how the earth feels

geological fantasy in the nineteenth-century united states

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FOR Z

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introduction the "fashionable science"

To the philosopher, geology is of incalculable value. No science digs deeper, few soar higher. Do you want a foundation for your philosophy, deep, abiding: here you may find it. For want of it, our so-called philosophies are castles of cards, erected today, blown down to-morrow. If history, written by the fallible finger of man, and extending over but two or three thousand years, is so important that men wisely spend a lifetime in its study, how much more important a history of events transpiring during countless ages, written by impartial historians, who have infallibly recorded the facts of the past! —**William Denton, *Our Planet, Its Past and Future* (1868)**

GEOLOGY IS NOT CONVENTIONALLY UNDERSTOOD as one of the "human sciences." Yet it has long possessed the ability to organize humans in relation to the worlds it describes. This has become clear in contemporary debates about the Anthropocene, a proposed new entry in the geochronological time chart that would recognize the planetary and durable impact of human geological agency.[1] In the two decades or so since the emergence of the term, the Anthropocene has provided many a thinker with the foundation for queries about what this epoch might reveal us to be, grounding speculation about what it means to be "geologically human."[2] But while the Anthropocene conversation is a recent development, the condition itself is nothing new; we have been geologically human for quite some time now. This is not merely true in a physical sense, with respect to the geologic matter dispersed through our bodies, such as the bones which, in Manuel de Landa's poetic formulation, "never forget [their] mineral origins."[3] It is also true economically,

ideologically, and, as William Denton would have it, philosophically. Indeed, geology has actively entwined itself with not only *what* but also *who* we understand to be "human" ever since its emergence as a modern science in the late eighteenth century.

Denton, a British-born, US-based geologist and lecturer, was far from alone, in his day, in his enthusiasm for geology. By 1834, the *Knickerbocker*, an influential New York–based literary magazine, could call the study of the earth and its history "the fashionable science of the day."[4] Articles on the latest geological discoveries circulated in popular periodicals while geological cabinets, museum displays, and lectures attracted substantial public audiences eager to learn about the latest theories of the earth's formation, spread across a backdrop of countless eons. Curious arrangements of extinct megafauna and flora arrested readers with their uncanny appeal—alien to, and yet not entirely separable from, the world in which those readers lived. Fossils and other earthly matter appeared, in Ralph O'Connor's apt phrase, as "sublime relics of a legendary past" preserved in the rock record,

Figure I.1. Henry de la Beche, *Duria Antiquior* (1830). Source: Wikimedia Commons.

imbuing human history with a timescale that made room for thrillingly different forms of being.[5]

The novelty of the science lay not only in the bizarre life-forms and strange, now-vanished worlds it disclosed but also in its insistence on the sheer immensity of the planetary past itself, an insistence that constituted a wholly new understanding of time. By the start of the nineteenth century, geology had revised the scientific understanding of the scale of earth's history, asserting that it occupied not the six thousand years allotted in the Bible, but untold millions; as the Scottish scientist James Hutton affirmed in his 1788 "Theory of the Earth": "The result, therefore, of our present inquiry is, that we find no vestige of a beginning,—no prospect of an end."[6] Such observations left Hutton's contemporaries feeling "giddy [at] looking so far into the abyss of time."[7] The expanse of ages then referred to as the planet's "antiquity"—what we now know, in John McPhee's evocative term, as *deep time*—was both transfixing and unsettling, and its dizzying impact was not entirely dissipated by nineteenth-century geologists' dedication to filling in its outlines. Geological timescales mocked human achievements, collapsing the entirety of human history into a brief, insignificant moment. As Denton declared, "We speak of old English castles . . . [and] the Pyramids of Egypt. . . . Yet what is the age of [these structures] compared with the age of the world? They are the veriest babes of time, the ephemera of a summer's day: they resemble the bubbles that float on Niagara's stream, glittering for an instant on its turbulent breast, then disappearing forever."[8] The earth's antiquity gave a new dimension to the traditional respect for the planet's unparalleled power to destroy. The excavation of the remains of Pompeii and Herculaneum, thriving cities buried by the massive explosion of Mount Vesuvius in 79 CE, kept before the eyes of eighteenth- and nineteenth-century audiences a reminder that the most cherished human constructions could be brought down in an instant.[9] The belief that such events were animated by supernatural forces intending to punish humans—an idea which still shadowed some popular Victorian representations of Pompeii—was sneered at by Hutton and other geologists, but their own emphasis on the daunting immensity of planetary time recalibrated the earth's ability to chastise human worlds. No longer did it need to *do* anything to check human self-importance; it could simply *be*.

The potential trauma caused by the new science's foundational claim—the hard-to-face fact of the planet's antiquity—was ameliorated in part by the geohistorical and cultural work that this claim enabled geology to accomplish. Nineteenth-century geologists set to work mapping the vastness of the planetary past in as much detail as possible. They frequently bragged

of their considerable accomplishments in this respect, comparing themselves to European explorers such as Christopher Columbus and James Cook as they celebrated their "heroic" conquest of time. In publicly oriented geological writing, the seductive lure of bygone worlds was balanced by the salutary promise of planetary literacy. Children and adults alike were urged to learn to decode the language of the rocks, to become readers of what one text aimed at youth named "the great stone book of Nature."[10] When depicted as a form of literacy, geology took on a moral cast. The mastery of geological knowledge and the exercise of geological curiosity, whether viewing a cabinet or identifying rocks while on a walk in the country, were seen as positive aids to self-cultivation, the duty of the virtuous civilized subject. For many, the science was a highly practical area of study. Farmers, miners, architects, craftsmen, and others were exhorted to learn the basics of the science as a means of improving their livelihoods. And geology was also held to convey a spiritual message, despite its break with biblical time; as the French scientist Claude Antoine Rozet declared, "The study of the earth . . . as of all other productions of nature, demonstrates at every step the existence of the Deity."[11] Samuel Metcalf, author of the 1834 *Knickerbocker* article, summing up the terms of its popularity, affirmed: "The wide extent of [geology's] applications—the lofty tone of its generalizations—the striking evidence which it affords of design and all-pervading benevolence, forcibly arrests the attention of every enlightened mind."[12]

Geology's ability to improve the modern subject is one of the ways in which the science colluded with biopower, Michel Foucault's term for the form of modern power exercised through the maximization or withdrawal of life, which came to flourish in the nineteenth century.[13] In Foucault's account of biopower's emergence, biology and statistics are the sciences that facilitate its administration. Yet contemporary theorists of biopower stress the flexibility of its targets, noting that it is not necessarily constrained by the borders of the human body or the form of the subject, or even by the notion of aliveness as we know it. As Jasbir K. Puar explains, "Societies of control [Gilles Deleuze's term for the extension of biopolitics into postmodern society] tweak and modulate bodies as matter."[14] *How the Earth Feels* explores some of the ways the body was situated as matter before the post-1950 period—a framing that opens the body to the geological gaze. From the nineteenth century onward, geology participated in the process of organizing bodies in relation to geological as well as biological substance. Despite its ostensible concern with nonhuman worlds, geology worked biopolitically to optimize the modern subject and to devivify those cast outside modernity.

The oscillation between the strange pleasures and creative possibilities offered by geological knowledge—the shivering alienation of geologic time and the captivating inhumanness of geologic matter—and the colonial structures and social hierarchies propped up by the geological timescale is the subject of this book. Geology, in the first half of the nineteenth century, was a new and exciting way of looking at the world. It was capable of endowing the most ordinary surroundings and the most common substances with awe-inspiring temporal heft and complexity. Its attention to the transformations of putatively inanimate matter across the eons suggested new understandings of agency. And as scientists began to fill in the outlines of a history of "past worlds" populated with weird, now-vanished creatures and vegetation, the science became a space to speculate about otherness. Geology's attention to the animacy of planetary matter over its long history offered new possibilities for understanding relationality and sexuality, contributed to the development of diffuse spiritual frameworks, and made possible new forms of speculation and resistance. At the same time, many of these imaginative projects were accompanied by a capacity to sediment colonial power and reserve the "humanity" that geology offset for a select subset of the species. In this introduction, I explain the cultural form that made these effects possible—geological fantasy—and examine some of the shapes it took both in the nineteenth century, when geology was first in vogue, and in our own moment, when it has become "fashionable" again. I'll consider the impact of geology's emphasis on the antiquity of the planet, how it undergirded the Euro/American conception of modernity, and how it structured colonial understandings of land and life. Finally, I will, in an overview of this book's archive, consider what makes the nineteenth-century United States a particularly apt site for an exploration of geological fantasy.

Geological Fantasy and Exomodernity

Central to my analysis in this book is the concept of geological fantasy. *Fantasy*, in my use of the term, does not signal an opposition to geological *fact*: it indexes, rather, a variety of ameliorative and creative formations that cluster around what are held to be the difficult truths geology teaches—truths that are founded upon the undeniable-yet-inassimilable realities of deep time and species extinction. These new realities made it possible to think innovatively about the relationships between humans and the world around them. But the alienation-effect assigned to them was central to the cultural meaning of

the science. The planet's antiquity was widely hailed as a concept relatively easy to grasp but profoundly hard to cope with. Hutton's colleague John Playfair, in a reflection now reproduced more often than is Hutton's own writing, described the challenge of viewing, with Hutton as guide, the Siccar Point "unconformity" (a formation in which two noncontinuous rock strata index a missing span of time—in the case of Siccar Point, about 80 million years). "On us who saw these phenomena for the first time," he reflected, "the impression will not easily be forgotten. . . . The mind seemed to grow giddy by looking so far into the abyss of time; and while we listened with earnestness and admiration to the philosopher who was now unfolding to us the order and series of these wonderful events, we became sensible how much farther reason may sometimes go than imagination can venture to follow."[15]

What I am calling geological fantasy emerges from the persistent positing of such chasms—the hole in the earth filled with time, the division in the observers unable to wrap their minds around it—as gaps foundational both to geology as a modern science and, in a sense, to modernity itself. To call it "fantasy" does not mean that it takes the side of the imagination against reason, but that it shuttles between those two poles, eroding that division even as it insists upon it in the name of science. My understanding of geological fantasy builds on Lauren Berlant's iterations of the concept of fantasy, which they uses to gesture not only toward "ideologies that create falsely disinterested representations of the world" but, crucially, toward "the unconscious continuities we project that allow us to trust the world enough to test it and change ourselves and it."[16] Fantasy, in the latter sense, is a thing we develop as a bridge to the world, something we need in order to be able to feel ourselves in relation to that world and to operate within it. Geological fantasy works precisely in this way: it turns an object depicted as an inhospitably indifferent planet into a world, or worlds, we can work with. Insofar as geology was (and continues to be) depicted as the site of hard truths about the planet's indifference to the human, geological fantasy, especially at a time when those hard truths presented themselves as newly glimpsed realities, operates as a cultural site where modes of connection between the figures supposedly estranged by geology, *planet* and *human*, could be proposed. Geological fantasy thus exemplifies—indeed, literalizes—Berlant's description of fantasy as "the means by which people hoard idealizing theories and tableaux about how they and the world 'add up to something.'"[17] Despite Playfair's assertion, imagination catches up to geology's hard facts one way or another; any damage done by the earth's "giddying" power to diminish the human is

ameliorated or activated otherwise in stories that bring the planet and the human back together somehow.

The impact of the planet's immense antiquity on human hubris is often figured as the annihilation of the species itself in the revelation of its ephemerality, its relative unimportance in view of the long history of the planet. McPhee, the twentieth-century writer who coined the term *deep time*, illustrates it precisely by imagining the disappearance of the human: "With your arms spread wide . . . to indicate all time on earth, look at one hand with its line of life. . . . [I]n a single stroke with a medium-grained nail file you could eradicate human history."[18] Yet the sheer persistence of that obliterative comparison in geological writing has sponsored a constellation of fantasies that effectively reestablish the humanity the comparison was said to erase. Indeed, the very assumption that the two were inherently opposed brought a new, modern version of the human to the fore: one that was fundamentally self-obsessed and consequently a little anxious when that obsession was exposed as such. The inassimilable temporal otherness geology introduced to the present scaffolded that figure in the form we might, adapting a concept from Mark McGurl, call *exomodernity*. Considering the persistence of literary-critical and philosophical appeals to deep time as a conduit to the world that "lies beyond or outside style," McGurl proposes the term *exomodernism* to designate the self-ironizing gesture that undercuts a designated period's stabilizing narratives, shadowing them with hallucinated "glimpses . . . of the unincorporated remainder."[19] Gestures toward the geological outside have been with us since the late eighteenth century, destabilizing modernity and its record of human achievements so reliably that they constitute a mode of stability in themselves. Just as an exoskeleton encases the body of an animal, exomodernity encircles the life—or, more precisely, the liveliness—of modernity. Planetary time stands as the outside to Man: something that exceeds him in its immensity and unknowability but also something through which he can constitute himself, through his unflinching recognition of this fact and its implications for his investigation and quantification of the earth's history. Exomodernity, in the sense I intend the term, takes the form of Man pressing up against a geologically informed limit, a boundary that at once refutes his expansiveness and, in doing so, provides a structure that supports his growth.

On this view, the oscillation between appeals to the planetary past as the site of Man's undoing and as a scaffolding for his achievements functions as a kind of *fort/da* game with geological time. Freud's description of this game in *Beyond the Pleasure Principle* illuminates the role of unpleasure in the formation

of the self. An infantile pastime meant to manage the trauma induced by the child's inability to control their world, the fort/da game consists of casting something standing in for the self's foundation (symbolized, for the child, by the mother) away from the self (*fort*, the German word for *gone*), then bringing it back (*da*, German for *here*). The anxiety of the self's potential undoing, in this sense, is deliberately excited in order to be soothed; the game operates as a phantasmatic structure used to stabilize the subject's sense of themselves in relation to the world. From this perspective, we can comprehend geology's alternations as a fort/da game around the stability of modernity, threatening it in order to confirm or transform it. The heft of geological time, the power of planetary forces, the vastness and variability of the globe, the fragility and impermanence of life-forms, dependent as they were on particular ecologies—the very foundations of geological knowledge—became the material for endless rounds of geological fantasy that sometimes operated to shore up and extend the existence of Man, sometimes to direct it otherwise.

The aesthetic appeal that the science possessed helped to fuel these rounds. Modes of fantasy issuing from, within, and through the geologic operated across numerous genres, including popular and professional scientific writing; fiction, nonfiction, poetry, and politics, the visual arts, and the natural-historical museum. All of these were recruited for the dissemination of geological knowledge in the nineteenth century. In his impressive study *The Earth on Show*, O'Connor documents geologists' efforts to gain acceptance for the new science, often manifested in an immersive and spectacular geopedagogy—dramatic storytelling, vivid illustration, engaging displays and panoramas. In the English geologist William Buckland's phrase, geologists should seek to bring their audiences into "immediate contact with events of immeasurably distant periods, as with the affairs of yesterday"; through such dramatic methods, skeptical audiences would be converted and enticed to learn more.[20] This inclination to spectacle, I propose, was also linked to the very dilemma the science posited as its own: the near-incomprehensibility of the time spans it invoked.[21] Amplifying the attractions of geology was a way of managing its inhuman subtractions, of coping with its insistence on the "giddying . . . abyss of time" and other manifestations of the planet's magnitude and might. "Imagination," which was, in Playfair's view, less willing to plumb the fathomless depths of the planetary past, would in fact be central to geology's popularity. Imagination brought the embodied subject into the drama of alien landscapes and bizarre life-forms, what Brian Noble calls the "otherworld-making" techniques of geological storytelling.[22] William Denton's description of the newly formed earth, for instance, invites his au-

dience to "uproll the curtain that unnumbered ages have dropped, and view the wondrous scene. Before us spreads a fiery ocean, bounded only by a fiery sky: its lightning-capped billows heave heavily under the influence of sun and moon; and now, as if mad, they leap in fury to the ruddy clouds that lower above them. Hissings, seething, boiling like a huge cauldron, while dense vapours rise continually from its surface, it presents to us a picture that none but a demon could truly paint."[23] The arresting theatricality of Denton's portrayal of the Precambrian era models the ideal of "immediate contact," as the wild, fiery fury of the scene imbues the earth with affect that transmits itself to an audience transfixed before the spectacle. Such methods engaged the body as a geological instrument, carrying audiences to worlds almost unimaginably strange, setting them down in bizarrely lively landscapes, inviting them to feel their way into the earth's past.[24]

Geologic fantasy was not only a matter of estrangement and novelty, though. It also inclined toward the sedimentation of familiar social forms and relations, the shoring-up of those forms surrounding the idealized Western subject.[25] Rational objectivity and empirical observation, watchwords for nineteenth-century scientists, controlled the play of the unfamiliar. In the first of a series of articles on the early history of the North American continent which appeared in the *Atlantic Monthly* in 1863, Harvard geologist Louis Agassiz explained this balance: "I am aware that many of the inferences, drawn from what is called the 'geological record,' may seem to be works of the imagination. In a certain sense this is true,—for imagination, chastened by correct observation, is our best guide in the study of Nature. We are too apt to associate the exercise of this faculty with works of fiction, while it is in fact the keenest detective of truth."[26] The ability to speculate beyond the visible, to draw connections not immediately obvious, was understood as the mark of an enlightened mind; this capacity, as Adelene Buckland has shown, was identified by Darwin and other nineteenth-century scientists as what distinguished the civilized from so-called primitive peoples unable to transcend their own time and space.[27] At the same time, relying too much on the imagination was also a danger; the imaginative drama of geologic otherworld-making needed always to be tempered by an orientation toward "truth" rather than fancy. Geologists insisted on the value of systematic and direct engagement with the intricacies of the natural world. This approach, they claimed, established their superiority to their scientific forerunners, who, failing to base their conclusions on empirical evidence from the "rock record," had constructed their planetary histories mainly through speculation. Science, modern geologists insisted, required not "dream[s], formed on . . . poetic fiction[s]," as Hutton

wrote of the work of his seventeenth-century predecessor Thomas Burnet, but observation and objectivity; these alone could rationalize and order the geological past.[28]

In the wake of Georges Cuvier's decisive argument for the reality of species extinction, the fossil record became a primary means of organizing geochronology.[29] Early debates about whether primary agency in the formation of the world belonged to aqueous or igneous agents—positions known as the Neptunist or Wernerian and the Vulcanist or Huttonian systems, respectively—gave way, by the 1820s, to the labor of filling in the sequence geologists referred to as the "rock record." And while that record disclosed creatures that appeared bizarre and sometimes frightening to modern audiences, effects that were often played up in geological spectacle, scientists nevertheless insisted on the fundamental orderliness of the worlds that geology chronicled. Noting the alarm an iguanodon might create if it suddenly appeared in an English forest, Edward Hitchcock, the Massachusetts state geologist and Congregationalist minister whose work is examined in chapter 3 of this book, hastened to assure readers that the creature, in the proper prehistoric context, was not at all strange; though it might be "very natural to feel [geology] is the history of monsters . . . further examination rectifies our mistake, and we recognize [extinct animals] as parts of one great system."[30] The geohistorical succession of lifeworlds was held to reflect steady, directed progress as well as reassuring order. In the first half of the nineteenth century, most prominent geologists (the British scientist Charles Lyell was a noteworthy exception) held that the rock record clearly demonstrated steady improvement in the organization and sophistication of life. Echoing the tenor of much popular geological writing, Denton confidently assured his audiences that "Progress is the law of our globe, as geology abundantly testifies." A merely human view of history, limited to a handful of decades, might overlook that fact, he added, but "sweeping over the ages of the mighty past, and contrasting its early appearances with those widely succeeding, we can doubt no longer."[31] The belief in improvement was used to support the claim that the long history of the earth could ultimately be viewed as a directed event: a slow, steady preparation for its tenancy by humans, the pinnacle of evolution. This claim essentially reversed the argument that deep time obliterated the works of man by depicting the accomplishment of those works as deep time's ultimate rationale. The planet's antiquity was not only redeemed but rendered a positive resource in this account insofar as human history, far from being diminished by the vastness of the planetary past, had been its destination all along, and the long wait had ultimately improved it.

As Denton affirmed, "The tree was growing whose fruit should be humanity; and the ages were necessary to knit its giant trunk and perfect its branches."[32]

This faith in progress was linked, in Western Europe and the United States, to the devotion to reason and hard work associated with the sciences but also, for many, to the moderated and scientifically verifiable faith in God that continued to guide much scientific writing and to shape beliefs through the first half of the nineteenth century.[33] The convictions of natural theology—the belief that the presence of God revealed itself in the workings of the physical world—structured the way the science came to bridge the abyss between deep time and the human, as Peter J. Bowler contends: "By 1830, it was firmly accepted in responsible geological circles that divine providence was manifested in the physical world not through continual miracles but in the original design of the system itself."[34] As Bowler points out, it was natural theology, and not the evidence of the fossil record, that shaped geologists' view of earth's history as directed. The conviction that the earth had evolved for humans was laden with spiritual as well as moral significance. Hitchcock, for instance, was able to trace a seamless path from his geological research to his religious instruction in a series of lectures titled *The Religion of Geology and Its Connected Sciences*. Despite their dismissal of the biblically guided 6,000-year history of the earth, geology was not purged of religion in the nineteenth century. Instead, it reimagined a belief in the divine as the inevitable corollary to the observation and contemplation of such a complex, yet orderly world.

The alignment of reason and faith indicates the science's participation in the history of secularism as some scholars have recently come to understand it: not as the development of a religion-free polity but as the management of belief to appear compatible with a modernizing world. Geology, in this view, provided a form of secular discipline, access to what Emily Ogden, glossing Talal Asad, describes as "a set of prescriptions for those who . . . '*aim* at modernity.'"[35] As the target of belief management, "modernity" is not so much a historical period or an achieved fact as an optimizing ideal tied to self-governance, which the sciences, geology among them, sought to support. Geology was celebrated as an educational tool uniquely suited for the production of refined, productive, and healthy individuals in a democratic society. The science was not only attractive to the "fashionable" classes; it was promoted across racial and class lines as an accessible as well as improving subject. An article recommending the construction of "Family Cabinets of Nature and Art" was printed in the *Colored American*, a New York–based African American weekly paper, in 1841.[36] The article, authored by Josiah

Holbrook, founder of the Universal Lyceum movement promoting popular education for adults as well as children, detailed the making of household cabinets of geological and other natural specimens. These, Holbrook insisted, would provide "amusement . . . raise the character and the usefulness of schools . . . diffuse knowledge over the globe . . . increase wealth . . . improve morals . . . [and] promote religion."[37] Moreover, the amusement associated with the project, Holbrook stressed, was hygienic, as young people would eschew frivolous, expensive, or immoral pursuits for the healthful attraction of a walk to procure geological specimens. In such contexts, geology presented itself as a democratizing as well as universally appealing subject; insofar as its materials were easily accessible, the advantages it conferred were available to all who wished to "aim at modernity."

The association of geology with reason, faith, and productivity alternated and often coexisted with breathless indulgence in dramatic visions of prehistoric otherworlds. Both genres of geological fantasy played into the maintenance of a modernity that, despite its supposed diminishment by the planet's antiquity, could not have existed without it.

Geological Fantasy in the Anthropocene

The proliferation of geological fantasy in the nineteenth century reflected the world-changing impact of the new science's foundational tenets. Nineteenth-century geology rapidly invented a radically new understanding of the earth, remapping the human relationship to the planet and proposing unforeseen possibilities for living thereon. In tandem with its reconceptualization of planetary history, geology put forth novel understandings of embodiment in relation to geological matter as well as an unsettling new genre of death in the scaled-up finality of species extinction. The fashion for geology indexed the science's success not only in describing the earth but in making it mean anew.

A similar transformation of planetary meanings is recurring in our own time—a moment when anthropogenic climate change has once again altered our understanding of the connections between humans and planetary systems, when global environmental and climate crisis makes time feel both intensified and foreshortened, when species extinction appears not as an aspect of the geohistorical past but as part of the texture of daily life. Geology, accordingly, is once again trending. By the end of this century's first decade, it was difficult to miss what Elizabeth Ellsworth and Jamie Kruse describe as "an

increasingly widespread turn toward the geologic as source of explanation, motivation, and inspiration for . . . responses to conditions of our present moment."[38] The Anthropocene debate has brought reporting on geological concerns back to the pages of popular journals, while the question of what it would mean, in light of the proposed epoch, to be, in philosopher David Wood's phrase, "geologically human" preoccupies numerous artists and academics.[39] In terms of the Anthropocene, which I discuss in this book's coda, the question evokes consideration of planetary trajectories of environmental harm, of how to correlate impact and cause in the mapping of the present (as) crisis. But what Ellsworth and Kruse identify as a "geologic turn" has surpassed the confines of this debate. This "turn"—which, in light of the science's nineteenth-century popularity, is very much a *re*turn—is both the inspiration for and ultimate target of this book's analysis. Especially in light of the sense of urgency that surrounds this return, I want to ask: how does the resurgence of geologic fantasy in the twenty-first century compare to its initial emergence in the nineteenth? Given the presumptive *new*ness of our situation, how new are the forms of "explanation, motivation, and inspiration" that geology has delivered? What genres of fantasy have remained with us over the past two centuries? Though for the majority of this book I will concentrate on nineteenth-century antecedents to the present—the "geologic turn" 1.0—I want, here, to briefly consider some of the long-standing patterns that have come to mark this recent return in the hope of illuminating some of these questions.

Most noteworthy, and most predictable, has been the reiteration of the inassimilable nature of deep time. The Anthropocene's potential intervention into the geochronological chart keeps the enormity of the planetary past persistently in view, and its challenges are frequently highlighted. A 2011 article in the *Scientific American* hypothesizes that "the human brain may not be hardwired to comprehend the billions of years of history that have shaped the modern environment"—an assertion that essentially updates Playfair's description of the gap between reason and the imagination into cognitive-science terms.[40] Admittedly, the difficulty of deep time can't quite be said to have *returned* in the present, insofar as it never really left: recall, for instance, John McPhee's nail-file comparison or Steven Jay Gould's 1987 account of the "great temporal limitation imposed by geology on human self-importance."[41] But of late it has been recruited for new uses. "The Anthropocene," Dipesh Chakrabarty asserts, "requires us to think on the two vastly different scales of time that Earth history and world history respectively involve. . . . [I]f we do not take into account Earth-history processes that outscale our very human

sense of time, we do not quite see the depth of the predicament that confronts humans today."[42] The intellectual difficulty of deep time is refracted, here, into the existential depth of our current predicament, employing the exomodern in the service of the epochal.

Within the humanities, geology's renewed appeal has been evident in the diffuse set of critical developments some have called the "nonhuman turn," a rebellion against the allegedly anthropocentric limits of humanist thinking. The urgency with which these developments have been framed is conveyed in Richard Grusin's introduction to a 2015 collection on the topic, where he asserts that "almost every problem of note that we face in the twenty-first century involves engagement with nonhumans," including the Anthropocene.[43] The impact of geological fantasy within this "turn" is especially noteworthy in its early years, when it served as the foundation for a number of claims. The science frequently operates as a conduit to ontology, as geologic matter, especially the fossil, indexing the heft of planetary time, points beyond the epistemologies that, like the humans who generate them, are ultimately ephemeral. Speculative realist Quentin Meillassoux's meditation on the arche-fossil, for instance, calls upon geology to counter what he calls "correlationism," the belief that "we [humans] only ever have access to the correlation between thinking and being."[44] The arche-fossil is technically not a fossil, but a trace of energy from the beginning of time, for which the antiquity of petrified geologic matter serves as a kind of metonym. Object-oriented philosopher Timothy Morton likewise deploys the fossil—in this case, the dinosaur fossil—as an introduction to hyperobjects, things that affect us profoundly even though they elude our conception. For Morton, the birth of modern geology, proxied by Mary Anning's momentous 1823 discovery of a Plesiosaurus skeleton, is the historical condition of possibility for the hyperobject insofar as it marks the time-bending moment where "vast non-human spatial and temporal magnitudes" could manifest physically within human lifeworlds.[45] As at once an index of deep time and a token of extinction, the fossil is also the conduit to a "petrifying" future, one in which humans, too, may exist on the earth only as mineral formations buried within the geological stratum that modern infrastructure will have become.[46] Geologic matter pulls time away from human perception, inducing what Morton describes as temporal undulation, a kind of uncanny time in which we can never be fully at home.

In these contexts, geological time does what it has always done—it checks the "human hubris," in new materialist philosopher Jane Bennett's terms, that is the common target of object-oriented and other anthrodecentric

thought.[47] This move appears so often that McGurl wryly designates this body of work "the new cultural geology," using its quest to "position culture in a time-frame large enough to crack open the carapace of human self-concern" as the basis of his account of exomodernism.[48] As suggested by the frequency with which the Anthropocene is mentioned, the stakes of that disruption are assumed to be, at least in part, environmental: the introduction of an ecocentric rather than narcissistically anthropocentric view of the world and, as per Chakrabarty, the proper framing of the existential crisis facing the species today.[49] Yet aggressively bashing deep time against the merely human may actually be counterproductive as far as inspiring environmental action goes. Geologist Marcia Bjornerud contends that this all-too-familiar opposition "suggests a degree of insignificance and disempowerment that not only is psychologically alienating but also allows us to ignore the magnitude of our effects on the planet."[50] Elizabeth Povinelli makes a related point about Meillassoux's arche-fossil; part of its appeal, she argues, is its ability to deflect attention from present-tense concerns by "mobiliz[ing an] intense self-involvement with things that existed before we got here, things that cannot demand accountability from us."[51] The presumed political innocence of the geologic allows it to shelter us from a present in which we are implicated in ever-more-intricate webs of responsibility and obligation. The capacity to distract us from those webs also serves to mask the reductive version of the human that Euro/American geology has long upheld. As Zakiyyah Iman Jackson points out in a powerful response to the nonhuman turn, such critiques of anthropocentrism misrepresent the figure they seek to decenter insofar as they privilege a specific genre of the human that postcolonial theorist Sylvia Wynter would identify as Man—a self-avowedly rational, bounded, and forward-moving entity of Euro/American descent—overrepresenting himself as if he were the Human in toto. (Indeed, as I discuss in more detail below, geological fantasy has played a role in developing and sustaining that figure.) In this sense, Jackson argues, much so-called posthumanist thought actively reproduces the overrepresentation of Man in its "sidestep[ping of] the analytical challenges posed by the categories of race, colonialism, and slavery"—ongoing structures that are subsumed into the overall diminishment of human history by deep time.[52]

The turn to geological time that marks the "new cultural geology" generates forms of time markedly different from Chakrabarty's deployment of the Anthropocene as a call to a dual historiography. The latter works to integrate and thereby to reenergize planetary and global history—maintaining a focus, through the lens of the planetary, on such issues as the currently

disproportionate impacts of climate change on the global South. The ontological bent of the former recruits the geological toward a more-than-historical sense of the past, a kind of suprahistoricity that often carries notably marvelous, even mystical, undertones. The impact of designating something a hyperobject, for instance, seems to render interacting with it "fascinating, disturbing, problematic, and wondrous." Writing of fossil fuels, Morton asserts that "oil is the result of some dark, secret collusion between rocks and algae and plankton millions and millions of years in the past. When you look at oil you're looking at the past."[53] Geologic matter, here, opens up a time that cannot be mapped onto any conventional timescale insofar as it shimmers across and between epochs. At other points, it becomes a means of escaping from time itself. The encounter between a paleontologist and a fossilized dinosaur footprint becomes, for Morton, an instance of "realist magic"; the scientist "coexists with the dinosaur and the ancient mud in a nontemporal configuration space. . . . It's as if this level of reality is a vast mesh of crisscrossing lines, marks, symbols, hieroglyphics, riddles, songs, poems and stories."[54] The speculative dimension of geological thought is here employed to invite the reader into a world within, yet beyond, the known one, a realm of mysterious signs to be decoded—the reading of an alternative rock record, in which the distinction between the rock and the human is compellingly unclear.

The mystical dimension of this more-than-historical geology expands on the moral clarity ascribed to this process of reading by nineteenth-century advocates of the science. Accessing this level of reality seems to have a moral, or at least an ethical, import in object-oriented thought insofar as it demonstrates one of the key tenets of this body of work: that objects are "not just lumps of dullness."[55] The activation of objects curtails human self-importance and elevates the significance of the nonhuman world, moves that may have environmental and social impacts—although much of the nonhuman turn, especially object-oriented thought, is not oriented toward "politics" in any conventional sense. Unlike Chakrabarty's dual planetary/global focus, though, the encounter with mystical-geological strata bypasses global historical measures; Morton's gaze at the "dark, secret collusion" between the nonhuman agents at the origin of "oil" sidesteps such factors as the human labor that turns oil into fuel or the mass land conquest powered by the petroleum industry. In this sense, the secret history of Mesozoic algae pits the planetary *against* the global, overshadowing other stories oil might be made to tell.[56] The bypassing of such histories is not simply an effect of this mode of thought—it appears, at times, to be part of the point, as swift dismissals of historical materialist thought as static and insufficient appear frequently in this body of

work.[57] The avoidance of "correlationist" or anthropocentric historiography, which would block the effort to establish more authentic relations with the object-world, draws once again on geology's presumed political innocence.

A somewhat different mode of geological fantasy operates within recent vitalist and new materialist thought. For new materialists, as Diana Coole and Samantha Frost explain, "materiality is always something more than 'mere' matter: an excess, force, vitality, relationality, or difference that renders matter active, self-creative, productive, unpredictable."[58] The mind-bending impact of the geological timescale is less central to this body of thought; rather, a focus on geological processes opens perspectives on the active materiality Coole and Frost emphasize. When cited at all, the earth's age tends to operate, as it does for Deleuze and Guattari, as a window to the perpetual flux of all matter: "The hardest rocks become soft and fluid matter on the geological time scale."[59] This flux guides Manuel de Landa's approach to "reality" as a "single *matter-energy* undergoing phase transitions of various kinds"; from this perspective, he can craft a geologic historiography which highlights those "dynamical elements (energy, flow, nonlinear causality) that [humans] have in common with rocks and mountains and other nonliving historical structures."[60] Similarly, Jane Bennett's "geo-affect" enables us to catch the vibe of what she terms vibrant matter, which might point toward an "expanded political economy," while Kathryn Yusoff's "geologic life" opens a corporeal dialogue with the inhuman, developing an awareness of how the "mineralogical dimension of human composition" impacts social, economic, and political life.[61] Such encounters with geologic forces and planetary matter abandon the rational, distanced objectivity upheld by nineteenth-century geology; instead, they enfold it alongside humans into what Karen Barad describes as "the world's differential becoming."[62]

The activation of geologic time through matter and material processes in the new materialisms undoes what Bjornerud identifies as the potentially alienating effect of deep time. Geologic vibrancy alters the status of the human by drawing it closer and animating it differently, an ethical move that is often explicitly environmental, although it too seeks to transform what "politics" means and how it operates. Attention to what gets swept along in the flow of the rocks, though, reveals the limits of vitalist and new materialist efforts to reconceive the human. In *The Transit of Empire*, Jodi Byrd (Chickasaw) tracks the twinning of settler-colonial and Orientalist thought in Deleuzo-guattarian figurations of the "Indian." Deleuze and Guattari, whose work is central to much new materialist thought, employ the "Indian" as a deterritorializing figure; yet this positioning follows the pattern Byrd identifies as a

transit through a "paradigmatic Indianness" deployed to facilitate US imperial desires. In *A Thousand Plateaus*, Deleuze and Guattari decorate fantasies of the "rhizomatic [American] West" with the idea of "Indians without ancestry," ultimately declaring that "America . . . put its Orient in the West."[63] That observation enfolds these "Indians" with residents of the Asian subcontinent, who are elsewhere used by Deleuze to figure a different approach to the unconscious, drawing on "more dynamic models: from the drifting of continents to the migrations of peoples." Contrasting Indian and Egyptian burial sites, he contends, "the Indians pass into the thickness of the rocks themselves, where the aesthetic form [is identified with] the creation of paths without memory, all the memory of the world remaining in the material."[64] The "rocks" seem to be a reference to Hindu burial caves, yet the Orientalized "Indians without ancestry" from the American West, situated outside biological descent, also resonate geologically. The move toward a nonrepresentational philosophy, pursuing the possibility of difference through material processes, locates "Indians" alongside the "drift of continents," outside human history. In this sense, as Byrd notes, Deleuzoguattarian thought becomes an "ontological trap" reifying colonial discourse: "What we imagine to be outside of and rupturing to the state, through Deleuze, already depends on a paradigmatic Indianness that arises from colonial discourses justifying expropriation of lands through removals and genocide."[65]

Deleuze's lithified Indian, as I demonstrate in this book, has a long history within colonial and geological thought. But this is not the only way in which Indigeneity gets absorbed into ontology. Zoe Todd (Métis), in a critique of actor-network theorist Bruno Latour, whose concept of distributed agency plays a part in much new materialist work, points out that such models resemble, but do not cite or consider, Indigenous thought. In this sense, she contends, the "ontological turn" sustains the colonizing function of the Western academy as a whole.[66] As Todd argues, "The colonial moment has not passed. . . . So it is so important to think, deeply, about how the Ontological Turn—with its breathless 'realisations' that animals, the climate, water, 'atmospheres' and non-human presences like ancestors and spirits are sentient and possess agency, that 'nature' and 'culture', 'human' and 'animal' may not be so separate after all—is itself perpetuating the exploitation of Indigenous peoples."[67] This breathlessness, tied to the aforementioned sense of urgency, reveals the "nonhuman turn" to be engaged in something similar to what Jean O'Brien (White Earth Ojibwe) describes as the settler practice of "firsting," the space-clearing claim that settlers were the first peoples to construct a meaningful social order in a given location.[68] In this sense, scholarship ani-

mated by the desire to respond to planetary crisis remains implicated, Todd asserts, in "ongoing colonial realities throughout the globe."[69]

The geologic inflection of much new materialist thought is, in this light, a particular concern, not simply because of the science's long history of involvement in colonialism but also because of its desire to remain in responsive dialogue with the earth. In Ellsworth and Kruse's description of the "turn toward the geologic as source of explanation, motivation, and inspiration," the "geologic" is not a gestural and vague relation to the planet as an abstracted whole; rather, it attaches thought to more specific, often located geologic processes and materials and to the relationships that can be established with and through these.[70] The cluster of desires animating this call to dialogue seems, in this light, to be reaching toward something like the structure Leanne Betasamosake Simpson (Michi Saagiig Nishnaabeg) and Glen Sean Coulthard (Yellowknives Dene) describe as "land as pedagogy," which Coulthard glosses as an approach to land as "an ontological framework for understanding relationships—a consideration of *what the land as system of reciprocal relations and obligations* can teach us about living our lives in relation to one another and the natural world in nondominating and nonexploitative terms."[71] The geologically inflected search for "explanation, motivation, and inspiration" can be understood, I believe, as a quest for similar knowledge. But this framework is problematic in at least two respects. The first is the erasure of Indigenous sovereignty: the "geologic" in this context is another form of space-clearing that overwrites specific Indigenous relationships to land, which are bound up with modes of governance and sociality, in favor of a general invocation of the human in relation to the planetary actualized through specific sites.[72] Even as the geologic transcends such merely human forms as citizenship, it retains the shape of the "settler common sense" that Mark Rifkin describes: not a "conscious repudiation of identity" so much as a "structure of feeling and set of routine orientations . . . that arise from and propel the extension of claims to Native lands and dismissal of Native polities."[73] The second problem is the related erasure of Indigenous intellectual and social labor. As a theory of force rather than work, the geologic renders invisible the necessity of directed energy in the maintaining of such systems.[74] Geology threatens, in this sense, to take the place of "nature" as it features in Romantic invocations of Indigenous life. As Mishuana Goeman asserts, "These sorts of telling make possible settler narratives that elide the very hard work it takes to make healthy and responsible communities, communities that take into account not only the human but nonhuman."[75] The "modes of collective placemaking and governance" that are, as Rifkin points

out, central to Indigenous sovereignty dissolve into a generalized vibrancy that turns *place* into the *space* where matter inter/acts.[76] While vitalist and new materialist geologies may be able to show humans what we "have in common with rocks and mountains," as well as with nonhuman biotic forms, it is less clear what "geologic life" might have to say about the terms on which to live that commonality.[77]

Bennett describes new materialism's "uncanny task" as "see[ing] what happens . . . if the 'call' from things is taken seriously."[78] I would argue that the forms of attention developed in response to that call—the effort to attend to the vitality of matter in new materialism, geologic and otherwise—have been most successful thus far in the development of a revitalized critical sensorium, a reorganizing of the senses beyond the limitations of the Aristotelian model.[79] This kind of work remains crucial, as the rehabilitation of the sensorium and its modes of apprehending knowledge are necessary for comprehending and responding to a transformed ecology. At the same time, as Jayna Brown asserts, "materialist studies need to attend to the ways in which systems of inequality are embedded in our understandings of that materiality and the processes by which scholars theorize it."[80] Some recent projects have managed to take up the geologic while maintaining this kind of attention. Tiffany Lethabo King's *The Black Shoals: Offshore Formations of Black and Native Studies*, discussed in chapter 5 in this book, establishes a geological form, the shoal, as the shifting foundation for a sustained dialogue between Black and Indigenous feminisms, while E Cram's *Violent Inheritance: Sexuality, Land, and Energy in Making the North American West* develops the concept of "land lines" as a means of tracking the convergences of sexuality, energy, infrastructure, and colonial violence on western land.[81] Without this type of reckoning, materialisms fueled by geological fantasy tend to absorb "difference" into materiality without providing an account of the forms of power that stratify it.

The assumed political innocence of geology, as a science of the non- and prehuman world, meant that it largely escaped the kind of critical interrogation that biology and other sciences received in the last decades of the twentieth century. Yusoff's recent critique of what she terms *White geology* begins to remedy this oversight, making visible how the science has operated as "a racialized optic razed on the earth."[82] *How the Earth Feels* takes up this work, using the complementary terms *settler geology* and, following Sylvia Wynter, *geology of Man* [overrepresented as the Human], to more precisely identify the historical forms that whiteness has taken. Any return to the geologic, I argue, needs to develop a stronger sense of the long history of geologic

fantasy, including its participation in projects of dispossession. Geological fantasy, as we will see, does not only read past worlds out of the rock record; it has sought, as well, to sediment the social hierarchies of the present.

Geology as Biopower (and Beyond)

Both the conviction that geology was good for individuals and the stories about extinction and evolution projected onto the geochronological record reflected the collusion of the science with the establishment and maintenance of modern biopower. Biopower, Foucault explains, is concerned with regulating the meanings, behaviors, and effects of bodies in line with "the right of the social body to ensure, maintain, or develop its life."[83] Despite geology's ostensible concern with nonlife, I argue, the liveliness of geological fantasy binds the science to the possibilities attached to life on both social and individual levels. Biopower builds upon the reconstitution of bodies in relation to land and organizes the racialization of death across deep time—two strategies for the exomodern management of the geological "wound" projected in the enormity of the planet's age.

Unpacking the entwinement of geology with biopower, Elizabeth Povinelli asserts that the analysis of global modernity is incomplete without an understanding of what she calls *geontopower*.[84] Geontopower is not simply an alternative to or substitute for biopower, but a mode of power that subtends it by demarcating "the difference between the lively and the inert"—a distinction that is particularly salient in settler-colonial contexts.[85] As we have seen, geology undergirded the life of the modern Western subject: it strengthened his mind and improved his circumstances; it positioned him as sufficiently secular to prioritize scientific empiricism over biblical literalism but also sufficiently devout to praise the deity by (literally) grounding his faith in the material world; it rendered him healthful and manly, yet also erudite and "fashionable." In this light, geology's optimization of the subject was bound up with the cultivation of whiteness, defined positively by means of these qualities and in contrast to the putative inertia, backwardness, and postanimacy that geological fantasy helped ascribe to racialized others through its hold upon material space—land—as well as geochronological time.

In Euro/American natural history and geology, land is approached as a knowable, classifiable object. The scientific gaze developed to gather that knowledge aligns with what Macarena Gómez-Barris calls the "extractive view," which "render[s] land as for the taking."[86] The earth sciences participated

in the maximization of land's potential, not only as an object of study but as a source of productivity and profit, well before the emergence of modern geology as a temporal science at the end of the eighteenth century. The modern colonial "genre of the human" that Wynter designates Man overrepresented as the human initially predicated its claim to humanity on the asserted superiority of European rationality, held up as justification for colonial administration. That claim, importantly, remade colonized land alongside colonized bodies, physically and conceptually transforming the terrain—Wynter nods to the "ongoing expropriation of New World lands and . . . the instituting of the large-scale slave plantation system"—alongside the displacement and forcible re-emplacement of Indigenous and African people thereon.[87] Settlers viewed New World lands and peoples alike as unproductive and unworthy without partition, development, cultivation, and governance. As they facilitated that transformation, the physical sciences, including mineralogy, geography, and natural history, played a central role in this dimension of colonial expansion, supporting the development of Man both materially, as they contributed new techniques to facilitate the accumulation and extraction of resources, and ideologically, as they consolidated a vision of land as inert, alienable, and wholly knowable, which made its expropriation and exploitation possible.

The division between rationality and irrationality, for Wynter, was most often expressed as one between the civilized citizen and the animalized savage. Mineral and vegetal associations, I propose, operated in tandem with animalization. European natural historians maintained that both Africa and the Americas were "newer" landmasses than Europe; hence, as Katherine McKittrick observes, people attached to those lands were assumed to be less sophisticated. Indigenous people of the Americas were often lithified in the process of being dispossessed. The acceleration of silver mining in South America through the application of European scientific techniques and the mita system of enforced Indigenous labor operated in precisely this way; as the Conde de Lemos, the newly appointed Viceroy of Peru, declared in a 1667 letter about the brutality of South American silver mines, "The rocks of Potosí . . . are bathed with the blood of Indians, and . . . if the money which is extracted from them is squeezed, more blood than silver would flow."[88] The terms of de Lemos's liberal protest hardened over the centuries into settler-geological common sense, though with less sympathy. Henry Rowe Schoolcraft, an American geologist discussed in chapter 2 in this book, complained, while on an 1820 exploratory voyage up the Mississippi River, of his Winnebago guides, who were not as helpful in finding local ore de-

posits as he had hoped, that "[they] look to the eyes of civilization as if they themselves had faces of stone, and hearts of adamant."[89] Black bodies were also reinscribed in relation to reconfigured colonial lands, particularly in the installation of the plantation system. What McKittrick terms "plantation geographies," oriented toward "black placelessness and constraint," tethered Africans brought to the New World to the land they worked.[90] The plantation, McKittrick observes, "became the location where black peoples were 'planted' in the Americas—not as members of society but as commodities that would bolster crop economies."[91] Such plantings sometimes gave rise to conceptions of what Monique Allewaert calls "ecological personhood," a vital mode of being that straddled (what we understand as) biotic life, objects, and landforms, in opposition to the European preoccupation with classification and quantification.[92] But the insistent foreclosures of the plantation economy also generated what Katherine Adams identifies as "dirt determinism," a fixed alignment of Black bodies and the soil they worked.[93]

The forcible remaking of land and bodies as extractible quantities stands as an early example of Povinelli's geontopower in its quest to overwrite and displace Indigenous and Black understandings of land, which maintained livelier, more reciprocal relationships to place. Such relationships—visible in forms like Simpson's "land as pedagogy" and McKittrick's "alternative mapping processes"—comprehend the earth's surface as a site that participates in the ongoingness of life, intimately and sensually bound up with humans as well as nonhuman life.[94] In its violent reinvention of Indigenous land and Black bodies as property, though, settler modernity depicted such frameworks as misrecognitions of the crucial distinction between life and nonlife, between (active) members of the modern world and (inert) raw material to be used for its benefit.

It would be the massiveness of the geological timescale, however, that would make possible the specific mode of life—the "life of the species"—through which biopolitics operates, with extinction, the massified and hyperfinal genre of death that geological time makes visible, standing as the ultimate threat to life on a species level. Wynter's account of New World colonization tracks the expansion of its genres of the human from the primarily spatial forms discussed thus far to the temporal ones that emerged along with the reorganization of the sciences in the nineteenth century around newly developmental paradigms. Biology and anthropology have been the fields most closely associated with the colonial administration of time. But geology, which owed its very existence to the invention of a new, paradoxically modernizing form of time—the antiquity of the planet—also played a key role. As

we have seen, the ability to recognize and properly respond to the vastness of geological time was held up as a sign of civilized status, another mark of intellectual "liveness" conforming to the ethnographic and biopolitical distinction between the forward-thinking and the "backward." Geologists were particularly fond of contrasting their own modern way of understanding the material world to Indigenous beliefs. Schoolcraft's 1822 report on a fossilized tree announced itself as the scientific analysis of an object "which has heretofore only served to excite the wonder, and exercise the superstition, of the Indian tribes."[95] What O'Brien would describe as an act of "firsting" feeds into Schoolcraft's assessment of the inertia of Indigenous understandings of the object, which failed to contribute the knowledge needed for both scientific and economic development. That assessment ties into the concomitant practice of "lasting," which O'Brien explains as the assignment of a temporalized construction of race which held that "Indians can never be modern because they can never be the subjects of change, only its victims"—a case Schoolcraft would elsewhere make as he insisted on the incompatibility of Indigeneity and civilization.[96]

The trope of Indigenous extinction followed on this insistence, resulting from "the coupling of the insistence of stasis for Indians with notions of blood," which, when confronted with the inexorable modernity that settlers were etching into the land, catalyzed a process of imagined degeneracy culminating in predictions of imminent extinction.[97] Geologically inflected depictions of Indigenous people as extinct played up the radical otherness, distance, and difference from the present imputed to Indigeneity; they suggested that not only Indigenous people but also their lifeworlds—the "great systems" to which they belonged—had also vanished, to be replaced, in the teleological sequence of (geo)history, by systems within which settlers could make themselves at home, temporally as well as spatially. The extinction trope, Kyla Schuller points out, materializes Coulthard's description of settler colonialism as "territorially acquisitive in perpetuity."[98] As geological fantasy, the trope of Indigenous extinction remade land for the support of settlers, imagining not just polities but entire ecologies designed to promote the growth of settlements.

In casting Indigeneity outside of and anterior to the realm of the human, the extinction trope revised it into the form that Wynter, following Jacob Pandian, identifies as the "fossil other." Definitively established as an index of species extinction by Georges Cuvier at the outset of the nineteenth century, fossils served as both support and counterpoint for evolutionary theories of

life's development. The fossil other designated those "archaic, stunted, undeveloped forms" of the human that fell off from the flow of life and were preserved unchanged as relics of other, now-surpassed worlds.[99] As a figure that turned land into time, space into race, geos into bios, the fossil other is an especially good index of the relay between biopower and geontopower. Tying together their oppositions between life/death and animacy/inertia, respectively, it comprehends Indigenous peoples as *post-animate,* associating them with a logic of species that played into the politics of racialization, lending itself to the state project of revising Indigenous sovereignty into racial identity.[100] The fossil other's uncanny post-animacy inverts the racialized living death whose ongoing production is central to what Achille Mbembe designates the necropolitical dimension of global modernity, its "creation of death-worlds," such as the plantation and the postcolony.[101] These racialized worlds operate in suspended time, outside-within the modern, constituting the contemporaneous but noncontemporary racialized counterpart to the exteriorized Indigenous populations imagined as already extinct. Adams's "dirt determinism," drawing on the plantation's alignment of Black bodies and soil, the most geologically recent and agriculturally active layer of the planet's surface, indexes this temporal suspension. Like dirt, the living-dead flesh of the colonized is at once productive and a potential contaminant, recalling the death-dealing function that Foucault, in his discussion of race as an axis of biopower, linked to depictions of the racial other as "threat to the species." Even as Indigenous lifeworlds were aligned with prior extinctions, signaling an imminent pastness, the modern racialized other was said to threaten the possibility of a future extinction and, hence, needed to be managed, contained, or even eradicated.

As practices and concepts, the earth sciences have been bound up with the establishment and maintenance of colonization and racialization, which should be understood, as Byrd emphasizes, as "concomitant global systems that secure white dominance through time, property, and notions of self."[102] As practical sciences, mineralogy and geology guided (and continue to organize) the material and conceptual reinvention of Indigenous lands and consequent destruction of Indigenous land-based modes of relation and governance. As a temporal science, geology supported the necropolitical transformation of African bodies forced to labor on these reinvented lands as well as the imagined fossilization of Indigeneity. And as a fashionable science, it worked to optimize the historical form of whiteness that Wynter and Foucault both identify as Man, who carries forward the "life of the species." As

it both plays into and, in its facilitation of land partition, exceeds biopower, geological fantasy is bound up with a vision of modernity, and of Man, literally and figuratively grounded in colonialism.

Geological Fantasy in the Antebellum United States

How the Earth Feels examines texts from and/or about the United States from roughly 1800 to 1870, a period that saw the high point of the science's popularity. My focus on the antebellum United States complements existing scholarship that addresses on the postbellum geological imaginary. Much of this scholarship highlights the coincidence of geology and continued westward expansion after the Civil War: the major geological surveys led by Clarence King, Ferdinand Hayden, John Wesley Powell, and George Wheeler; the sensationalized "bone wars" between two rival paleontologists, Edward Drinker Cope and Othneil Charles Marsh; and the rise of the national obsession with dinosaurs, resulting in part from the work of these two men.[103] Postbellum geological surveys have received far more historical and critical attention than their antebellum counterparts, in part because they were accompanied by photographers whose images captured (and continue to enchant) the public eye. Yet the visual language operating in those images—the expansive spaces standing in for deep time as well as their relentless relegation of the Indigenous residents of those lands to the past—drew upon themes and concepts that were already established, as I show, in antebellum geological fantasy. In the same way, dinosaurs, which became the most popular representatives of the geologic past in the United States near the end of the century, stepped out onto terrain that had been prepared for them in the antebellum period, even as they manifested a more ferocious conception of US imperialism.[104]

The book's focus on the United States highlights its status as an especially good case study for geological fantasy. American scientists, as we will see in chapter 1, framed the North American continent as an exceptional geological exemplar, pronouncing it more instructive and more interesting than Old World landmasses. But the United States does, in fact, provide an exemplary illustration of one common form of geological fantasy: the imbrication of geology and nationalism. Long before the formation of the United States Geological Survey (USGS) in 1879, geology helped to coordinate state power and American national affect with respect to conquered and annexed lands. Geologists accompanied most of the exploratory missions launched by the

United States over the course of the nineteenth century. Their purpose was largely pragmatic: the identification and mapping of mineral deposits and other information pertaining to what Schoolcraft, one of those surveyors, termed "national and domestic purposes."[105] Yet their writing about those lands and their travels thereon also fueled public interest in the geologic past. As Thomas Allen notes, the ability to "imagine [American] land as a repository of time—ages of time stretching unfathomably far into the depths of the earth" satisfied the perceived need for a national history sharply distinguished from that of Europe.[106] Geologic nationalism also served the purpose of land conquest, annexation, and settlement by providing a deep history that white settlers could orient toward their own arrival. The biopolitical dimension of settlement, the remaking of kinship, sexuality, and reproduction toward domestic-familial modes, was accompanied by a geo-phantasmatic reconstruction of the earth, one that imagined the continent as progressing toward the establishment of those modes. This fantasy served to justify the idea of land ownership as the foundation of the American household even as practical geology's mapping of the land according to "resources" facilitated the possibility of extraction.[107]

The archive for *How the Earth Feels* includes both formal scientific publications and popular geological writing as well as newspaper and magazine articles, poetry, oratory, fiction, and the visual arts—all common sites for the circulation of geological information in both pragmatic and speculative guises. I pay particular attention to the aesthetic dimension of these writings because this is where geological fantasy most often takes hold. I have deliberately sought, in these pages, to expand the handful of canonical writers whose work tends to be highlighted in studies of the influence of geology on nineteenth-century authors (Ralph Waldo Emerson, Henry David Thoreau, Herman Melville), both because those writers have already been ably addressed in this context by Branka Arsić, Eduardo Cadava, and many others, and because their writings exemplify only a portion of the wide range of forms geological fantasy took in this period.[108] I am especially indebted to two fine books that examine geological time in the nineteenth-century United States: Wai Chee Dimock's *Through Other Continents: American Literature across Deep Time* and the geological chapters of Allen's *A Republic in Time: Temporality and Social Imagination in Nineteenth-Century America*. Dimock's and Allen's analyses of how nineteenth-century writers wrestled with the problem of geological time, which primarily address transcendentalist writers, make possible my own exploration of geological fantasy by other writers and my consideration of how geological time intersects with biopower in settler-colonial

and racialized contexts. I also owe a great deal to the work of cultural historians focusing on British geology in this period, including Adelene Buckland, Ralph O'Connor, and Noah Heringman. Heringman's account of what he terms "aesthetic geology" has been especially useful in my discussion of nineteenth-century American geological fantasy insofar as he attends to the interplay of the sublime alterity of rock, in the British Romantic imagination, with "economic geology," the part played by the science in the development and capitalization of land. My attention to settler colonialism and to the ways geological fantasy operated in relation to those genres of the human that took form in the Americas builds on this insight.

This book progresses from an initial overview of dominant forms taken by nineteenth-century geological fantasy to four chapters organized around case studies. Chapter 1, "'The Infinite Go-Before of the Present': Geological Time, Worldmaking, and Race in the Nineteenth Century," explores a range of geological texts from Europe and North America as they navigate the meanings of the planet's antiquity, turning it into a form of cultural capital for overrepresented Man. Dwelling on the centrality of Cuvier to Foucault's understanding of life, I excavate the occluded role of geological fantasy in modern biopower, then turn to the way writers focused on the United States engaged with this figure as a means of establishing both territorial dominion and racial hierarchy across the continent. The genre I term "manifest geology" nationalized and racialized geochronology, tying together the deep past and the American future. Yet geology also sponsored critical departures from this genre. In a closing consideration of James Fenimore Cooper's adventure novel *The Crater, or, Vulcan's Peak: A Tale of the Pacific* (1847), I show how the recalibration of geology's time could be used to question its foundations.

Chapters 2 and 3 highlight fantasies that took shape around regional geological events whose paces diverged: Indigenous and settler responses to a series of earthquakes in the central Mississippi Valley area in 1811–12, along with the extinction fantasies sedimented in their aftermath, and settler scientific and poetic writing about fossilized footprints identified in the Connecticut Valley in the mid-1830s. Chapter 2, "Unsettled Ground: Indigenous Prophecy, Geological Fantasy, and the New Madrid Earthquakes," begins by considering the nongeological analyses of the earthquakes developed by Indigenous people in the region, which regarded them as an anticolonial activation of the earth, and by settlers, whose religious and sensational responses to the quakes were enfolded into narratives of US national benevolence used to further white settlement and Indigenous displacement. From there, it goes on to document the absorption of Indigenous analyses of the quake into the

oft-repeated settler romance of "Tecumseh's prophecy," which provided (and continues to provide) a form of national-geological catharsis, even as geological investigation of the quakes and their effects abetted Indigenous removal by imagining them in the mode of the fossil other. Chapter 3, "Romancing the Trace: Ichnology, Affect, Matter," examines scientific writing, sermons, and poetry about the fossil tracks, which were initially identified as the traces of long-extinct birds. Focusing in particular on writing by the Massachusetts state geologist Edward Hitchcock and the Romantic poet Henry Wadsworth Longfellow, I show how the tracks both continued and partially unsettled the work of settler geological fantasy seen in the previous chapters. Two opposing takes on human agency imprinted on the tracks emphasize at once its limits and its endurance in ways that make them available for alternate political purposes, including the condemnation of chattel slavery.

Chapters 4 and 5 focus on what I term "minor geologies": located clusters of fantasy that operate apart from, and often against, the geology of overrepresented Man. Here I consider two such locations—the experimental queering of the white feminine body and the geologic forms of freedom envisioned by Black male antislavery writers. My intent is not to provide a broad overview of nineteenth-century minor geologies—a project that scholars have begun to take up—or to catalog the many forms they might take.[109] Rather, in selecting these specific sites of analysis, I want to highlight the unevenness that so often marks fantasies of geologic dissolution and reconstruction. In each chapter, the writers I address draw brilliantly on the other-than-human possibilities geology offers but never fully detach from the forms associated with Man, maintaining investments in whiteness and masculinity, respectively. Chapter 4, "Matters of Spirit: Vibrant Materiality and White Femme Geophilia," focuses on how the supposedly porous bodies of white women intersected with stratigraphic and speculative explorations of the planet's past. I point to parallels between contemporary new materialist attention to the energetic nature of matter and to nineteenth-century reflections on something like the spirit of geological matter—though a spirit that, in this chapter's decidedly unconventional examples, markedly departs from the Christian inflection employed by writers considered in earlier chapters. The first example addressed is a series of geological experiments conducted by Elizabeth M. Foote Denton and Annie Denton Cridge, William Denton's wife and sister, who claimed the ability to sense the past experiences of geological matter and other objects. The second case is Harriet Prescott Spofford's 1860 short story "The Amber Gods," whose unusual narrator, Giorgione Willoughby, a young white woman from a wealthy family, uses amber—"fossil

gum"—to access the geological past, a site where she can invent new ways of being and new erotic possibilities. In both cases, the porosity of the white feminine body stops short of unsettling its whiteness; while white femme geophilia departs markedly from the masculinism of much nineteenth-century geological fantasy, it inclines toward the replication of antebellum American racial hierarchies.

Chapter 5, "The Natural History of Freedom: Blackness, Geomorphology, Worldmaking," continues the examination, begun at the end of chapter 3, of how geological fantasy might be organized in opposition to chattel slavery and antiblackness in the United States by focusing on the uptake of geological tropes and analyses in writing by African American men at midcentury. Drawing on Britt Rusert's analysis of "fugitive science," I consider how fugitive and speculative geology drew on the aesthetic and historical dimensions of the science, exploring its potential for resisting slavery and for generating alternative forms of African American humanity. Some of these emerge from citations of volcanism by Frederick Douglass and J. Sella Martin, who framed it both as a figure of Black heroic leadership and as the site of geologies and ecologies suggesting genres of the human other than possessive individualism. The chapter also considers James McCune Smith's geological theories of race and Black worldmaking. McCune Smith, as I show, deftly employed geology both to counter white-supremacist theories of biological fixity and to imagine modes of Black social life that alternately reflected and departed from the conventional association of geology with "progress." In both cases, though, the omission of any consideration of gender diminishes the potential of these creative responses to the conditions of Black life.

In a brief closing Coda, "Ishmael's Anthropocene: Geological Fantasy in the Twenty-First Century," I address the Anthropocene proposal as the dominant form of contemporary geological fantasy. As the proto-Anthropocenic musings of Ishmael, the narrator of Herman Melville's 1851 novel *Moby-Dick,* demonstrate common responses to the epochal proposal draw on phantasmatic structures that reach back to the nineteenth century, reproducing some of the affects and genres associated with overrepresented Man. In place of the same old story, I contend, the present crisis requires not the "geology of mankind"—a term sometimes used synonymously with Anthropocene—but a geology *against* Man, one that can manifest geology's otherworld-making capacity responsively within our own.

notes

INTRODUCTION

1 On the origins of the Anthropocene proposal, see Kolbert, *Sixth Extinction*.
2 See, for example, Wood, *Deep Time, Dark Times*, 34.
3 De Landa, *Thousand Years of Nonlinear History*, 27.
4 Metcalf, "Interest and Importance," 227.
5 O'Connor, *Earth on Show*, 33.
6 Hutton, "Theory of the Earth," 304.
7 Playfair, "Biographical Account."
8 Denton, *Our Planet*, 66.
9 For explorations of the cultural significance of these events in the eighteenth and nineteenth centuries, see McCallam, *Volcanoes in Eighteenth-Century Europe*, and Gardner Coates et al., *Last Days of Pompeii*.
10 Ansted, *Great Stone Book of Nature*.
11 Rozet, quoted in Hitchcock, "Preface," vi.
12 Metcalf, "Interest and Importance," 227.
13 Foucault, *History of Sexuality*.
14 Puar, "'I Would Rather Be,'" 63.
15 Playfair, "Biographical Account."
16 Berlant, "Intensity Is a Signal," 114.
17 Berlant, *Cruel Optimism*, 2.
18 McPhee, *Basin and Range*, 126. For reflections on the power of thinking with, beyond, and against extinction, see Grusin, *After Extinction*.
19 McGurl, "New Cultural Geology," 382.
20 Buckland, quoted in O'Connor, *Earth on Show*, 279.
21 O'Connor, *Earth on Show*, 1–2.

22 B. Noble, *Articulating Dinosaurs*.
23 Denton, *Our Planet*, 41, 51.
24 As I discuss in chapter 4, some of Denton's own research literalizes this technique. He was a believer in psychometry, a form of mediumship that involved the sensing of residues of past experience, and along with his wife, Elizabeth Denton, and sister, Annie Denton Cridge, he used this technique to conduct research from the first-person perspective of geological and astronomical artifacts (stones, meteorites, and so forth).
25 Wynter, "Unsettling the Coloniality"; Foucault, *Order of Things*.
26 Agassiz, "America, the Old World," 375. See also Agassiz, "Silurian Beach," "Fern Forests," "Mountains and Their Origin," "Growth of Continents," "Geological Middle Age," "Tertiary Age."
27 Buckland, "'Inhabitants of the Same World.'"
28 Hutton, *Theory of the Earth*, 271. Hutton argued that the history of the earth could be inferred from causes now in operation, a forerunner of what would come to be known as "uniformitarian" or steady-state theory, against what was often called "catastrophism," the belief that the sudden, violent changes that were primarily responsible for the state of the earth had been more intense in the prehistoric past and were gradually diminishing in force. This argument permitted some "catastrophists" to remain within the biblical time frame, then established at 6,000 years, though not all did. For instance, Georges Cuvier is often deemed to be a biblical literalist because of his catastrophist leanings, but as we will see in chapter 1, he actually accepted then-current geological thinking about the earth's age.
29 Rudwick, *Meaning of Fossils*.
30 Hitchcock, *Religion of Geology*.
31 Denton, *Our Planet*, 296.
32 Denton, *Our Planet*, 123.
33 Denton, here, is an exception; as I discuss in chapter 4, his geology aligned with Modern Spiritualism rather than Christianity. Overall, though, the presence of Christianity within the field, as Bowler shows, was pronounced, though it declined by the end of the century. See Bowler, *Fossils and Progress*; see also Klaver, *Geology and Religious Sentiment*.
34 Bowler, *Fossils and Progress*, 29.
35 Asad, *Formations of the Secular*, 13; quoted in Ogden, *Credulity*, 6. For other important recent studies of secularism in the nineteenth-century US, see Modern, *Secularism in Antebellum America*, and Coviello, *Make Yourselves Gods*.
36 Holbrook, "Family Cabinets of Nature."
37 Holbrook, "Family Cabinets of Nature."
38 Ellsworth and Kruse, "Introduction," 6.
39 Wood, *Deep Time, Dark Times*.
40 Fecht, "Urban Geology."
41 Gould, *Time's Arrow, Time's Cycle*, 1.

42 Chakrabarty, "Anthropocene Time," 6.
43 Grusin, "Introduction," vii.
44 Meillassoux, *After Finitude*, 5.
45 Morton, *Hyperobjects*, 61.
46 Morton, *Hyperobjects*, 59–60.
47 Bennett, "Systems and Things," 232.
48 McGurl, "New Cultural Geology," 380.
49 On ecocentrism, see Buell, *Environmental Imagination*.
50 Bjornerud, *Timefulness*, 16.
51 Povinelli, *Geontologies*, 76. A noteworthy exception to this tendency is Jussi Parikka's *Geology of Media*. Observing that "a deep time of the planet is inside our machines, crystallized as part of the contemporary political economy," Parikka tracks the global peregrinations of rare earth minerals—from toxic sites of extraction through computers and other techno-toys to the ever-growing piles of e-waste disproportionately dumped on the non-Western world, proposing that these reveal the geologic underpinnings of sped-up consumerism and exploitation of cheap labor. See Parikka, *Geology of Media*, 57–58.
52 Z. I. Jackson, "Animal," 671. See also Z. I. Jackson, "Outer Worlds." For related critiques of the obfuscation of race in new materialist thought, see Tompkins, "On the Limits and Promise"; Leong, "Mattering of Black Lives."
53 Morton, *Hyperobjects*, 58. Wynter's analysis of overrepresented Man, which I discuss in more detail below, is contained in Wynter, "Unsettling the Coloniality."
54 Morton, *Realist Magic*, 82.
55 Morton, *Realist Magic*, 101.
56 As Neel Ahuja has recently outlined, for instance, oil is the very material of globalization, insofar as petroleum production played a central role in the spread of racial capitalism from the Atlantic world across Asia. See Ahuja, *Planetary Specters*.
57 Morton, for instance, frequently mocks Marxist critics for trying to explain everything. New materialist philosopher Jane Bennett, similarly, affirms without explanation that within the nonhuman turn, "'historical materialisms' are not perceived as offering [a] . . . satisfying response to . . . those [trends] described roughly as ecological: the growing awareness of climate change and the possibility that Earth may have entered the geo-political epoch of the Anthropocene." See Bennett, "Systems and Things," 232. For powerful historical materialist analyses that do provide responses to ecological crisis, see Moore, *Capitalism in the Web of Life*; Malm, *Fossil Capital*. For Marxist responses to the nonhuman turn itself, see Rosenberg, "Molecularization of Sexuality"; Nealon, "Infinity for Marxists."
58 Coole and Frost, "Introducing the New Materialisms," 9.
59 Deleuze, *Difference and Repetition,* 2. See also Cohen, *Stone*. Deleuzoguattarian thought is a key influence on new materialist thought, though not the only

one. See Coole and Frost, "Introducing the New Materialisms"; also Dolphijn and Tuin, *New Materialism*.

60 De Landa, *Thousand Years of Nonlinear History*, 20.

61 Bennett, *Vibrant Matter*, 122; Yusoff, "Geologic Life," 779. See also Bob Johnson's fine *Mineral Rites*, which excavates the experience and meanings of geologic life in the era of fossil fuels.

62 Barad, *Meeting the Universe Halfway*, 91.

63 Deleuze and Guattari, *Thousand Plateaus*, 19.

64 Deleuze, "What Children Say," 64; partially quoted in Byrd, *Transit of Empire*, 14.

65 Byrd, *Transit of Empire*, 14.

66 Todd, "Indigenous Feminist's Take." See also TallBear, "Indigenous Reflection on Working"; Ravenscroft, "Strange Weather." As a white scholar educated and operating within settler contexts and theoretical frames, I don't, as yet, have sufficient knowledge of Indigenous thought to do justice to its breadth and complexity within this book, although I have tried to engage Indigenous views of place and land in relation to settler-geological ones. My purpose in citing Todd's critique is to observe that settler scholars at minimum need to be conscious of the limitations of Euro/American theories in relation to Indigenous and decolonial thought and to call attention to the way histories of Indigenous displacement are bound up with the subjects they address.

67 Todd, "Indigenous Feminist's Take," 16.

68 See O'Brien, *Firsting and Lasting*. In an earlier study, *Dispossession by Degrees*, O'Brien asserts that the myth of extinction was itself a way of understanding land, predicated on certain assumptions about the "connection between land and identity" that associated landlessness with disappearing (10).

69 Todd, "Indigenous Feminist's Take," 15.

70 Ellsworth and Kruse, "Introduction," 6. One example of such situated responses is *Geologic City*, created by Ellsworth and Kruse, collaborating under the name Friends of the Pleistocene. The project narrates the structures that organize and enable life in New York City in geological terms. (Brownstone buildings, for instance, are labeled "Dinosaur Houses," referencing the contemporaneity of their sandstone exteriors with the iconic Triassic/Jurassic creatures, leading to the renaming of Brooklyn as "Brownstone National Park.") See Friends of the Pleistocene, *Geologic City*.

71 Coulthard, *Red Skin, White Masks*, 13. See also Simpson, "Land as Pedagogy," 9–10.

72 Vanessa Watts similarly identifies the ongoing abstraction and anthropocentrism attached to recent moves in settler scholarship that seek to recognize the agency of nonhumans. See Watts, "Indigenous Place-Thought."

73 Rifkin, *Settler Common Sense*, 3.

74 In *The Birth of Energy*, Cara New Daggett examines what she terms the "energy-work nexus . . . the intertwining of energy and the Western ethos of

dynamic, productive work . . . produced as cosmic truth." Geology made this entanglement possible; as she observes, the geological emphasis on the earth as historical rendered it "a duration in time, and thus . . . a potential reservoir for work." Yet in this view, geological matter (fossil fuels) and the solar energy system remain passive in themselves; humans must release energy from this reservoir, must put the earth to work. See Daggett, *Birth of Energy*, 5, 25.

75 Goeman in Aikau et al., "Indigenous Feminisms Roundtable," 94.

76 Rifkin, "Geo into Bio and Back Again," 876.

77 De Landa, *Thousand Years of Nonlinear History*, 21.

78 Bennett, "Powers of the Hoard," 239–40.

79 I make this claim at greater length in "How the Earth Feels," 7.

80 Brown, *Black Utopias*, 124. On the racialization of matter see especially Chen, *Animacies*, and Z. I. Jackson, *Becoming Human*.

81 King, *Black Shoals*; Cram, *Violent Inheritance.* See also Savoy, *Trace*, and LeMenager, "Sediment."

82 Yusoff, *Billion Black Anthropocenes*, 14.

83 Foucault, *History of Sexuality*, 136.

84 Povinelli, *Geontologies*.

85 Povinelli, *Geontologies*, 5.

86 Gómez-Barris, *Extractive Zone*, 5.

87 Wynter, "Unsettling the Coloniality," 290.

88 Quoted in Robins, *Mercury, Mining, and Empire*, 69. After the Spanish Crown took over Indigenous silver mining sites in South and Central America, it expanded both the scale and the danger of mine work through the introduction of techniques such as the use of mercury to amalgamate silver. The adoption of this process led to the acceleration of silver mining in Bolivia and the establishment of mercury mines at Huancavelica in what is now Peru. (Both sites remain profoundly contaminated by mercury to this day.) Robins asserts that initially, enslaved Africans were not used as mine laborers at Potosí because enslavers regarded them as capital investments and did not want to risk losing them to the horrific conditions in the mines. This was not the case in Brazil and elsewhere, however.

89 Schoolcraft, *Summary Narrative*, 185.

90 McKittrick, "On Plantations," 948.

91 McKittrick, "Plantation Futures," 8.

92 Allewaert, *Ariel's Ecology*.

93 K. Adams, "DuBois, Dirt Determinism."

94 Simpson's account of "land as pedagogy," a framework within Nishnaabeg thought, requires knowing with, not simply about, land: understanding oneself as "ultimately dependent on intimate relationships of reciprocity, humility, honesty and respect with all elements of creation, including plants and animals." Simpson, "Land as Pedagogy," 9–10. The mapping practices

developed by enslaved and self-emancipated Black subjects, McKittrick contends, navigated land in terms of material relations and sensory connections: "fugitive and maroon maps, literacy maps, food-nourishment maps, family maps, [and] music maps . . . assembled alongside 'real' maps (those produced by black cartographers and explorers who document landmasses, roads, routes, boundaries, and so forth)." McKittrick, "On Plantations," 949. Forms of resistant recollection like Jennifer C. James's "ecomelancholia," which emphasizes how "memory permeates black landscape . . . becom[ing] a part of the natural world," demonstrate the survival of these alternate modes of land knowledge in and as modes of critical memory. James, "Ecomelancholia," 163.

95 Schoolcraft, *Memoir on the Geological Position*, 3.

96 O'Brien, *Firsting and Lasting*, 107.

97 O'Brien, *Firsting and Lasting*, 119. In an earlier study, O'Brien asserts that the myth of extinction was itself a way of understanding land, predicated on certain assumptions about the "connection between land and identity" that associated landlessness with disappearing. See O'Brien, *Dispossession by Degrees*, 10.

98 Coulthard, *Red Skin, White Masks*, 152; quoted in Schuller, "Fossil and the Photograph," 232.

99 Pandian, *Anthropology and the Western Tradition*, 57.

100 Barker, "For Whom Sovereignty Matters." See also Morgensen, "Biopolitics of Settler Colonialism"; Rifkin, *When Did Indians Become Straight?*

101 Mbembe, "Necropolitics," 40.

102 Byrd, *Transit of Empire*, xxiii. Wynter's account of the emergence of overrepresented Man identifies these two processes as stages, which she differentiates with the terms *Man1* and *Man2*. I have chosen not to use these terms in order to avoid the implication that Man2, the figure organizing modern racialization, displaces Man1 insofar as these processes, as Byrd stresses, are entangled but not identical. See Mark Rifkin's discussion of Wynter along these lines in Rifkin, *Fictions of Land and Flesh*, 20–25.

103 On the rhetoric of the images produced in postbellum geological surveys, see Trachtenberg, "Naming the View"; Sandweiss, *Print the Legend*; Berger, "Overexposed." For perspectives on Indigenous photography as it counters the alliance between photography and settler colonialism, see Tsinhnahjinnie and Passalacqua, *Our People, Our Land, Our Images*. On the "bone wars," see Jaffe, *Gilded Dinosaur*. For a brilliant consideration of settler photography of Western subjects in tandem with paleontology, see Schuller, "Fossil and the Photograph." On dinosaurs as cultural objects, see especially B. Noble, *Articulating Dinosaurs*, and W. J. T. Mitchell, *Last Dinosaur Book*.

104 On dinosaurs and empire, see W. J. T. Mitchell, *Last Dinosaur Book*.

105 Schoolcraft, *Memoir on the Geological Position*, 9–10.

106 Allen, *Republic in Time,* 152.

107 On the structures of feeling that suture settler kinship and land ownership, see Rifkin, *Settler Common Sense*.

108 See Allen, *Republic in Time*; Arsić, *On Leaving* and *Bird Relics*; Cadava, *Emerson and the Climates of History*; Jonik, *Herman Melville and the Politics*; Dimock, *Through Other Continents*; Farmer and Schroeder, *Ahab Unbound*; Morgan, "Transcendental Geologies"; R. Martin, "Fossil Thoughts"; Nurmi, *Magnificent Decay*; Windolph, *Emerson's Nonlinear Nature*; Guthrie, *Above Time*.

109 For a fine exploration of what a nineteenth-century Black feminist minor geology might look like, see Samantha Pinto's reading of three nineteenth-century Black women whose narratives make visible the imbrication of sexual and scientific violence. Pinto's "unnatural history" speculates on how the fossil form might generate an alternate framework for the imagination of Black women's sexual agency. Pinto, "Objects of Narrative Desire."

CHAPTER ONE. "THE INFINITE GO-BEFORE OF THE PRESENT"

1 Emerson, "Poet," 329.

2 Whitman, "Slang in America," 431.

3 Whitman, "Slang in America," 435.

4 A similar analogy is made by Richard Chenevix Trench in his widely read *On the Study of Words*: "You know how the geologist is able from the different strata and deposits, primary, secondary, or tertiary, succeeding one another . . . to conclude the successive physical changes through which a region has passed. . . . Now with such a composite language as English before us, we may carry on moral and historical researches precisely analogous to his." Trench, *On the Study of Words*, 73–74.

5 Metcalf, "Interest and Importance," 229.

6 For readings of Emerson and Whitman that foreground their resonance with the nonhuman turn, see Arsić, *On Leaving*; Arsić and Wolfe, *Other Emerson*; Allen, *Republic in Time*; Bennett, *Influx and Efflux*.

7 Emerson, "Fate," 201.

8 Emerson, "Fate," 202.

9 Though this paragraph is sometimes taken as an expression of Emerson's own racist opinions, within the context of an essay that excoriates the positing of limits, whether of fate or nature, as obstacles to freedom, one that Eduardo Cadava identifies as "perhaps Emerson's most profound and searching engagement of the idea of manifest destiny in terms of questions of race," the deliberate failure of the pretended continuity between natural, prehuman history and the unnatural violence of American history becomes clearer. Cadava, "Guano of History," 106. For a nuanced reading of how Emerson's revision of geological time surfaces to disrupt the sedimentation of racial violence in his 1844 antislavery address, see Morgan, "Transcendental Geologies."

10 Goffe, "'Guano in Their Destiny,'" 30. On the composition and location of various types of guano, see Schnug et al., "Guano."