fuels like coal. Such studies indicate that any given transition is not a movement from one state to another but an uneven, unpredictable, and ongoing process of reorganization.

Finally, we are intrigued by recent research into the *microbiome*, the complex ecology of flora—bacterial, eukaryotic, and fungal—that cohabit with larger living bodies (including our own) and are critical to their health, particularly for digestion and resistance to disease. Research into the microbiome recognizes how any living body is less a closed and singular organic entity than a rich ecology, with a complex, permeable, and changing relation to its internal and external environment. Adapting to this thought is hard. Julia Adeney Thomas, musing over the problem, notes that if "each 'individual' is better understood as a collectivity of species, and 'humanity' as an archipelago of multiple, independent life-forms, . . . even imagining an archive that would allow us to tell the contingent stories of normal, healthy super-organisms is difficult" (to put it mildly).[51] Thinking about the ecology of bodies in the nineteenth century might play out at two levels. We might consider how literature of the Victorian body opens up to a more relational conception of its life and world. (And here we think Mel Chen's *Animacies*, William Cohen's *Embodied*, Elizabeth Wilson's *Gut Feminism*, and Stacy Alaimo's *Exposed* provide apt models for how this kind of dis-organized

notion of the body might operate.)[52] Alternatively, we might ask what a more microbiotic conception of literature's organic form might offer. How is a novel, for example, dependent on the operation of smaller generic and formal elements, and how do those elements mediate its relation to the wider world, whether of editors, publishers, and readers, or of genres, modes, and tropes, or of economies, nations, and temporalities? Contributions from Ella Mershon, Jeanette Samyn, and Emily Waples detail the extraordinary complexity of such interactions and the range of strategies that nineteenth-century writers and scientists, both in Europe and the United States, brought to bear in tracing their course.

To ask such questions is to round back to the problem of organic form and to situate open ecology in relation to a range of new work on "transcorporeality," from Alaimo's *Bodily Natures*, to Jane Bennett's *Vibrant Matter*, to Haraway's *When Species Meet*.[53] The evolving interests of Haraway's career, in fact, trace out this longer arc, as they developed from an early scientific history of organic thinking, to her formulation of a feminist ethic that rejected the distinction between organic and mechanical bodies, to her most recent work, which insists that new figures of thought can engage the present ecological crisis by acknowledging our imbrication within the messy environment around us.[54] In Haraway's account, the present moment is "made up of ongoing multispecies stories, and practices of becoming-with in times that remain at stake, in precarious times."[55] But Haraway also reminds us that the ability to think through such critical times was very much present in the Victorian period: she asks us, in particular, to draw from Marx and Darwin the "bravery and capacity to tell big-enough stories without determinism, teleology, and plan."[56] In Tsing's recent account, the challenge of the present is to find stories that will allow us, as she puts it in the subtitle of her study, to find "life in capitalist ruins."[57] We agree—and moreover, we endorse her tacit claim that a poem like Robert Browning's "Love among the Ruins" can help us tell them.

3. A Manyfesto for Open Ecologies

Manifestoes imply a strong teleology and a singular program: elements incompatible with open ecologies. We use the term somewhat waggishly: here follows a *many*festo of sorts, calculated to open up our own practices of naming, categorizing, and metaphor-making as scholarly ecocritics, a sounding out of new approaches rather than an exhaustive catalog.

1. Open ecologies are *situational*: rather than focusing on a single actor, species, or stratum of the environment, they are defined by the interaction of diverse inorganic as well as living components.
2. They are *compositional*: they are not organic units or holistic cosmologies but instead involve multiple actors with differing interests.
3. They are *nonprogrammatic*: their forms are emergent rather than predefined or autotelic; their patterns and futures are unpredictable, chancy.
4. They are *abnatural* in the sense defined by Jesse Oak Taylor: they are characterized by uncanny interpenetrations of the manufactured and the other-than-human.[58]
5. They are marked by *uneven* distributions of power; they demand that we reconceptualize modes of violence, from the environmentalism of the poor and the ecologies of race to the reframing of toxicity, threat, and predation.
6. They are neither preconcerted harmonies nor utopias.

In sketching this manyfesto, we advocate moving beyond systems thinking, as developed in cybernetics and systems theory. To think in terms of system, as Clifford Siskin persuasively argues, is to mobilize a totalizing genre, one that assumes the conformity and replicability of a specific pattern and the consistency of its operation.[59] One influential definition of life itself, first proposed in 1972 by Chilean biologists Humberto Maturana Romesín and Francisco Varela, is an autopoietic system, one capable of reproducing and maintaining itself.[60] An example of such a system is the idealized biological cell: the structures of a cell actually *produce* the components that, in turn, continue to maintain the organized, bounded structure that produces these components. The autopoietic conceptualization of life emphasizes its cybernetic qualities: its self-maintenance, closure, and replicability. In contrast, an allopoietic system, such as a factory, uses raw materials (or components) to generate an organized system (such as a smartphone) that is *different* from itself. Of course, if we extend the boundary or frame of such a system enough to encompass the environment, natural resources, and supply chain outside the factory, then we might eventually reach a level of description that constitutes another autopoietic system. We can think of James Lovelock's "Gaia" model of the 1970s, which argues that the entire Earth functions as a self-regulating, living system, as the result of this

kind of expansive reframing. But ultimately, we argue, autopoiesis is a basic misreading of any system, insofar as it ignores how all systems are dependent upon and exquisitely sensitive to their wider conditions. Both the fate of the world and the fate of the cell are essentially contingent upon these wider conditions, and their histories reveal the chancy nature of that interaction. This is the essence of the ecological thought.[61]

Open ecologies therefore challenge the reductive fantasy of mainstream sustainability, which envisions a self-perpetuating, steady-state economic system that meets "the needs of the present without compromising the ability of future generations to meet their own needs."[62] Such models dream of continual (another word for "sustainable") growth and development without a sober rethinking of the role that several centuries of imperial capitalism have played in the production of anthropogenic climate change. They also imply a vantage from which to see and calculate all the possible external costs (in energy, in carbon) that accrue with each decision about production and consumption—a perceptual apparatus, as George Eliot would be the first to remind us, both spatially and temporally impossible. Allan Stoekl has dubbed this vertiginous act of imagination the "sublime of externalities": "the impossibility of calculating externalities is akin to the withdrawal of God: if we really could calculate externalities all would be possible, foreseeable; without it, we walk through the desert, yearning for the moment of deliverance and 'closure.'"[63]

Rather than replay the exhaustive (and exhausting) acts of recuperation required by systems thinking, the essays in this volume turn to ecologies of the nineteenth century that honor possibilities of excessiveness and renunciation. Open ecologies are excessive in the literal sense that they exceed the bounds of totalizing human perception. They are also excessive in that they acknowledge the inevitability of energy expenditure—waste—beyond their notional boundaries. In *The Accursed Share*, his whimsical, challenging rewriting of political economy, Georges Bataille sketches the deeper connection between energy and excess: "The living organism . . . ordinarily receives more energy than is necessary for maintaining life; the excess energy (wealth) can be used for the growth of a system (e.g., an organism); if the system can no longer grow, or if the excess cannot be completely absorbed in its growth, it must necessarily be lost without profit; it must be spent, willingly or not, gloriously or catastrophically."[64]

This is what we mean by saying that open ecologies are not utopian: they are not autopoietic. They do not envision systems or worlds in which

surplus is metabolized so as to nourish and maintain the system in a potentially infinite series of recuperative acts. Here we find it useful to invoke the distinction Fredric Jameson draws between utopian *program* and utopian *impulse*: the former refers to "deliberate and fully self-conscious" schemas of social reform such as intentional communities and revolutionary praxis, whereas the latter refers to "an allegorical process in which various Utopian figures seep into the daily life of things."[65] Utopian fiction, we believe, is a genre designed to test the necessary distance between impulse and program. To be open is to have gaps. It is telling, we believe, that utopian fiction, as a literature of closure, emphasizes the possibilities of error, of having holes.[66] That such novels disappoint their autopoietic ambition is less a mark of failure than of an extraordinary sensitivity to the reality of complex systems—natural and cultural—in all their energetic, environmental, and historical complication.

Although it rethinks and complicates utopianism in crucial ways, an open ecological perspective is not marked by despair. But it is also wary of a naïve optimism and the narratives of progress and freedom that support it. The tense relation between hope and naïve freedom is at the heart of recent debates over queer futurity and ecocritical theory. On one hand, Lee Edelman has famously argued that modern notions of political futurity are bound up in a conception of heterosexual reproduction that is often explicitly queer- (and, we would add, trans-) phobic. In many ways, Timothy Morton's subsequent proposal for a "queer ecology" that organizes "against compulsory nature" would seem to be aligned with Edelman's critique (as well as our own search for an open ecology): it calls for "an intimacy [that] necessitates thinking and practicing weakness rather than mastery, fragmentariness rather than holism, and deconstructive tentativeness rather than aggressive assertion."[67] And yet, as Jordy Rosenberg has recently argued, the material optimism of Morton's account of ecological intimacy—"embracing silicon as well as carbon"—threatens to reconstitute, at a molecular level, the "touchy-feely ideologies of embeddedness" he dismisses.[68]

In a powerful critique that reads Morton's queer ecology as part of a wider "molecularization of sexuality," Rosenberg explores this brand of optimism as a wider problem for the ontological turn. His account, drawing on Andrea Smith and Scott Morgensen's critique of the "settler rationality" embedded in much white queer scholarship, argues that the abstraction of ontology, like the abstraction of a "queerness" from specific subjects, erases the violent history from which such formations emerge, especially "the displacement and extermination of indigenous

people from the settler colony."[69] We seek to avoid a version of open ecology that, as Rosenberg puts it, projects a "primitivist fantasy" into the material world, and so "reiterates a version of . . . settler rationality."

For this reason, we detail how some organicist versions of ecological thought were modeled on the invasion and transformation of already occupied spaces. At the same time, we excavate alternative accounts of the ecological, ones that allow us to tell histories of violence and power. We require more detailed histories of ecological thought, accounts that take up histories of race and empire, in order to confront the long-standing dilemma of how "natural" collectives are articulated to, and implicated in, the economic and social collectives of industrial modernity.

In place of optimism, or a defined utopian program, we seek an ecologically utopian impulse. We take inspiration in the ongoing recuperation of Bloch's possibilism, a future-oriented hope for a better world found in a remarkable array of cultural formations such as music, architecture, popular culture, myths, daydreams, and medicine.[70] This hopefulness has been taken up and developed in recent years in a strain of queer theory most fully articulated in José Esteban Muñoz's influential study *Cruising Utopia*. For Muñoz, queerness is inherently utopian in that it constitutes "a structured and educated mode of desiring that allows us to see and feel beyond the quagmire of the present."[71] Yet such hope is not naïve or quietist; it does not partake of an "elite homosexual evasion of politics."[72] Similarly, the invocation and even celebration of open ecologies may be hopeful without evading politics. We hold that a more detailed account of nineteenth-century objects (both natural and cultural) will bring the complexity of such politics to the fore and aid us in imagining a less harmful future.

Such utopianism may persist even in the face of—indeed, as a result of—an understanding of the limits of open ecological models. In her recent study *Utopia, Limited*, Anahid Nersessian locates in the nineteenth century a literary mode that demonstrates the "desirability of constraint, whether economic, material, or affective" as a way to open up alternative possibilities for the future, a type of attenuated utopian impulse that remains a viable response to the "foreshortening of planetary life."[73] The tacit plea of such a reframing—one that we find not only in Nersessian but also in recent work by Haraway, Morton, Heise, Roy Scranton, and many eco-theorists—is that we vitiate expectations, curb and rechannel desire, adjust ourselves to the idea of a more tenuous future on a more fragile planet than we had bargained for: a rejiggering of the reality principle for a new age.[74] While the idea of turning

to the Victorian literary archive for such models of restraint might at first blush seem perverse, we believe that the essays in this volume demonstrate the rich and complex ways in which our forebears grappled with competing ecological models, and that, paradoxically, open ecologies can furnish us with more flexible ways of thinking suited to living in the Anthropocene.

Notes

1. Morton, "Guest Column," 276. Morton really has it in for organicism lately—referring in *The Ecological Thought*, for example, to the "touchy-feely, ultimately authoritarian organicism upon which claims of interconnectedness are usually built." The particular critique of organicism as politically suspect can be traced back at least as far as Raymond Williams. Timothy Morton, *The Ecological Thought*, 23.
2. Eliot, *Middlemarch*, 141, 832.
3. D. Miller, "Narrative and Its Discontents," 223.
4. "Middlemarch," 137.
5. Eliot, *Middlemarch*, 148.
6. Beer, *Darwin's Plots*, 157.
7. Eliot, *Middlemarch*, 346, 442.
8. Eliot, *Middlemarch*, 141.
9. Stauffer, "Haeckel, Darwin, and Ecology."
10. Beer, *Darwin's Plots,* 101.
11. The literature on Romantic organicism is vast, from early discussions by A. O. Lovejoy and René Wellek to more recent studies by Robert Richards, Denise Gigante, and Jennifer Mensch. Lovejoy, "The Meaning of Romanticism for the Historian of Ideas"; Wellek, "The Concept of 'Romanticism' in Literary History II"; Richards, *The Romantic Conception of Life*; Gigante, *Life*; Mensch, *Kant's Organicism*.
12. Marx, "Introduction to *A Contribution to the Critique of Political Economy*," 26.
13. See, for example, Jennifer Mensch's recent monograph, *Kant's Organicism*: "Darwin's idea regarding the 'common descent' of all species from one origin—Kant's womb of nature, so to speak—opened up an epistemic framework for interpreting nature on all its levels. . . . Descent with modification, as an idea for interpreting the interconnection of nature, was also intended as a description

of the organic means by which such interconnection had occurred. . . . [For Goethe] the archetypal ideas served as the means for teaching the scientist to see the identity of the real and the ideal, an act Goethe termed 'intuitive perception,' but when reading Darwin one had to be continually reminded that the idea of natural affinity was something that had been added by the investigator as a means for connecting a merely accumulated set of empirical facts. As Darwin himself would repeatedly remind readers of the *Origin of Species*, the idea of common descent simply put the facts together in a more satisfying manner than did the reigning theory regarding God's special creation of the species lines." Mensch, *Kant's Organicism*, 153.

14. For an early discussion of the influence of Spencer's organicism on George Eliot, see, for example, Graver, *George Eliot and Community*.
15. As Donald Worster notes of late twentieth-century environmentalists, "Though they are quick to deny a belief in any nonmaterial or vitalist force in the organism or in the ecosystem, ecologists frequently argue that breaking nature down in to its atomistic parts cannot result in a true understanding of the whole." Worster, *Nature's Economy*, 21–22.
16. Kucich, "Modernization and the Organic Society."
17. Beer, *Darwin's Plots*, 101.
18. Matteo Pasquinelli has also detailed the influence of organicism on Foucauldian archaeology. In his illuminating account, which reviews Georges Canguilhem's organic revision of scientific history and the distribution of control within natural and social systems, such organicism was crucial in shaping Michel Foucault's thinking, especially his conception of the dispositif as a quasibiological normalization. While recognizing that this is a complicated question, we might also invoke the work of Martin Heidegger here as an important theoretical precursor, particularly in his emphasis on the self-realization of nature in his later philosophy (e.g., "Building Dwelling Thinking"). Pasquinelli, "What an Apparatus Is Not."
19. Poovey, "The Model System of Contemporary Literary Criticism"; Freedgood, "How the Victorian Novel Got Realistic, Reactionary, and Great"; A. Miller, "Dombey's Perspective."
20. Wellek and Warren, *Theory of Literature*, 24.
21. One important exception to the continued organicist trend of much recent Anthropocene theory is Jeremy Davies's *The Birth of the Anthropocene*. See also Moore, *Capitalism in the Web of Life*, 3; Malm, *Fossil Capital*, 280.

22. Malm, *Fossil Capital,* 281.
23. Guha and Alier, *Varieties of Environmentalism*; Nixon, "Environmentalism and Postcolonialism"; Nixon, *Slow Violence.*
24. Grove, *Green Imperialism*; Anker, *Imperial Ecology*; Endersby, *Imperial Nature*; Delbourgo, *Collecting the World.*
25. Whyte, "Indigenous Climate Change Studies"; Pickerill, "Black and Green."
26. Nishime and Williams, "Introduction," 4.
27. Carroll, *Empire of Air and Water*, 7.
28. Hensley and Steer, *Ecological Form*, 4, 8.
29. Pierce, "'A Great Complication of Circumstances.'"
30. Translated in Stauffer, "Haeckel, Darwin, and Ecology," 140. For a discussion of related uses of the term "household" in Ruskin and his contemporaries, see Albritton and Albritton Jonsson, *Green Victorians.*
31. Clements, *Research Methods in Ecology*, 199.
32. Clements, *Research Methods in Ecology,* 220, 199.
33. Phillips, *The Biotic Community*, 20 (emphasis ours).
34. For more on the continuing interplay between environmental and cultural models of environmental succession, change, and invasion in South Africa, see Comaroff and Comaroff, "Naturing the Nation"; Lidström et al., "Invasive Narratives and the Inverse of Slow Violence."
35. Hensley and Steer, *Ecological Form*, 4.
36. Menely and Taylor, *Anthropocene Reading*, 4.
37. E. Miller, "Ecology," 5.
38. Carrington, "Arctic Stronghold."
39. Ahmed, *Queer Phenomenology*, 164.
40. "Manifesto of the V21 Collective."
41. Heringman, *Sciences of Antiquity*; Turner, *Philology*; Griffiths, *The Age of Analogy.*
42. Anker and Felski, "Introduction," 1–4.
43. Haraway, *Staying with the Trouble*; Morton, *Hyperobjects*; Nelson, *The Argonauts.*
44. J. Cohen, *Stone,* 65.
45. Here we disagree with the argument, advanced most recently by Jonathan Kramnick and Anahid Nersessian ("Form and Explanation"), that forms of explanation and objects of inquiry align neatly with disciplinary distinctions.
46. Tsing, *The Mushroom at the End of the World.*

47. Laurance and Yensen, "Predicting the Impacts."
48. See both Carolina Murcia's prediction of this effect and proof of such behavior by Golden and Crist. Murcia, "Edge Effects in Fragmented Forests"; Golden and Crist, "Experimental Effects"
49. Scott, *Chaos and Cosmos*.
50. Gidal, *Ossianic Unconformities*.
51. Thomas, "History and Biology in the Anthropocene," 1595.
52. W. Cohen, *Embodied*; Wilson, *Gut Feminism*; Alaimo, *Exposed*.
53. Alaimo, *Bodily Natures*; Bennett, *Vibrant Matter*; Haraway, *When Species Meet*.
54. Haraway, *Crystals, Fabrics, and Fields*; Haraway, "A Cyborg Manifesto"; Haraway, *Staying with the Trouble*.
55. Haraway, *Staying with the Trouble*, 55.
56. Haraway, *Staying with the Trouble*, 50.
57. Tsing, *The Mushroom at the End of the World*.
58. Taylor, *The Sky of Our Manufacture*, 23.
59. Siskin, *System*.
60. Maturana Romesín and Varela, *Autopoiesis and Cognition*.
61. Though systems thinking sets aside the language of life in favor of mechanism, it retains a commitment to the basic integrity of structure and function that characterizes all organic thought. As Immanuel Wallerstein bluntly puts it, world systems "ha[ve] the characteristics of an organism" (347). For this reason, open ecologists look beyond the systems turn of twentieth-century thinking, including Arthur Tansley's substitution of "ecosystem" for the ecologies of Clements and Phillips, the world-systems theory of both Wallerstein and Giovanni Arrighi, and the recent articulation of cybernetics to "non-modern ecological rationality" represented by "general" ecology. Tansley, "Use and Abuse"; Wallerstein, *The Modern World-System I*; Arrighi, *The Long Twentieth Century*; Hörl, *General Ecology*, 6.
62. The quotation is from the United Nations' 1987 report *Our Common Future*, informally known as the Brundtland Report (chap. 2 [n.p.]). For fuller discussion of the problems with the sustainability concept, see Alaimo, "Sustainable This, Sustainable That"; Davies, *The Birth of the Anthropocene*; Medovoi, "Contribution to the Critique"; Stoekl, "'After the Sublime.'" For an overview of the history of the concept in the nineteenth century, see Kreisel, "Sustainability."
63. Stoekl, "'After the Sublime,'" 44.
64. Bataille, *The Accursed Share,* 21.

65. Jameson, *Archaeologies of the Future*, 3, 5. Jameson takes the concept of utopian impulse from Ernst Bloch.
66. Nineteenth-century utopias tend to acknowledge, whether deliberately or unconsciously, the impossibility of autopoietic recuperations. Samuel Butler's *Erewhon*, Edward Bulwer-Lytton's *The Coming Race*, and James De Mille's *A Strange Manuscript Found in a Copper Cylinder*, to name a few examples, express coded anxieties about contemporary economic relations, and the possibility of "sustainability," through such images as famine, plague, and cannibalism. Even William Morris's Nowhere depends on emigration—the ejection (or waste) of surplus population—to prop up its seemingly hermetic labor system: "Those lands which were once the colonies of Great Britain . . . are now and will be for a long while a great resource to us." Morris, *News from Nowhere*, 84–85.
67. Morton, "Queer Ecology," 278.
68. Rosenberg, "The Molecularization of Sexuality," 277, 278.
69. Here Rosenberg quotes Smith: "[Q]ueer politics and consciousness often rely on a primitivist notion of the indigenous as the space of free and unfettered sexuality that allows the white queer citizen to remake his or her sexuality. However, once this sexual praxis is engaged, it does not translate into solidarity with indigenous peoples' land struggles." This form of critique "disguises the fact that the queer, postcolonial, or environmentally conscious subject is simultaneously a settler subject." Smith, "Queer Theory and Native Studies," 52. Quoted in Rosenberg, "The Molecularization of Sexuality."
70. Bloch, *The Principle of Hope*.
71. Muñoz, *Cruising Utopia*, 1.
72. Muñoz, *Cruising Utopia*, 3.
73. Nersessian, *Utopia, Limited,* 12. Nersessian notes that "Poiesis, the Greek word for making or shaping, entails loss, but not necessarily of a kind that begs to be rendered in pained or melodramatic terms. On the contrary, Romanticism teaches that the abdication of possibilities can furnish us with equanimity just as it can furnish us with art" (2).
74. See, for example, Ursula Heise's recent call to "desentimentaliz[e] extinction"; Timothy Morton's warning against "cheering yourself up too fast"; and Roy Scranton's elegiac description of "learning to die in the Anthropocene." Donna Haraway exhorts us most explicitly: "In urgent times, many of us are tempted to address trouble in terms

of making an imagined future safe, of stopping something from happening that looms in the future, of clearing away the present and the past in order to make futures for coming generations. Staying with the trouble does not require such a relationship to times called the future." Heise, *Imagining Extinction*, 76; Morton, "The Dark Ecology of Elegy," 269; Scranton, *Learning to Die in the Anthropocene*; Haraway, *Staying with the Trouble*, 1.

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Works Cited

Ahmed, Sara. *Queer Phenomenology: Orientations, Objects, Others*. Durham: Duke University Press, 2006.

Alaimo, Stacy. *Bodily Natures: Science, Environment, and the Material Self*. Bloomington: Indiana University Press, 2010.

———. *Exposed: Environmental Politics and Pleasures in Posthuman Times*. Minneapolis: University of Minnesota Press, 2016.

———. "Sustainable This, Sustainable That: New Materialisms, Posthumanism, and Unknown Futures." *PMLA* 127, no. 3 (2012): 558–64.

Albritton, Vicky, and Fredrik Albritton Jonsson. *Green Victorians: The Simple Life in John Ruskin's Lake District*. Chicago: University of Chicago Press, 2016.

Anker, Elizabeth S., and Rita Felski. *Critique and Postcritique*. Durham: Duke University Press, 2017.

Anker, Peder. *Imperial Ecology: Environmental Order in the British Empire, 1895–1945*. Cambridge, Mass.: Harvard University Press, 2001.

Arrighi, Giovanni. *The Long Twentieth Century: Money, Power, and the Origins of Our Times*. New York: Verso, 2010.

Bataille, Georges. *The Accursed Share: An Essay on General Economy*. 2 vols. New York: Zone Books, 1988.

Beer, Gillian. *Darwin's Plots: Evolutionary Narrative in Darwin, George Eliot and Nineteenth-Century Fiction*. 2nd ed. Cambridge: Cambridge University Press, 2000.

Bennett, Jane. *Vibrant Matter: A Political Economy of Things*. Durham: Duke University Press, 2010.

Bloch, Ernst. *The Principle of Hope*. Translated by Neville Plaice, Stephen Plaice, and Paul Knight. 3 vols. Cambridge, Mass.: MIT Press, 1986.

Carrington, Damian. "Arctic Stronghold of World's Seeds Flooded after Permafrost Melts." *The Guardian*, May 19, 2017.

Carroll, Siobhan. *An Empire of Air and Water: Uncolonizable Space in the British Imagination, 1750–1850*. Philadelphia: University of Pennsylvania Press, 2015.
Clements, Frederic E. *Research Methods in Ecology*. Lincoln: University Publishing Co., 1905.
Cohen, Jeffrey Jerome. *Stone: An Ecology of the Inhuman*. Minneapolis: University of Minnesota Press, 2015.
Cohen, William A. *Embodied: Victorian Literature and the Senses*. Minneapolis: University of Minnesota Press, 2008.
Comaroff, Jean, and John Comaroff. "Naturing the Nation: Aliens, Apocalypse and the Postcolonial State." *Journal of Southern African Studies* 27, no. 3 (2001): 627–51.
Davies, Jeremy. *The Birth of the Anthropocene*. Berkeley: University of California Press, 2016.
Delbourgo, James. *Collecting the World: Hans Sloane and the Origins of the British Museum*. Cambridge, Mass.: Harvard University Press, 2017.
Eliot, George. *Middlemarch*. Edited by Rosemary Ashton. London: Penguin, 1994.
Endersby, Jim. *Imperial Nature: Joseph Hooker and the Practices of Victorian Science*. Chicago: University of Chicago Press, 2008.
Freedgood, Elaine. "How the Victorian Novel Got Realistic, Reactionary, and Great." Interdisciplinary Nineteenth-Century Studies Conference, Asheville, North Carolina, March 10–13, 2016.
Gidal, Eric. *Ossianic Unconformities: Bardic Poetry in the Industrial Age*. Charlottesville: University of Virginia Press, 2015.
Gigante, Denise. *Life: Organic Form and Romanticism*. New Haven: Yale University Press, 2009.
Golden, David M., and Thomas O. Crist. "Experimental Effects of Habitat Fragmentation on Rove Beetles and Ants: Patch Area or Edge?" *Oikos* 90, no. 3 (2000): 525–38.
Graver, Suzanne. *George Eliot and Community: A Study in Social Theory and Fictional Form*. Berkeley: University of California Press, 1984.
Griffiths, Devin. *The Age of Analogy: Science and Literature between the Darwins*. Baltimore: Johns Hopkins University Press, 2016.
Grove, Richard. *Green Imperialism: Colonial Expansion, Tropical Island Edens, and the Origins of Environmentalism, 1600–1860*. Cambridge: Cambridge University Press, 1995.
Guha, Ramachandra, and Juan Martínez Alier. *Varieties of Environmentalism: Essays North and South*. London: Earthscan, 1997.
Haraway, Donna J. *Crystals, Fabrics, and Fields: Metaphors of Organicism in Twentieth-Century Developmental Biology*. New Haven: Yale University Press, 1976.
———. "A Cyborg Manifesto: Science, Technology, and Socialist-Feminism in the Late Twentieth Century." In *Simians, Cyborgs, and Women: The Reinvention of Nature*, 149–81. New York: Routledge, 1991.
———. *Staying with the Trouble: Making Kin in the Chthulucene*. Durham: Duke University Press, 2016.
———. *When Species Meet*. Minneapolis: University of Minnesota Press, 2008.

Heidegger, Martin. "Building Dwelling Thinking." In *Poetry, Language, Thought*, translated by Albert Hofstadter, 141–59. New York: Harper Collins, 2001.
Heise, Ursula K. *Imagining Extinction: The Cultural Meanings of Endangered Species*. Chicago: University of Chicago Press, 2016.
Hensley, Nathan K., and Philip Steer. *Ecological Form: System and Aesthetics in the Age of Empire*. New York: Fordham University Press, 2018.
Heringman, Noah. *Sciences of Antiquity: Romantic Antiquarianism, Natural History, and Knowledge Work*. Oxford: Oxford University Press, 2013.
Hörl, Erich, ed. *General Ecology: The New Ecological Paradigm*. London: Bloomsbury Academic, 2017.
Jameson, Fredric. *Archaeologies of the Future: The Desire Called Utopia and Other Science Fictions*. London: Verso, 2007.
Kramnick, Jonathan, and Anahid Nersessian. "Form and Explanation." *Critical Inquiry* 43, no. 3 (2017): 650–69.
Kreisel, Deanna K. "Sustainability." *Victorian Literature and Culture* 46, nos. 3–4 (2018): 895–900.
Kucich, John. "Modernization and the Organic Society." In *The Oxford History of the Novel in English*, edited by Patrick Parrinder, 3:343–60. Oxford: Oxford University Press, 2011.
Laurance, William F., and Eric Yensen. "Predicting the Impacts of Edge Effects in Fragmented Habitats." *Biological Conservation* 55, no. 1 (1991): 77–92.
Lidström, Susanna, Simon West, Tania Katzschner, M. Isabel Pérez-Ramos, and Hedley Twidle. "Invasive Narratives and the Inverse of Slow Violence: Alien Species in Science and Society." *Environmental Humanities* 7, no. 1 (2015): 1–40.
Lovejoy, Arthur O. "The Meaning of Romanticism for the Historian of Ideas." *Journal of the History of Ideas* 2, no. 3 (1941): 257–78.
Malm, Andreas. *Fossil Capital: The Rise of Steam Power and the Roots of Global Warming*. New York: Verso, 2016.
"Manifesto of the V21 Collective." *V21* (blog), http://v21collective.org/manifesto-of-the-v21-collective-ten-theses (accessed August 23, 2018).
Marx, Karl. "Introduction to A Contribution to the Critique of Political Economy." In *Karl Marx: 1857–61*, vol. 28 of *The Collected Works*, by Karl Marx and Frederick Engels, 17–48. New York: International Publishers, 1987.
Maturana Romesín, Humberto, and Francisco J. Varela. *Autopoiesis and Cognition: The Realization of the Living*. Boston: D. Reidel, 1980.
Medovoi, Leerom. "A Contribution to the Critique of Political Ecology: Sustainability as Disavowal." *New Formations* 69 (2010): 129–43.
Menely, Tobias, and Jesse Oak Taylor, eds. *Anthropocene Reading: Literary History in Geologic Times*. University Park: Pennsylvania State University Press, 2017.
Mensch, Jennifer. *Kant's Organicism: Epigenesis and the Development of Critical Philosophy*. Chicago: University of Chicago Press, 2015.
"Middlemarch. By George Eliot. Book II—Old and Young." *The Athenaeum* 2310 (February 3, 1872).
Miller, Andrew H. "Dombey's Perspective." The Dickens Project, Santa Cruz, California, July 2016.

Miller, David Albert. "*Narrative and Its Discontents: Jane Austen, George Eliot, Stendhal.*" PhD diss., Yale University, 1977.
Miller, Elizabeth Carolyn. "Ecology." *Victorian Literature and Culture* 46, nos. 3–4 (2018): 653–56.
Moore, Jason W. *Capitalism in the Web of Life: Ecology and the Accumulation of Capital.* New York: Verso, 2015.
Morris, William. *News from Nowhere.* Edited by David Leopold. Oxford: Oxford University Press, 2009.
Morton, Timothy. "The Dark Ecology of Elegy." In *The Oxford Handbook of the Elegy*, edited by Karen A. Weisman, 251–71. Oxford: Oxford University Press, 2010.
———. *The Ecological Thought.* Cambridge, Mass.: Harvard University Press, 2010.
———. "Guest Column: Queer Ecology." *PMLA* 125, no. 2 (2010): 273–82.
———. *Hyperobjects: Philosophy and Ecology After the End of the World.* Minneapolis: University of Minnesota Press, 2013.
Muñoz, José Esteban. *Cruising Utopia: The Then and There of Queer Futurity.* New York: New York University Press, 2009.
Murcia, Carolina. "Edge Effects in Fragmented Forests: Implications for Conservation." *Trends in Ecology & Evolution* 10, no. 2 (1995): 58–62.
Nelson, Maggie. *The Argonauts.* Minneapolis: Graywolf, 2016.
Nersessian, Anahid. *Utopia, Limited: Romanticism and Adjustment.* Cambridge, Mass.: Harvard University Press, 2015.
Nishime, LeiLani, and Kim D. Hester Williams. "Introduction: Why Racial Ecologies?" In *Racial Ecologies*, edited by LeiLani Nishime and Kim D. Hester Williams, 3–15. Seattle: University of Washington Press, 2018.
Nixon, Rob. "Environmentalism and Postcolonialism." In *Postcolonial Studies and Beyond*, edited by Ania Loomba and Suvir Kaul, 233–51. Durham: Duke University Press, 2005.
———. *Slow Violence and the Environmentalism of the Poor.* Cambridge, Mass.: Harvard University Press, 2011.
Our Common Future: Report of the World Commission on Environment and Development, 1987, UN Documents, http://www.un-documents.net/ocf-02.htm#IV.
Pasquinelli, Matteo. "What an Apparatus Is Not: On the Archaeology of the Norm in Foucault, Canguilhem, and Goldstein." *Parrhesia* 22 (2015): 79–89.
Phillips, John F. V. *The Biotic Community.* Cambridge: Cambridge University Press, 1931.
Pickerill, Jenny. "Black and Green: The Future of Indigenous-Environmentalist Relations in Australia." *Environmental Politics* 18 (2018): 1–24.
Pierce, Trevor. "'A Great Complication of Circumstances': Darwin and the Economy of Nature." *Journal of the History of Biology* 43, no. 3 (2010): 493–528.
Poovey, Mary. "The Model System of Contemporary Literary Criticism." *Critical Inquiry* 27 (2001): 408–38.
Richards, Robert J. *The Romantic Conception of Life: Science and Philosophy in the Age of Goethe.* Chicago: University of Chicago Press, 2002.
Rosenberg, Jordana (Jordy). "The Molecularization of Sexuality: On Some Primitivisms of the Present." *Theory & Event* 17, no. 2 (2014), https://muse.jhu.edu/article/546470.

Scott, Heidi C. M. *Chaos and Cosmos: Literary Roots of Modern Ecology in the British Nineteenth Century*. University Park: Pennsylvania State University Press, 2015.
Scranton, Roy. *Learning to Die in the Anthropocene: Reflections on the End of a Civilization*. San Francisco: City Lights Books, 2015.
Siskin, Clifford. *System: The Shaping of Modern Knowledge*. Cambridge, Mass.: MIT Press, 2017.
Smith, Andrea. "Queer Theory and Native Studies: The Heteronormativity of Settler Colonialism." *GLQ* 16, nos. 1–2 (2010): 41–68.
Stauffer, Robert C. "Haeckel, Darwin, and Ecology." *Quarterly Review of Biology* 32, no. 2 (1957): 138–44.
Stoekl, Allan. "'After the Sublime,' After the Apocalypse: Two Versions of Sustainability in Light of Climate Change." *Diacritics* 41, no. 3 (2013): 40–57.
Tansley, A. G. "The Use and Abuse of Vegetational Concepts and Terms." *Ecology* 16, no. 3 (1935): 284–307.
Taylor, Jesse Oak. *The Sky of Our Manufacture: The London Fog in British Fiction from Dickens to Woolf*. Charlottesville: University of Virginia Press, 2016.
Thomas, Julia Adeney. "History and Biology in the Anthropocene: Problems of Scale, Problems of Value." *American Historical Review* 119, no. 5 (2014): 1587–1607.
Tsing, Anna Lowenhaupt. *The Mushroom at the End of the World: On the Possibility of Life in Capitalist Ruins*. Princeton: Princeton University Press, 2017.
Turner, James. *Philology: The Forgotten Origins of the Modern Humanities*. Princeton: Princeton University Press, 2014.
Wallerstein, Immanuel. *The Modern World-System I: Capitalist Agriculture and the Origins of the European World-Economy in the Sixteenth Century, with a New Prologue*. Berkeley: University of California Press, 2011.
Wellek, René. "The Concept of 'Romanticism' in Literary History II: The Unity of European Romanticism." *Comparative Literature* 1, no. 2 (1949): 147–72.
Wellek, René, and Austin Warren. *Theory of Literature*. London: Jonathan Cape, 1966.
Whyte, Kyle. "Indigenous Climate Change Studies: Indigenizing Futures, Decolonizing the Anthropocene." *English Language Notes* 55, nos. 1/2 (2017): 153–62.
Wilson, Elizabeth A. *Gut Feminism*. Durham: Duke University Press, 2015.
Worster, Donald. *Nature's Economy: A History of Ecological Ideas*. 2nd ed. Cambridge: Cambridge University Press, 1994.