

Manifesting Vertical Destiny:
Geology, Reform, and the Stratified Earth in American Literature,
Long Nineteenth Century

by

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Dissertation submitted in partial fulfillment of
the requirements for the degree of Doctor
of Philosophy in the Department of
English in the Graduate School
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ABSTRACT

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Abstract

My project, *Manifesting Vertical Destiny: Geology, Reform, and the Stratified Earth in American Literature, Long Nineteenth Century*, excavates the cultural impact of the concept of the layered earth—or strata—in American fiction, non-fiction, and poetry. In the nineteenth century, the concept of strata changed the planetary narrative, revising theological interpretations of earth history, showing that the earth was much older than humanity and that humans were one element out of many contributing to this narrative, and a recent one at that. As they encountered deep piles of distinct rock layers in which humanity was absent, scientists realized that in the long story strata told, humanity was a new character rather than a central player. As they reached the general public, these stories elicited lively debates about the place of the human, anticipating many of the debates we are having today surrounding the question of the Anthropocene. *Manifesting Vertical Destiny* chronicles these debates and their social and political consequences.

In four chapters, I place scientists and literary writers side-by-side, demonstrating how they variously engaged the insights of geology provided by strata. Four thinkers exemplify the response to the newfound diminishment of the human by finding a new role for humans in this transformed cosmos. Literary writers Nathaniel Hawthorne and Emily Dickinson assert the force of imagination for human preservation, using their literary works to transform the erasing power of telluric force into a power to

reclaim the human. Similarly responding to the smallness of the human, the geographer George Perkins Marsh and the early American geologist William Maclure channel the stratigraphic imagination into new accounts of humanity writ large. Together, these figures show how strata inspired new ways of imagining the place of the human in society, while the literary case studies in particular demonstrate how the lessons of strata were working their way, metaphorically, into the collective imagination.

Ultimately, in looking downward, Americans discovered earth layers with no trace of the human. Such a conspicuous absence led these thinkers to pose the same question in the present: what are the limits of the human? In *Manifesting Vertical Destiny*, I show how the imaginative reconstruction of possible pasts within earth layers inevitably led Americans to reconsider the present and a hoped-for future. Geology and reform are intimately linked because, as Americans learned how to read the layered earth, they realized that each transition from one stratum to another marked a radical transformation in environment: the verticality of stacked-up layers denoted alternative places and times, in the form of ancient environments, within the same geographical point. The absence of the human within these many earth layers led nineteenth-century thinkers to question the impact of humans in their contemporary moment, pushing the boundaries of what was possible, from Hawthorne's transformed literary vision to Dickinson's argument for gender equality in the sciences, Maclure's radical realignment of economic class, and Marsh's evangelization of environmental ethics. For these

scientists and literary writers did not merely dally in earthly depths—they claimed verticality.

Dedication

For my parents

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Acknowledgements

I give thanks to everyone who has encouraged me during my time at Duke. I would like to especially thank Priscilla Wald and Michael D'Alessandro for numerous conversations, advice shared, and countless encouragements. I give thanks to Thomas Ferraro for his passionate feedback, Timothy Marr for his exuberant response to both the details and the grand picture, and Rob Mitchell for teaching me about science-and-literature studies. I am thankful for all the colleagues who have responded to my work both at Duke and at conferences. The Winterthur Museum and Library supported my project through a one-month research fellowship in July 2018. The Winterthur librarians, students, and support staff all generously shared their time and ideas. Early in my project, when I was considering a chapter on Henry David Thoreau, I received support from the Morgan Library and Museum; I was a reader in the Sherman Fairchild Reading Room in 2014 and 2015. In addition, I received support and advice from a 2015 NEH Summer Institute led by Sandy Petrulionis, "Transcendentalism and Reform in the Age of Emerson, Thoreau, and Fuller." Through fellowships, the Duke University Graduate School has given me the time to research and write about a topic I am passionate about. Most of all, I thank my family: my parents, Anne and William; my wife, Amy; my sister, Joy; and my entire extended family. If you are reading this, and I left you out, I thank you too.

Introduction

We cannot survey the crust of our planet without recognising the traces of the prior existence and destruction of an organic world. The sedimentary rocks present a succession of organic forms [...] which have successively displaced and succeeded each other. The different superimposed strata thus display to us the faunas and floras of different epochs. In this sense the description of nature is intimately connected with its history; and the geologist [...] cannot form a conception of the present without pursuing, through countless ages, the history of the past.

— Alexander von Humboldt, *Cosmos* [1849]

Time feels so vast that were it not

For an Eternity -

I fear me this Circumference

Engross my Finity -

— Emily Dickinson, Poem 858 [1864]

During the long nineteenth century, the layered earth—or strata—told a story of human smallness. As scientists encountered deep piles of distinct rock layers in which humanity was absent, they realized that in the long story strata told, humanity was a new character rather than a central player. This narrowing of the human element in earth’s story accompanied an expansion in human consciousness. Reaching beyond the narrow vision of the horizontal to express themselves, scientists and literary writers delved into depths. They claimed verticality.

In asserting this newfound vision of human smallness, these writers forged a link between geology and reform that was intimately tied to the concept of the layered earth. Just as the naturalist Alexander von Humboldt insisted that geologists “cannot form a conception of the present without pursuing, through countless ages, the history of the past,” nineteenth-century cultural figures framed contemporary issues through the deep

perspective provided by strata (55). Faced with telluric depths recording an endless array of violent changes—stratum upon stratum—receptive thinkers adopted earth’s rhetoric of transformation to envision literary, social, and political transfiguration in the nineteenth-century present.

This stratigraphic story—the realization of humanity’s diminishment—is simultaneously crucial and underappreciated. Accounting for the “new, antihumanist findings of the large-scale sciences,” literary critic Wai Chee Dimock asserts, “the feebleness of the human mind was, in some sense, the central discovery of the nineteenth century” (54). Astronomy’s vast expanses of space articulated this feebleness in the eighteenth century, while geology’s vast expanses of time continued the thought into the nineteenth. Historian of geology Martin J.S. Rudwick argues that geology created a “revolution in human thought no less profound, but much less widely recognized, than those associated with Copernicus, Darwin, and Freud” (*Worlds Before Adam* 553). Rudwick defines this revolution as “the realization that our human species is a recent newcomer on our planet, confined to a mere sliver of time at the tail end of an immensely long, diverse, and eventful history of the earth” (553). Yet this revolution cannot be reduced solely to temporal expansion, “since there had always been the possibility that the universe was eternal and the timescale therefore infinite” (553). The revolution, rather, centered upon the way geology transformed the definition of the human. The place of the human “was radically reshaped, in such a way that *non-human*

nature was now seen to be as significant in the dimension of time as it had long been recognized to be in the dimension of space" (553-554). The stratigraphic story is the narrative of the non-human taking its proper place within earth history.

Yet this division of the non-human narrative into astronomy's space and geology's time is, in one sense, a false dichotomy. Strata—in all their physicality—were the means by which thinkers envisioned long spans of time. The "deep space" of stacked earth layers was the material means of imagining long durations and countless transformations. The layered earth contributed the "deep" of deep time, a concept denoting unimaginably long durations of earth history.¹ Humans learned how to read these layers during the nineteenth century, and scholars have attached terms to this newfound vertical vision, from Bruce Braun's "seeing geologically" to Jason Weems's "cross-sectional gaze" (22, 37). Regardless of the terms one uses, strata became more widely legible in the nineteenth century than they had ever been before.² During this period, strata not only transformed the human story, but also—more fundamentally—*became* story.

Earth layers are also the major visual tools I use to expand ecocritical and Americanist critical discussions. Ecocritics have traditionally focused, with nuance and precision, on the green surfaces of the earth. Building on ecocriticism's material turn, my project extends Serenella Iovino and Serpil Oppermann's assertion that "all matter [...] is a 'storied matter'" (1). Like such critics as Stacy Alaimo, Karen Barad, Ross

Barrett, and Daniel Worden, I cast matter not as passive objects, but as actants intimately circulating within networks that include humans. While ecocritics tend to focus on materials that are more readily relatable to the human, such as bio-materials and energy, my project narrates how Americans registered the very ground under their feet and how that ground allowed them to envision a different future. These futures are collective precisely because of the pervasiveness of this medium's message: Americans from all walks of life, from occasional mineral collectors to natural historians, were discovering the historical story embedded in the earth. It is surprising that material ecocriticism has historically undervalued geology, insofar as the materials of this discipline are thicker, more pervasive, and also more common than many of the other biotic material subjects. We can expand the scope of material ecocriticism by positioning "mere rocks" as cultural movers.³ Consider this a vertical intervention. In an age in which nations are increasingly turning inward, refusing a planetary perspective, my project reveals the variety of creative intellectual reforms strata enabled when thinkers were receptive to its stories. In looking at the interpretively malleable and transformative layers of earthly pasts, Americans discovered the grounds for a different future.

In addition to ecocriticism in general, the verticality of geology's vision also reframes American critical histories in particular through the simple gesture of looking downward. Nineteenth-century American literature is traditionally situated horizontally, as if the westward trajectory of expansionist narratives only occurred along

a flat plane. Literary scholar Eric Sundquist points out that as explorers and settlers moved westward, those who published travel accounts “composed in effect the nation’s first and most influential nationalistic literature” (Sundquist 135). These accounts often skim the surface, noting biological and surficial mineral resources. This incessant horizontality coopts time itself, as many writers mention how that seemingly most horizontal technology—the railroad—altered nineteenth-century conceptions of time, decreasing distances and speeding up temporal scales.⁴ Yet these same westward-moving railroads also cut downward into earth’s layers whenever their flat trajectory met a hillside. As numerous nineteenth-century geological treatises and cross-sectional sketches reveal, railroads opened up a subterranean view to many Americans, revealing the deep time of vertical space just as they were shortening time horizontally. Thus my project also shows how the deep space of stratigraphic layers unsettles the dominant nineteenth-century narrative of westward progression, aligning vision, metaphors, and capabilities of thought along an alternative axis.

Along this underappreciated axis, there are two dominant theories of verticality in the nineteenth century. The cultural geographer Bruce Braun contextualizes the rise of historical—or what he calls “stratigraphical”—geology by the mid-nineteenth century in Canada: “In the span of less than 100 years a dramatic shift had occurred, from collecting specimens and viewing the physical outlines of landscapes to ‘seeing geologically.’ What was visible in nature had changed irrevocably: one no longer

attended to scattered mineral samples or other curiosities, but to the ‘inner architecture’ of the earth” (22). Braun recognizes stratigraphic vision as a fundamentally new way of apprehending the earth during the nineteenth century—a vision that is learned and taught and shared, never automatic or universal. In contrast, the cultural critic Ruth Mackay begins her study of American verticality in 1890, “the year that the U.S. Census declared the end of unsettled land lying to the west” (2). Transforming conceptions of space, this westward halt led to a metamorphosis in “American aspirations for conquering space,” as “vertical spatial metaphors [...] replaced horizontal ones after the closure of the frontier” (2). She argues, “facing the loss of what was imagined to be endless westward land, narrative attention turned toward the verticality of skyscrapers, aviation, drilling, and mining” (2). While both theories of verticality offer insight into conceptualizations of territory, they do not attend to nineteenth-century verticality’s profound redefinition of the human in the face of deep time and endless transformations from one distinct earth layer to the next.

Aligned into layers, grains of rock tell a story. No longer discrete, homogenized collections of grains linking a lithology to a single environment, the introduction of layers introduces change. Traditionally, every sedimentary rock lies within a continuum of erosion and deposition. Different environments activate different forces—wind, water, glacial, among others—leading to different erosive-depositional contexts producing particular genres of rocks. Though the water has long moved on, the color,

size, and patterning of lithified sediment capture a moment of liquid force. The ephemeral movements of water get preserved for eternity (or at least millions of years), arranging mineral particles according to the water's depositional character. Rocks represent forces frozen in time. A rock composed of imbricated pebbles within a matrix of very coarse grains shows how unidirectional water flow—say, in a braided river—formed this pattern. A rock composed of clean quartz sand gently dipping in parallel beds suggests a beach or barrier island supplied the fluid force capable of sustaining that pattern. A slab of black shale illustrates how these grains—too fine for the eye to discern—settled quietly in a deep, oxygen-deprived basin.

So far, though, these three lithic examples represent what is possible when analyzing discrete, homogenized collections of grains: geologists classify the rock and then link that lithology with its depositional environment, or what they call the rock's facies (i.e. the sedimentary structures and organic and inorganic material that link the rock to a particular environment where it formed). By themselves, these three lithologies are akin to characterizations, or even vignettes. It takes strata, though, to tell a story.⁵ Imagine, for a moment, a hypothetical (and unlikely) stratigraphic column containing these three rocks: the imbricated conglomerate on the bottom, the clean quartz sandstone in the middle, and the black shale on top. The verticality—layered one on top of the other—of these disparate lithologies denotes horizontal changes through time, transitioning from a terrestrial (braided river) to a transitional (barrier island) to a

marine (deep shelf or basin floor) environment. That particular space on earth has witnessed a geologic crescendo (or marine transgression), as water evidently intruded onto the land, transforming what was once river land into a deep marine environment. This ancient, horizontal movement of water expresses its geologic capabilities—a mixture of forces enacted in time and place—in stone. If rocks by themselves represent forces frozen in time, strata represent changes—whether transitions or revolutions—in forces, frozen in time, and humans learned how to read this rocky rhetoric, like never before, during the long nineteenth century.

Broadly, this project is an elaboration of that last sentence, assessing its geologic and cultural interlayerings. Witnessing the transformation of forces within the layered earth provided a model for Americans to transform their own world. The layered earth, in other words, provided a rhetoric of change. Stratigraphic layers embody a dizzying array of spatial and temporal shifts: the dividing line between one unique layer of earth and the next, from one type of sedimentary rock to another. While modern geologists would use the language of conformities and unconformities, focusing merely on whether or not that stratigraphic transition is interrupted, the authors in my study register the cultural implications of strata's volatility. For them, the transition between layers—the leap in time and space—is polysemic; it reminds us that the planet knew the life forms that preceded us and it will witness our successors. For some authors, stratigraphic transformation connotes environmental disaster, trauma, and loss, as one

environment dies and another rises; for others, this shift from one stratum to another — unhinged from a particular emotional valence — embodies change itself. No matter how they specifically register stratigraphic shifts, though, what was clear was that the layered earth radically altered the concept of the human, and thus humans were tasked with finding a new role for themselves. They were tasked, in other words, with becoming as dynamic and resilient as the layers and earth forces they were studying.

To begin articulating my argument regarding the relationship between strata and force in American literature, and why that argument matters, I need to ask a more fundamental question first, namely: how, generally, do humans mobilize strata — or sedimentary rocks — to tell a story? The movement from rock to story, from lithified signifier to environmental signified, may seem manifest to an experienced geologist, but this seemingly automatic process only results from years of training the senses, of disciplining the body to associate certain patterns of grains with certain depositional environments. One of the first steps in converting strata to story is to convert one's body into a narrativizing agent by becoming an embodied measurement of the outside world. Geologists are constantly straddling the boundary between embodied and decimal measurements, between the somatic and metric systems. Geologists in the field convert their pace (distance walking from right foot to right foot) into meters, and their eye height, middle joint of the little finger, and thumb width into centimeters, knowing this will help them describe ever-smaller units of distinct strata, from large lithostratigraphic

units like Groups and Formations to the smallest distinct units of strata, called Beds. Understanding grain size in millimeters, they also train their fingers to perceive gradations in grain size merely by feeling a rock: if they can easily see grains in a rock, for example, it is composed of coarse sand; if they can see the grains and it feels like coarse sand paper, the rock is composed of medium-sized sand grains; if they have to squint to see the grains and it feels like regular sandpaper, the rock is composed of fine sand, and if they can feel the grains but not see them, it is composed of either very fine sand or silt. Thus geologists discipline their senses to reliably measure rocks and strata in multiple dimensions, such as color, sedimentary structure, grainsize, and name. Knowing that every rock is also a record of its own making, they also associate specific, fungible characteristics with particular depositional environments. They start broadly, knowing that tan and pink sedimentary rocks tend to be terrestrial, and green ones tend to be marine; that if a rock contains shells, it probably formed in the lower shore face; that unidirectional ripples on a rock are associated with the upper point bar, and that silty shale denotes an offshore shelf.

One could easily continue this miniature sociology of science study of geology, analyzing, for example, a stratigrapher's field notebook to see how these hundreds of trained perceptions combine to describe and narrate a stratigraphic section, such as the way geologists constantly link rocks to a precise location. What is revealed through these examples, though, is that strata's story is not manifest—it is *made* manifest as

geology intimately intersects with the human body, as the interaction of the senses begins to mobilize strata to tell a story. It is the story of that making manifest that I want to tell because just as the human body can be disciplined into narrating the layering of strata, American writers—in their entanglement with strata—learned how to narrate earth layers, or verticality.

The phrase “manifesting vertical destiny” may sound like Whig science, as if I am setting up an inevitable trajectory for America’s engagement with sedimentary rocks and strata. But I use this phrase more in its etymological meaning, to gesture toward the way narratives about rock layers are constructed through a myriad of human-geological interactions, physically, psychologically, historically. In the eighteenth and nineteenth centuries, America grappled with the meaning of strata, and this meaning redefined the limits of the human and can be read in both literary and non-literary stratigraphic stories. Manifesting vertical destiny is the story of that making manifest. “Manifest” derives from the Latin, *manifestus*, which can be broken down into *manus* (hand) and *festus* (struck). “Destiny” comes from the Latin, *destinare*, meaning to “make firm, establish.” Thus this phrase emphasizes the materiality and physicality of strata’s story: how America engaged strata as a concept, making it firm by striking it—sometimes, literally—with the hand.

This manifesting of the layered earth is intimately tied with colonial and post-Revolutionary Americans' sense of ability and agency. In his 1782 *Letters from an American Farmer*, Jean de Crèvecoeur writes:

As it is from the surface of the ground which we till that we have gathered the wealth we possess, the surface of that ground is therefore the only thing that has hitherto been known. It will require the industry of subsequent ages, the energy of future generations, ere mankind here will have leisure and abilities to penetrate deep, and, in the bowels of this continent, search for subterranean riches it no doubt contains. (5)⁶

Framing the earth in pecuniary terms, Crèvecoeur divides natural knowledge between surfaces and depths, initiating the basic unit of stratigraphic knowledge. Although settlers in America have only skimmed the agricultural surface so far, he imagines a future in which descendants are able to delve into telluric depths. At present, though, his contemporaries lack the time and ability to sufficiently manifest the vertical. What Crèvecoeur reveals is that just as America was gazing westward, it was also gazing downward, into the earth. This simultaneous unease and fascination with the vertical plays out multiple times in the ensuing decades.

Almost a century later, the visionary American thinker and amateur geographer George Perkins Marsh, the central subject of my last chapter, would lament the inability of Americans to accurately perceive sediments and strata.⁷ Pointing out how geological science is relatively new compared with the other sciences, he asserts, "The common eye is not yet trained to the study and recognition of the inorganic, eruptive, or sedimentary forms and outlines which mark the surface of the earth, and still less to the relations

between different heights of formations and the vegetable organisms specially appropriate to them" ("Study of Nature" 84). Even by the mid-nineteenth century, most Americans, according to Marsh, do not recognize the lithologic patterns on earth's *surface*, thus also placing stratigraphic depths—"different heights of formations"—out of reach as well. To illustrate his point, he notes how few landscape paintings accurately capture the geological realm, and there is yet no painter who can depict "a sand-plain, a shattered lava-current, a natural prairie, or even a rocky pinnacle unclothed with moss or other vegetation" (84). American artists may understand the organic, but their abilities cannot fathom the inorganic. Marsh starts with flat surfaces (sand-plains, lava flows, prairies), magnifying into the vertical rocky pinnacle. Thus verticality itself represents the pinnacle—the assumed *telos*—of geologic knowledge.

America measures the metaphoric depths of its geologic knowledge and force against its ability to conceive verticality. Marsh evidently did not think America improved its sedimentary knowledge in the decade following the Civil War because he elaborates on the same point in a footnote in the 1874 edition of *The Earth as Modified by Human Action*. Noting how rock in the U.S. is often overlain with moss, soil, and vegetation, he asserts that the parochial American is "not very familiar with naked rock as a conspicuous element of landscape" (483). Again using landscape painting or description as evidence for his point, he complains, "in their conception of a bare cliff or precipice, they hardly ascribe definite color to it, but depict it to their imagination as

wearing a neutral tint not assimilable [*sic*] to any of the hues with which nature tinges her atmospheric [*sic*] or paints her organic creations" (483). Americans are so geologically blind that they cannot adequately perceive rock color. Yet Marsh, similar to Crèvecoeur, has hope for the future of America's vertical knowledge, insofar as he asserts, "the common eye is not *yet* trained to the study and recognition of the inorganic" ("Study of Nature" 84, emphasis mine). Evidently, the assumption that America will eventually grasp the layering of the earth is so ingrained in Marsh that he internalizes the assumed *telos* within the grammar of his sentence, admitting this stratigraphic knowledge is not *yet* common, but will be. America, for Marsh, is still very much in its infancy of manifesting the vertical.⁸

This relationship between strata and force finds its most acute contemporary expression in discussions regarding the Anthropocene, the concept that humans have become a geological force. Although traditionally the major forces guiding sedimentary rock formation have been erosion and deposition, geologists are currently assessing whether humans have sufficiently supplanted these forces, altering earth's stratigraphic record enough to justify a name-change in earth's chronological time. All too often, in an attempt to match their rhetoric with the extreme conditions of the Anthropocene, critics mischaracterize the concept to such a degree that they erase aspects of its history. The historian Dipesh Chakrabarty, for example, asserts that the Anthropocene denotes a collapse between natural and human history that is somehow *new*. Chakrabarty asserts

this newness throughout “The Climate of History,” noting, for example, “it is only very recently that the distinction between human and natural histories [...] has begun to collapse” because humans—as a collective—have transformed into agents with global impacts (207). “Humans began to acquire this agency only since the Industrial Revolution” (207). Perhaps his claim for newness stems from the way he equates the Anthropocene with recent climate change, overlooking how humans have impacted earth’s stratigraphic system for centuries. Though climate change certainly accelerates our stratigraphic signature, strata have been the sites of this human-geology collapse for a much longer time, arising in literature insofar as questions of force and impact crop up whenever humans talk about strata. As Anthropocene researchers point out, “humans had a growing stratigraphic influence throughout the Holocene epoch as the global population gradually increased” (Waters et al. 2622-2623). By returning to strata’s relation to the Anthropocene, we can see how human and geological time have melded for much longer than some might suggest and have been recognized as doing so since, including during the long nineteenth century.

Chakrabarty’s desire to equate the Anthropocene with climate change—and thus posit an elegant and precise start date aligning with the Industrial Revolution—is part of a larger narrative erasing particular dimensions of the Anthropocene’s complexity. This propensity to fixate on specific dates and locations as the “start” of the Anthropocene belies the diachronous messiness of its unfolding. There must be something supremely

satisfying about aligning such a momentous turn in geological history with a particular event or calendar date, but any such clean alignment necessarily erases some aspect of the Anthropocene's conceptual history.

What is erased is the way strata in general—particularly, sedimentary rocks—intrinsically occasion a contemplation of force and transformation. The geological layering of earth events—cycles of erosion and deposition—inevitably leads to questions of force because it is in strata that humans can impact earth history, that biology inscribes itself into geology. But how *does* strata occasion a contemplation of human impact? And if strata—or verticality—is made manifest through multiple intersections with the human body, how does this necessary incursion of the human alter the way strata get mobilized into narrative?

The answers to these questions suggest that Marsh was not entirely correct when he characterized America as a nation geologically blind. Rather, particular American scientists and literary writers variously engaged the insights of geology provided by strata. The smallness of the human always leads to a recognition. Four thinkers exemplify the response to the newfound diminishment of the human by finding a new role for humans in this transformed cosmos. Literary writers Nathaniel Hawthorne and Emily Dickinson assert the force of imagination for human preservation, using their literary works to transform the erasing power of telluric force into a power to reclaim the human. Similarly responding to the smallness of the human, Marsh and the early

American geologist William Maclure channel the stratigraphic imagination into new accounts of humanity writ large. Together, these figures show how strata inspired new ways of imagining the place of the human in society, while the literary case studies in particular demonstrate how the lessons of strata were working their way, metaphorically, into the collective imagination.

The story begins with a moment of destratification in the form of a landslide, in which strata itself forced its narrative upon the human. In 1826, a landslide at Crawford Notch in the White Mountains of New Hampshire killed the Willey family, consisting of Polly and Samuel Willey, their five children, and two hired men. As the earth layers roared down the mountainside, the family members fled their house directly into the path of the slide, while the slide itself perfectly encircled their dwelling, leaving it untouched; had they only stayed in their home, they would have survived. This landslide was a “cultural event,” as the critic John Sears points out, the narrative getting retold in numerous sermons, newspaper articles, poems, and travel books (74). Literary scholar Eric Purchase suggests that this event forced American artists to scrutinize the land—including the layered earth—with greater attention. My chapter shows how Americans came to see a larger planetary narrative in which strata itself became an agent through its failure to remain stratified, prompting writers to telescope the death of one family into a larger post-human framework, reforming parochial points of view into planetary viewpoints.

In particular, I examine how Nathaniel Hawthorne used his short story adaptation of the event—“The Ambitious Guest”—to assert the power of geologic forces over the human. From the influence of his geology professor Parker Cleaveland to the magazine articles he co-edited with his sister Elizabeth Manning Hawthorne, Hawthorne was evidently a geological theorizer, and the Willey Disaster forced him to train this geological vision upon the human. He was, after all, writing during a tumultuous time in the interpretation of earth layers, as his college years precisely overlap the so-called end of one of the most dominant geotheries of the day: the standard model, which asserted that virtually all of earth’s rocks and dominant surface features derived from the gradual fall of a global sea (Rudwick *Bursting the Limits* 175). Hawthorne responded to this geological uncertainty by intimately entangling the human and the geological, and advocating for the one thing that remained clear: the smallness of the human in relation to the power of the earth. In addition to placing humanity within its proper stratigraphic perspective, Hawthorne reveals in the process how strata became a vibrant source of literary inspiration in the nineteenth century; the layered earth, in particular, mobilized an imaginative potential that allowed him to remember the human despite the tendency of telluric forces to expunge the human record.

The subsequent chapters follow through on this imaginative potential of the layered earth, focusing in particular on the relationship between strata and reform, itself

a type of imagination, or thinking anew. I turn, in the second chapter, to a discussion of how the interpretation of strata presented nineteenth-century Americans with highly contested possible pasts, freeing them to envision radical futures. Central to my argument is how William Maclure, America's preeminent geologist in the opening decades of the nineteenth century, envisioned the fundamental unit of geology not as the rock in itself, but as rocks in relation to each other. Traversing Europe and America during politically revolutionary times, he found in the stratified layers of the earth an analogy with the rigid social strata and evidence of not just the possibility, but also the inevitability, of change. Accordingly, he determined to transform these social strata using geology. Maclure decried the false narratives of the powerful, which could dupe the working class only insofar as they allowed their bodies to be undisciplined. He offered the study of strata and minerals—aligning concrete objects with specific sensory experiences and names—as a way to radically realign economic class in the nineteenth century, reattaching word and substance, sensory perception and mineral. Stratigraphic study became a way to enact the American Revolution within the body itself, physically changing its ability to perceive surroundings, and thus guard against false narratives. Responding to older theories of the earth, this stratigraphic pedagogy became, for Maclure, a new theology for the de-centered human.

Continuing strata's reform message into the literary realm, late nineteenth-century poetry registers the prevalence of strata in the collective imagination. In my

third chapter, I turn to the poetry in which Emily Dickinson uses a stratigraphic debate to think with and against her male scientific predecessors, reimagining the context—and function—of science in the process. If the figure of the geologist was gendered male in the nineteenth century, Dickinson uses strata to question that gendering—to enter the debate and share her own stratigraphic story, asserting her own agency to make meaning, anticipating by more than a century the contemporary biologist Evelyn Fox Keller’s use of a female scientist to occasion a meditation regarding alternative possibilities of science. With particular attention to different manuscript versions of her poem “Though the great Waters sleep,” I show, moreover, how the stratigraphic debate became for her a way of thinking about the idea of the human as one small element of a mysterious cosmos in addition to an entity for scientific dissection.

From humans as an element, the next chapter transitions into humans as a stratigraphic force, an important realization for articulating post-bellum environmental reform. This chapter shows the conflict between two distinct stratigraphic stories: a narrative that expands the imprint of the human, figuring humans as a force akin to a geological force, and a narrative that minimizes the imprint of the human, figuring them as mere geographical forces, skirting the surface of the earth, but not significantly impacting the subterranean realm. While George Perkins Marsh initially espouses a less extensive vision of human environmental impact in his seminal 1864 environmental text, *Man and Nature*, the more expansive version is detailed by Italian geologist Antonio

Stoppani in his 1873 text, *Corso di Geologia*. I show how Stoppani's radical rendering of human limits deploys a more conservative method for interpreting earth's layers: as a mosaic geologist, he correlates earth's layers with biblical events—such as the Noachian flood—in the books of Moses. My chapter focuses on how the concept of strata enables Marsh to reconcile the commingling of religion and science prompted by his engagement with Stoppani.

Together, these chapters join a chorus of scholars, from Dimock to Rudwick, delving into what the medievalist literary critic Jeffrey Jerome Cohen calls “lithic possibility,” or rock's “invitation to think the past and future beyond the limits of the humanly possible” (18).⁹ Cohen analyzes “lithic-human enmeshment” during the Middle Ages, focusing in particular on rocks detached from their original source, from Stonehenge to the gems of medieval lapidaries (6). Yet his approach to storied stones is meant to mobilize similarly petric-minded scholars working in other literary periods: “We need models” he asserts, “from as many times as possible for thinking about the inhuman” (7). While focusing on rocks *in situ* in the form of strata and a cultural context centuries in the future, my project nevertheless resonates with Cohen's search for “lithic alliance,” or “stone as active partner in the shaping of worlds” (14). Or, for my purposes, how the layered earth—a material correlative of deep time and endless change—led nineteenth-century Americans to re-shape their world.

In recent years, scholars have re-shaped the critical landscape by inventing a variety of models for decentering the human and engaging nonhuman entities. From vibrant and ecofeminist materialisms to actor network theory and object-oriented philosophy, theorists have imaginatively devised methodologies that re-enchant the material.¹⁰ While certainly resonating with these various materialisms, this project focuses on the historicized way cultural figures translate strata into story. Rather than frame nineteenth-century culture within a particular materialist methodology, I show how contemporary thinkers used their own terminologies and theories to envision the layered earth.

For in looking downward, Americans discovered earth layers with no trace of the human. Such a conspicuous absence led these thinkers to pose the same question in the present: what are the limits of the human? In *Manifesting Vertical Destiny*, I show how the imaginative reconstruction of possible pasts within earth layers—or strata—inevitably led Americans to reconsider the present and a hoped-for future. Geology and reform are intimately linked because, as Americans learned how to read the layered earth, they realized that each transition from one stratum to another marked a radical transformation in environment: the verticality of stacked-up layers denoted alternative places and times, in the form of ancient environments, within the same geographical point. The absence of the human within these many earth layers led nineteenth-century thinkers to question the impact of humans in their contemporary moment, pushing the

boundaries of what was possible, from Hawthorne's transformed literary vision to Dickinson's argument for gender equality in the sciences, Maclure's radical realignment of economic class, and Marsh's evangelization of environmental ethics. For these scientists and literary writers did not merely dally in earthly depths—they claimed verticality.

Notes

¹ Also called “geologic time,” deep time traditionally refers to temporal durations on the order of millions of years. In this dissertation, because I am writing about a time period predating radiometric dating, I use the term more generally to denote the expansive, non-human time scales the layered earth exhibited. For more on the discovery of deep time, see Rudwick’s *Bursting the Limits of Time: The Reconstruction of Geohistory in the Age of Revolution*.

² Technically, as Weems points out, “the idea of stratigraphy is credited to the Italian scientist Nicolaus Steno, who in 1669 devised its foundational principles. [...] The first systematic application of stratigraphy, however, did not take place until the nineteenth century with the work of the Englishman William Smith” (36). Although this dissertation focuses on the concept of strata in the nineteenth century, it is not a disciplinary history of the geologic subfield called stratigraphy.

³ Countering E.O. Wilson’s biophilia concept, Cohen offers the idea of geophilia, which he defines as “matter’s promiscuous desire to affiliate with other forms of matter” (27). To describe ecocriticism’s biotic bias, philosopher Manuel DeLanda uses the phrase “organic chauvinism” and literary scholar Dan Brayton refers to “chlorophilia” (qtd. in Cohen 16, 275).

⁴ Many scholars have explored the way transportation innovations in the nineteenth century changed conceptions of time. Perhaps the most quoted passage is from Emerson’s “Thoreau”: “Mr. Thoreau explained to the President [of Harvard] that the railroad had destroyed the old scale of distances” (455). Maclure also refers to “steam-boats, locomotive carriages, rail-roads, etc. annihilating space and time” (*Opinions* 3: 77). For more on the railroad’s impact on time, see Wolfgang Schivelbusch’s *The Railway Journey: The Industrialization of Time and Space in the Nineteenth Century* and Ian R. Bartky’s *Selling the True Time: Nineteenth-Century Timekeeping in America*.

⁵ When I make this claim regarding strata and story, I am referring specifically to the way transitions between earth layers have a rhetoric all their own. Certainly, other scholars have focused on single stones to tell stories. See, for example, Jeffrey Jerome Cohen’s *Stone: An Ecology of the Inhuman* and Roger Caillois’s *The Writing of Stones*.

⁶ David I. Spanagel also uses Crèvecoeur’s passage in the book, *DeWitt Clinton and Amos Eaton: Geology and Power in Early New York*, making a claim about the relationship between science and literature in America: “Just as the scientific investigation of American nature had promised to be a boon to Clinton’s political

careers, so might the wonders and history of the landscape lie at the heart of the cultural impulse to create something new and noteworthy in the fields of fiction, poetry, and prose. A harbinger of this marriage between American natural history and imaginative literary production can even be seen in the mythic potential described by the first famous Hudson River author, Hector St. John de Crèvecoeur" (154).

⁷For more information about George Perkins Marsh, consult Lowenthal's *George Perkins Marsh: Versatile Vermonter* and his updated biography, *George Perkins Marsh: Prophet of Conservation*. For a brief biography accompanied by photographs, see *The World of George Perkins Marsh, American's First Conservationist and Environmentalist: An Illustrated Biography*, by Jane Curtis, Will Curtis, and Frank Lieberman.

⁸Marsh has an optimistic view of human agency in the nineteenth century. Indeed, Marsh redefined human agency during this period. In a 21 May 1860 letter to Spencer F. Baird, Marsh describes his upcoming book *Man and Nature*, placing agency at the heart of his thinking: "Well, it's a little volume showing that whereas Ritter and Guyot think that the earth made man, man in fact made the earth" (*Life and Letters* 422). This simple binary switch, arguing that humans created the earth, was a radical idea. Most scholars considering Marsh's impact, though, focus on the merely geographical agency of humans: the ability to impact the surficial features of the land. Marsh, after all, is best known as an amateur geographer. But there are moments when he veers into the geological, gazing downward and delving deeper to contemplate earth's stratigraphic story.

⁹More generally, these chapters join a multitude of scholars working within the intersection of geology and literature. There are, among others, Dennis R. Dean's classic overview, "The Influence of Geology on American Literature and Thought," Noah Heringman's *Romantic Rocks, Aesthetic Geology*, Adelene Buckland's *Novel Science: Fiction and the Invention of Nineteenth-Century Geology*, Brenda Maddox's *Reading the Rocks: How Victorian Geologists Discovered the Secret of Life*, and Kristine Larsen's *The Women Who Popularized Geology in the 19th Century*.

¹⁰For more on new materialism, see Iovino and Oppermann's *Material Ecocriticism*, and Coole and Frost's *New Materialisms: Ontology, Agency, and Politics*.

Chapter 1: Stratigraphic Estrangement: Nathaniel Hawthorne and the Imaginative Potential of the Layered Earth

Through abiding alliance humans become stone's time travelling companions, with the lithic offering multiple, noncoincidental modes of worldly inhabitance, a dizzying multiplication of prospect. Because of its density, extensiveness, tempo, and force, there is something in rock that is actively unknowable, something that will not surrender itself to stabilities, a truth behind the trope that stone rebukes epistemology. In that reproach inheres a trigger to human creativity [...].

—Jeffrey Jerome Cohen, *Stone: An Ecology of the Inhuman* [2015]

In 1826, the Willey family—Polly and Samuel Willey, their five children, and two hired men—lived six miles from the nearest neighbor in Crawford Notch, a passageway through the White Mountains of New Hampshire. As the American geologist Benjamin Silliman recounted in his influential journal, the Notch “is composed of a double barrier of mountains, rising very abruptly from both sides of the wild roaring river Saco. [...] Imagine this double barrier,” he invites readers, “rising on each side, to the height of nearly half a mile in perpendicular altitude” (219). A couple dry years had so thoroughly sapped the area of moisture that the dirt roads were a mere powder.¹

But August 28 brought a torrential rainstorm, lasting all day. During this “impenetrably dark and frightfully tempestuous” night, Silliman speculated, the family “probably remained in their house, amidst the war of wind and rain and mountain torrents, and the tremendous crash of the forests—earth and rocks, which for miles around them, were rushing down in one wide scene of desolation, and with an astounding noise and concussion” (220-221). There were many avalanches that night,

across several miles, but one in particular formed “immediately above the house, and descended in a direct line towards it” (220-221). Silliman describes how “the sweeping torrent, a river from the clouds, and a river full of trees, earth, stones, and rocks, rushed to the house and marvellously divided within six feet of it, and just behind it, and passed on either side, sweeping away the stable and horses, and completely encircling the dwelling, but leaving it untouched” (221). At some point, the family must have become so fearful they fled the house to take refuge in a safe spot they had recently constructed. Silliman refers to this landslide as “*almost a miracle*” because the debris encircled the house “as if *repelled* by an invisible power” (221, Silliman’s emphasis). In the very act of retreating toward their safe spot, they were overwhelmed by the landslide, which killed all nine members of the household.

Not long after the Willey Disaster, Nathaniel Hawthorne was traveling in New England toward his own safe spot, his boyhood home of Raymond, Maine.² As Arlin Turner speculates in his biography, “Hawthorne would have felt something of the immediacy he gives the tragedy” in his writings (76). He would have encountered details of the landslide in the many sermons and newspaper stories published at the time.³ But as John Sears notes, “the Willey Disaster was not just news; it was a cultural event” (*Sacred Places* 74). The site of the Willey House became “one of America’s first major tourist attractions” (74). Hawthorne himself was apparently so fascinated by this story of geological disaster that he traveled to Crawford Notch in 1832, spending a few

days to observe the terrain first-hand.⁴ Between published accounts and his own visit, he was inspired to write the short story “The Ambitious Guest,” which was published in the June 1835 *New England Magazine*.⁵

This chapter is the story of that inspiration and, more broadly, the story of how Hawthorne was particularly open to the imaginative potential of the layered earth. He understood strata’s estranging properties: the earth’s ability to proclaim the smallness of the human. His short story resonates with geology’s estrangement by asserting the power of earth’s narrative over the human. At the same time, Hawthorne embraced the way geology in general defamiliarized humans in multiple ways—a defamiliarization that provided a crucial connection between geology and literature. Geology, for Hawthorne, was an invitation for speculation. Encountering the new discipline in college, he found a science with imaginative theories that activated his literary imagination. Earth science inspired Hawthorne to speculate about stratigraphic forces, to study the intersection of the inorganic and the human, and even to change his own writing practices to foreground his direct engagement with the layered earth. Hawthorne’s imaginative engagements with geology—the intimate connections between that science and creativity—lay the groundwork for the more particular, reform-minded engagements in subsequent chapters. For reform relies on the ability to think anew.

Although this kinship between geology and the creative imagination has many sources, a primary influence on Hawthorne, as he came of age, was the unsettled quality

of earth science as a discipline. Hawthorne lived through a watershed moment within the history of geology. His college years (1821-1825) precisely align with the so-called end of one of the most dominant geotheries of the day: what geologists called the standard model. This theory of the earth asserted that virtually all of the earth's rocks and dominant surface features derived from the gradual fall of a global sea (Rudwick 175). This water-focused geotherapy, according to the conventional history of geology, dominated scientific circles starting around 1775 and fell by 1825 (Adams 209).

Regardless of the specificities of rival theories, or even of the standard model itself, what is significant here is the sheer volatility of earth science during Hawthorne's most formative years. These stratigraphic debates are important because they represent the human engaging with earth processes that are confounding precisely because they exceed the human. Large-scale, inhuman forces had been forming earth's strata for billions of years, and humans strove to understand their meaning. Hawthorne recognized the brash inventiveness and protean nature of geologic study during this period, and he wrote a short story that channeled this mercurial, creative quality by changing a key detail of the historical Willey Disaster.

Specifically, Hawthorne changed the major stratigraphic force that triggered the landslide, taking out the rainstorm altogether (or any storm, for that matter), and making wind the major geologic force of his fictionalized account of the Willey Disaster.⁶ Set in the Notch of the White Mountains, Hawthorne's story follows a humble, unnamed

family that provides lodging for a youth (the eponymous ambitious guest, also referred to as “the stranger”) traveling to Burlington, Vermont. This unnamed youth is certain that, though unknown at the time, future generations would recognize his greatness. His outsized ambitions lead the family to likewise dream of the future. The father envisions a good farm a safe distance from the mountain and eventual service on the General Court; Esther, the wife (and the only named character in the story), believes her husband is thinking about his future as a widower; the children imagine many fanciful things, including one boy who wants to bring the entire household up to a waterfall; the seventeen-year old daughter, the narrator implies, dreams of marrying and starting her own family, and the aged grandmother, with her funeral trimmings completed, recalls a superstition that, if anything is amiss with a corpse, the dead hands will rearrange the clothing, and so she asks her family to hold a looking-glass to her face when she dies. Amidst all this planning and future-looking, though, the family momentarily forgets its precarious geologic present, and, while they fantasize, a landslide begins rumbling down the mountainside. Because they are slow to recognize the impending landslide, they flee before they can reach their safe spot, and the landslide destroys the entire family, leaving the house unharmed. Hawthorne ends the story with a lesson: “Wo, for the high-souled youth, with his dream of Earthly Immortality! His name and person utterly unknown; his history, his way of life, his plans, a mystery never to be solved; his death and his existence, equally a doubt! Whose was the agony of that death-moment?”

(171). Though the family is unnamed, readers would have instantly recognized the story of the Willey family, who—though humble—were renowned in death because of the slide. In contrast, the youth in the story sought earthly immortality, and—in apt *contrapasso*—received oblivion as a result.

Hawthorne thus introduces two strangers: the ambitious guest and wind (designated the solitary stratigraphic force and invested with tremendous power). By calling wind a stranger, I am referring to the fact that Hawthorne eschews the typical Willey family account, in which water is the main force triggering the landslide. Wind is vital for Hawthorne—it is the element he uses, throughout his oeuvre, to denote the vitality of the earth. And it is the stratigraphic force he uses to transform the Willey Disaster into fiction. By replacing the powerful force of water from the historical Willey Disaster with wind, he accentuates the power difference between humans and the earth. His wind is not even given a storm, and yet it has the force to generate his story's landslide.

Although he accentuates this human-earth power difference, he also asserts humanity's reply. In the face of wind's obliterating power, Hawthorne reclaims the human through story. Humans are witnesses, and they can use their imagination to write against the wind. In imagining the Willey family's inner life, Hawthorne reveals how literature works against human erasure. He finds a place for them in this cosmos.

By excluding aqueous force—both rainfall and any mention of a storm—and inserting the stratigraphic power of aeolian force, Hawthorne also estranges readers from the historic landslide, modifying one of the most agreed-upon aspects about this memorable moment of de-stratification. There is a reason the influential British geologist Charles Lyell highlighted the Willey Disaster in his chapter, “Action of Running Water” (275). The 1826 geologic event was defined by water.⁷ On one level, water’s role in the landslide was merely a matter of observation, fitting a catastrophe to its proper force. Silliman closely observed the mountainside a couple years after the event, noting it was still “deeply furrowed and scarred, by the tremendous effects of the memorable deluge” (Silliman 219). The slide scraped “down to the solid mountain rock” and was “produced by torrents of water, which appear to have *burst* like water spouts upon the mountains” (220, Silliman’s emphasis).

On another level, beyond the mere matching of a geologic force to its physical effects upon the land, the power of water during the historical Willey Disaster was considered greater in magnitude than any rainfall in living memory. In a letter accompanying Silliman’s geologic musings on Crawford Notch, the Rev. Carlos Wilcox, for instance, calls the 1826 event “the most destructive fall of rain ever known in that region” (223). The rainfall was so devastating that some writers—in their grasping for metaphors to adequately capture this fluid force—inevitably turned to the most destructive aqueous event recorded in the Bible: Noah’s Flood. As Silliman writes, “This

catastrophe presents a very striking example of sudden diluvial action, and enables one to form some feeble conception of the universal effects of the vindictive deluge which once swept every mountain, and ravaged every plain and defile" (Silliman 222). This New England landslide on this particular date carried echoes of water's power on a biblical scale.

In addition to the Willey Slide's analogical connection to the Deluge, there was also a literal connection: geologists generally believed the Deluge sculpted the geography of Crawford Notch (Sears 79). They associated mountain and valley topography with torrential water, as Frank Adams explains: "The very uneven character of the earth's surface with its deep valleys and high precipitous cliffs testifies to the action of great floods and other powerful influences" (221).⁸ Although geologists acknowledged the way both water and wind helped trigger the Willey Disaster, water was always considered the primary force for both the event and the geography. Hawthorne, in other words, could not have avoided the association between the Willey Disaster and fluid force. From the event itself to the Noachian resonance of the geography in general, the connection between the Willey site and water was overdetermined. He could have easily chosen water as the main force underlying the destruction of the unnamed family's house, but instead he chose to upgrade a relatively minor geologic force by making wind the central geologic dynamic.

Calling wind a “minor geologic force” may seem counterintuitive, but I use that phrase to highlight the relative roles of wind and water as global forces sculpting earth’s crust. As the geologist Michael Summerfield observes, “wind is a comparatively feeble geomorphic agent over much of the Earth’s surface” (235). Outside of desert environments and other areas of significant denudation, wind does not wield much geologic force. Even within highly windy environments, although humans may perceive the wind as powerful, its force is nevertheless dwarfed by the power of water. Indeed, because Hawthorne omitted the storm in his short story, wind should have played an even smaller role than it did in the historical Willey Disaster.

In addition to accentuating the power of the earth over the human, the choice of wind also invokes the deep temporal disjuncture between humans and earth processes. This may seem counterintuitive, since wind appears ephemeral. Yet the emphasis on wind and the removal of water invokes humanity’s grappling with stratigraphic forces during the early nineteenth century. The famous fire-and-water debate has been called one of the bitterest geologic controversies (Adams 247). “The rise and fall” of the standard model, according to Adams, “forms one of the most important, interesting and even romantic chapters in the history of geology” (209). By deleting water as a stratigraphic force in his story, Hawthorne would have signaled to his readers that he was conjuring this debate—and further contrasting the human and the earth—since the relative power of earth forces was the central part of the discussion.

As Hawthorne's college geology professor, Parker Cleaveland, introduces this debate in his *Elementary Treatise*, most geologists believe a fluid agent formed earth's minerals, but they disagree over whether that fluid was water or caloric (also called fire) (723). "Hence two geological systems have arisen," Cleaveland elaborates, "according as the principal agency in the production of the mineral kingdom is attributed to water or caloric" (723). He calls the standard model "*Neptunian theory*," with adherents dubbed "*Neptunians*" or "*Wernerians*;" the rival one he names "*Vulcanian theory*," with adherents called "*Vulcanists*" or "*Huttonians*" (723, Cleaveland's emphasis).

The debate itself is important because it represents the small human actively confronting large-scale, deep time stratigraphic forces. The fact that there is a controversy—that the crust resists humanity's desire to know it—attests to the temporal differential between humans and the earth. More than a mere milestone in earth science history, this debate over stratigraphic forces captures the human—in all its smallness—yearning to understand the meaning of earth's layers.

Moreover, because both the geologist William Maclure in my second chapter and Emily Dickinson in my third chapter respond to this stratigraphic debate, it is crucial to get a clear idea of the two sides. Long associated with the geologist Abraham Gottlob Werner, neptunian theory (a version of the standard model) asserts that the globe was once covered with water higher than the tallest mountains (Cleaveland 723). These waters "contained in solution all the materials, of which the present crust of the

earth is composed" (723). The earth's rocks formed in successive layers, changing in composition as the waters were tranquil or agitated, and as the solution changed in chemistry. The first rocks deposited were crystalline rocks like granite and gneiss. The last rocks deposited were sedimentary rocks—called "secondary rocks" because they came after the first ones—and included sandstones, chalks, and basalts (724). Given this origin story, then, each rock type is a universal formation, which means strata entirely surround "the nucleus of the earth, like the coats of an onion" (724). Crustal revolutions, though, "destroyed or concealed the continuity of strata" (724).

In contrast, vulcanian theory—long associated with the geologist James Hutton—hypothesizes that "the crust of the *present* globe" derived "from the disintegration and destruction of *former* continents" via erosion (725, Cleaveland's emphasis). These eroded continents are then deposited at the bottom of the sea, consolidated "by the action of subterraneous *fire*," and elevated "to form the *present* continents" (725). Rather than universal strata with a set order of deposition, Huttonian theory is a never-ending process of erosion, deposition, fiery consolidation, and uplift.

Although these stratigraphic theories in general represent the small human grappling with the immensity of planetary scales, they also have distinct relations to deep time. Neptunian theory was—to generalize broadly—associated with biblical interpretations of earth's crust and a younger model of the earth. In contrast, vulcanian theory's incessant cycles of erosion and deposition allowed geologists to better envision

deep time. Writing “The Ambitious Guest” at a time when water-focused geotheries were increasingly downgraded and placed in context with other powerful earth processes and forces, Hawthorne also chose to downgrade the power of water in his literary rendering of the Willey Disaster. In essence, Hawthorne was aligning himself with deep time (i.e. away from water). Yet he was also aligning himself with the sheer volatility of strata during this period and raising the human voice—the wind of the human breath, if you will—as a response to the expansive, obliterating forces of the earth.

By incorporating wind into his story, Hawthorne asks readers to compare the earth and the human: the annihilating powers of earth’s wind versus the saving powers of the human voice to resist such annihilation. To modify literary critic Jeffrey Jerome Cohen’s words, strata—particularly during the 1820s downfall of the standard model—rebuke epistemology, and “in that reproach inheres a trigger to human creativity” (8). Through the absence of water, Hawthorne’s story resonates with the contentious, shifting nature of geothery in the 1820s and 1830s. The particular strength and impact of specific forces were in question, and his story reflects this mutability by embracing that most protean and ethereal of geologic forces: wind. In order to show how closely Hawthorne engaged geology, I need to characterize—modifying the context and meaning of Richard Brodhead’s “school of Hawthorne”—the *geologic* school of Hawthorne, speculatively outlining the impact of his college professor and excavating

Hawthorne's own geologic assertions as implied in his early fiction and magazine editing. Hawthorne's writings show that he conceptualizes wind as earth's key animating force—the inner vitality that allows him to render the wind a character unto itself, and an immensely powerful one at that.

For Hawthorne's geological schooling, the Willey Disaster was especially significant because it forced him to apply his geological vision to *humans*. The event compelled him and other writers to use the kinds of tools through which they had been learning to construct narratives about earth's deep past (i.e. deep time), and apply this vision to the nineteenth-century present. After the landslide, the Willey family's final hours were reconstructed through the circumstantial evidence of their geological setting. They were essentially relics or fossils within society's geological narrative.

"The Ambitious Guest" is a story about memory and rocks, and in particular, the ability of forces—both human and geological—to impact the earth, to leave their mark. Hawthorne's stratigraphic exploration comes together in the form of the trace. He uses the figures of the footstep and the wind to structure his narrative, allowing him to assert a power difference between humans and earth processes, at least when it comes to geological impacts. Despite humanity's attempt to raise an earthly memory—to assert the longevity of that footstep—one of earth's most mutable geological forces nevertheless leaves a stronger trace upon the land than any human.

Yet Hawthorne's story, in reconstructing the inner lives of the Willey family, also sets up its own narrative as a kind of fossil—a way of remembering these humans and the struggle to reclaim humanity in the face of earthly erasures. Hawthorne found creativity, in part, in the intersection of the organic and inorganic. The scholar John Limon calls Hawthorne a “theorist of thresholds,” and that threshold certainly includes the intersection of humanity and the earth (122). Indeed, in order to theorize this stratigraphic threshold—this new layer of earth that wiped out the Willey family—Hawthorne estranges himself from his accustomed writing practices by visiting the site directly and allowing the geologic specificity to inform his writing. Hawthorne, then, *is* the witness using literature for human survival—the storyteller venturing to the scene of de-stratification to reclaim the human.

Although many implications arise when analyzing the way geology inspired Hawthorne's literary imagination, one major implication is that such an approach creates a different Hawthorne.⁹ Specifically, the geologic narratives within his work excavate a Hawthorne who did not merely import scientific themes into fictional stories. Hawthorne was a geological theorizer. By the term “geological theorizing,” I am denoting the fundamental genre of geology: the empirical and temporally speculative process of observing a particular geological feature and surmising the force that adequately accounts for that feature. Hawthorne practiced this form of geology in both his fiction and his journal, as he sought to explain the origin of specific geological scenes,

affixing the proper force to its proper impact.¹⁰ If, as Brodhead asserts, “his chief subject is the way the past invisibly invests itself in the present,” then this present chapter extends that past beyond the historical, into the geological (8). Hawthorne’s short story represents the fulfillment of his major geological interests. The Willey Disaster forced him to see humans through the geological lens he had been building up for years, and he uses his story to carve out a role for the human in this new cosmos—the human as witness.

The Geologic School of Hawthorne

But in order to fully witness the role of humans in this cosmos, Hawthorne had to first hone his geological vision. His schooling and early publications reveal how he was able to envision wind as an outsized force that was so dynamic it was virtually alive. This is the context that leads directly to his perception of aeolian force in “The Ambitious Guest.” In other words, geology provided a means of thinking about elements that could invest a particular element—in Hawthorne’s case, wind—with magnitudes of power beyond human experience.

From an historical perspective, the idea of selecting a particular stratigraphic force—such as wind—and asserting its power is part of a much larger tradition within earth science. As Rudwick explains, “the ultimate goal of many savants concerned with the science of the earth was to construct what they called a ‘*system*’ or high-level theory about the earth” (*Bursting* 133, Rudwick’s emphasis). Although I have been using the

term “geothery” generally to refer to theorizations of the earth, Rudwick assigns the term a particular definition. “Geothery,” or “Theory of the Earth,” was a scientific genre comparable to literary genres like the short story and novel (134). Specifically, it is “the genre of those scientific theories that aspired to offer a true causal account of the earth, its origin [...] and its development or change through time” (Rudwick 134-5). Savants sought to define and assert the truth of their own geotheries, vying for the prestige of revolutionizing earth systems just as Isaac Newton revolutionized the solar system and celestial mechanics more broadly (133). In their headlong pursuit for an all-encompassing theory of the earth, savants suggested a variety of new forces, processes, and models. Thus, Rudwick asserts, “there was a proliferating profusion of systems, often incompatible with one another” (136).

Many geotheries in the eighteenth century were wildly speculative and fantastic. Indeed, this was an age in which geology and fiction closely intersected, as some geotheries were “dismissed as a mere fantasy or novel [*roman*]” (Rudwick *Bursting* 179). Hawthorne, in one sense, assumes the role of savant, taking advantage of this history of speculative geology to then transform the known geologic force of a much-studied event. By asserting the power of such an ephemeral force as wind Hawthorne is, in part, parodying the savant’s habit of organizing earth systems around a dominant, underappreciated force. Geology was a new science at the turn of the

nineteenth century, and these savants epitomized geology's reputation as a discipline so theoretical it risked, at times, disengaging from the earth itself.¹¹

Mindful of this history, Hawthorne heightened the power of wind. The story of this aeolian vitalization can be told in three documents, two leading up to the 1835 publication of "The Ambitious Guest" and one document from shortly after the story was published.¹² These documents include his geology professor's influential treatise, and—by implication—the geologic interpretive community during Hawthorne's college years; his first and most geological novel, *Fanshawe*, and the geologic debates and approaches expressed in *The American Magazine of Useful and Entertaining Knowledge*, both leading up to and including Hawthorne's editorship. These materials paint a portrait of Hawthorne's interpretive community and his own practice of geologic theorizing. In particular, they reveal a Hawthorne predisposed to conceiving geologic forces in outsized terms, specifically regarding the intensity of their force. Most importantly for his story, they show a mind fascinated with the living earth, animated with breath.

Although Hawthorne probably entered his freshman year with some knowledge of geology (his entrance exam required him to show skill in geography, at least), his major introduction to the systematic study of geology likely happened when he entered Bowdoin College in October 1821 (Stewart 13-14). Even then, according to the 1822 course catalogue, students did not study "Cleaveland's Mineralogy" until the third term

of their senior year (17). Yet Hawthorne likely encountered Parker Cleaveland's thoughts on geology well before his final year, since there were only eight faculty members listed in the 1821 catalogue (Stewart 15). Cleaveland was the most distinguished faculty at Bowdoin during Hawthorne's time, having written one of the most influential early geological treatises: *Elementary Treatise on Mineralogy and Geology*, first published in 1816 and establishing Cleaveland's reputation (Turner 36; Merrill 41).¹³ The treatise would have been the talk of campus because, as Hawthorne entered his sophomore year in 1822, this celebrated volume's second edition was freshly published. Beyond his scholarly reputation, Cleaveland also had a spirited personality that left an impression on students.¹⁴

Cleaveland came of age as a scholar in the late eighteenth century, which is significant for Hawthorne's schooling because it means his professor's perspective on geology was formed as the standard water-focused model still held sway. Although he was hesitant to delve into theory, Cleaveland clearly sided with the standard model, asserting the idea that volcanic action was limited to a small portion of the earth, and water was powerful enough to have formed virtually every mineral, including rocks modern geologists now consider volcanic.¹⁵ Thus Hawthorne's schooling, in part, revolves around the idea that it is scientifically sanctioned to assert that one type of force—in Cleaveland's case, water—can be responsible for virtually every type of rock. A single geologic force can outweigh all others.¹⁶

This lesson of stratigraphic force's expansive tendencies only magnified because, a few years later in his 1828 debut novel *Fanshawe*, Hawthorne engaged the idea that a force has the potential to expand into intensities beyond the known limits. This is because, rather than dying in 1825, neptunian theory lived on in different ways, including merging into another theory of the earth, this time focused more on the idea that forces have the ability to magnify in power beyond present-day standards.¹⁷ *Fanshawe* is set at Harley College (a stand-in for Bowdoin) and tells the story of the antagonist Mr. Butler's kidnapping the college president's adopted daughter, Ellen Langton; the novel focuses in particular on the secluded scholar Fanshawe's pursuit to save her. At one point in their journey, Butler and Langton find themselves near a small river and immense cliffs:

They stood beneath a precipice, so high that the loftiest pine-tops (and many of them seemed to soar to heaven) scarcely surmounted it. This line of rock has a considerable extent, at unequal heights, and with many interruptions, along the course of the river; and it seems probable that, at some former period, it was the boundary of the waters, though they are now confined within far less ambitious limits. (144-145)

Like many of Hawthorne's geological asides in this novel, the scenic description is grounded in particular geologic theories of the day. This passage sets up an image of incongruity: a diminutive river flowing through a colossal valley. The scene enacts Hawthorne's geological theorizing, as he considers the proper force to fit the scene, speculating temporally: since the river is too small for this valley, it stands to reason that the waters were once much more "ambitious" "at some former period." Here

Hawthorne channels one of the major geological conundrums of the age: the origin of valleys. As Rudwick explains, “a huge valley [...] drained by a puny little stream [...] seemed utterly inadequate to explain its excavation, no matter how much time was invoked” (102). Following Newton, every self-respecting savant knew that “like causes should have like effects” (102-103). Hawthorne’s passage resonates with the commonsense geological theorizing of the day: when faced with an impact (a large valley) out of sync with an observed force (a small stream), that force must therefore have been much stronger in the past. “Erosion by a sudden and violent rush of water, at some remote time,” writes Rudwick, “often seemed the most likely causal explanation of many valleys: the well-attested effects of violent flash floods were a persuasive small-scale analogue” (103). This theory that past forces were more intense became known as catastrophism and was widely followed in the 1820s into the 1830s.¹⁸

Thus in his writing leading up to his 1832 visit to Crawford Notch, Hawthorne was engaging with the idea that geologic forces could behave with immense intensities beyond human experience. Even at the time “The Ambitious Guest” was published in 1835, editors and writers around him were not only espousing catastrophism, but some at least were still doggedly upholding the old standard water-based model. Indeed, when Hawthorne travelled to Boston in January 1836 to start his new job as the editor of *The American Magazine of Useful and Entertaining Knowledge*, he inherited a publication that was both catastrophist and Wernerian. Yet Hawthorne, along with his sister

Elizabeth Manning Hawthorne, curated a different type of geology in 1836. It was a geology that vitalized the earth, entangling humanity and geology so closely that, at times, they became one and the same. It was a geology that saw stone in the human and animated the earth with living breath.

The first issue of *American Magazine* that Hawthorne edited was published in March 1836, and his last issue came out in August. Across the half-year arc of these publications, although Hawthorne presented several perspectives on geology, one distinct pattern involved intersecting the organic and the inorganic, life and death, human and geology. Sometimes, as in the April issue, this human-geologic entanglement came in the simple form of outward appearance, such as the mountain in China “hewn into the shape of a man” (“A Man-Mountain” 315). At other times, this pattern took the form of direct transformation, such as the report that, in Africa, an Italian traveler discovered “the entire body of a man [...] carbonized by the heat of the sand” (“Preservation of the Dead” 314). Even recently deceased humanity, it appeared, could be translated to stone. The human-geological divide was no match for the nineteenth-century mind. Yet mountains carved into human form and bodies petrified are relatively tame human-geological intersections compared to another iteration of this theme lasting from the April to August issues.

Geology was alive for Hawthorne. It was vital. And wind—*spiritus*—was the element that conveyed this vitality. As implied by the stories he gathered with his sister,

he was fascinated with the idea of the breathing earth. Another April article recounts the story of Saint John, still alive within his dirt grave in Ephesus; the earth covering his grave, according to some accounts, moved up and down with his every respiration (“St. John’s Grave” 319). Here the earth itself is not yet animated, as Saint John is the miraculous engine. At the very least, this article expresses the combination of geology and the miraculous that Hawthorne embraces in his own writings.

By the May issue, though, he takes the leap into a truly vitalist earth, presenting a “Theory of Tides”: “A Pythagorean philosopher affirmed that the ebbing and flowing of the sea was the respiration of the world, which he supposed to be a living monster, drawing in water instead of breath, and heaving it out again” (389). At ease with interchanging water and wind, this article sets up a monstrous earth whose watery breath constitutes global tidal movements. Elsewhere, this living earth’s voice takes on the mourning, moaning aspect Hawthorne himself uses in “The Ambitious Guest.” August’s “Voice of the Wind” article shows a writer describing the sounds of the wind during winter along Lake Huron’s “Kempenfeldt Bay:” “A dreary, undulating sound wandered from point to point, perplexing the mind to imagine whence it came or whither it went, whether aerial or subterranean; sometimes like low moaning, and then swelling into a deep-toned note, as if produced by some Æolian instrument; it being in fact and without metaphor, the voice of winds imprisoned in the bosom of the deep” (492). Here Hawthorne presents in his magazine the idea that the wind itself is alive,

capable of assuming emotional valences, concepts that resonate deeply with his own story. From the vital wind and monstrous earth, Hawthorne ends this human-geological exploration with the motherly earth. He presents these words about Kentucky's Mammoth Cave in the August issue: "Through the mouth of the cave there is a continual current of air, which for six months of the year, is drawn inward, and during the other six, rushes outward with force enough to extinguish a torch. It is one of the breathing-places of our mother Earth, where she performs her long respirations, and heaves her mighty, yet unavailing sighs, for the sin and sorrow of her children" ("Caverns" 507). Further enlivened by analogizing the earth-human relation as a mother-child relation, the article continues to vitalize the earth. The wind here is emotively marked like the previous example, this time figuring the wind as sighs for humanity's "sin and sorrow." Winds in these articles convey messages Hawthorne incorporated into his own writings. It is the vitalizing agent asserting a relation between humans and the earth. The wind acts as a medium through which the article casts its spell, initiating readers into a geology not grounded in expected reality, but open to the fantastic.

Aeolian Force in "The Ambitious Guest"

As if writing a microcosm of his geologic schooling, Hawthorne has the wind grow ever stronger and animated in his short story. The story both exhibits his major geological interests and expands them insofar as he brings in another force—the

human—to contrast with aeolian force. For the Willey Disaster compelled him to see humans through the geological lens he had been building up for years. Steeped in knowledge of the earth, with an abiding fascination with forces and impacts (the fundamental vocabulary of geological theorizing), Hawthorne wrote a story about traces (i.e. the trace wind leaves versus humans). In it, he makes a statement about the differential ability of forces to make an impact emanating into deep time. If that statement were summarized, it would read something like this: in the intersection of human and geology, earth's ephemeral force—wind—vastly overshadows the physical might of humans. In this story, humanity takes the figure of footsteps, and the earth—aside from the overlying mountains—takes the figure of wind. Linked from the start, footsteps and wind form opposite physical trajectories within the story: one diminishes (if it was ever powerful in the first place), and the other amplifies.¹⁹ Footsteps mark the family's earthly erasure, as these marks become the engine that drives them out of their home and to their demise. Yet Hawthorne, in the very writing of the story, nevertheless reasserts the power humans have: the power to imaginatively revivify the buried, using the imagination for human preservation.

Raised in the school of catastrophism, Hawthorne nevertheless exceeds even that school's bounds by investing wind with a power well beyond any savant's wildest geotheories. He essentially out-catastrophizes the catastrophists. From setting to character to practical deity, wind—intense from the start—amplifies its reach

throughout the narrative. In the beginning, Hawthorne characterizes Crawford Notch as a geography defined by wind. Indeed, the element appears immediately after the geographic location is mentioned: “This family were situated in the Notch of the White Hills, where the wind was sharp throughout the year, and pitilessly cold in the winter” (162). Having characterized the force, Hawthorne then provides a more concrete visualization of the setting’s verticality: the mountain was “so steep, that the stones would often rumble down its sides” (162). The implication here is that wind has greater leverage in this perpendicular geologic scenario, as rocks are known to dislodge by mere gravity. On top of the ease of disturbing rocks, this setting also intensifies wind itself, as the Notch acts as a funnel concentrating wind into extreme force. As the ambitious youth says, “the Notch is just like the pipe of a great pair of bellows; it has blown a terrible blast in my face” (163-164). This “blast” — from the Proto Indo European “bhle” for “to blow” — conceals an inner vitality bordering on vitalism. This vitality amplifies throughout the story, as wind expands to contain a grander sense of force. By invoking blasting and blowing, Hawthorne constructs a wind that is in constant search of a blower — some more solid prime mover, or foundation of meaning.

Magnifying from mere setting, the wind takes on the guise of a character. Indeed, it is virtually a living being in some passages. As the narrator explains: “the wind came through the Notch and seemed to pause before their cottage — rattling the door, with a sound of wailing and lamentation, before it passed into the valley” (162).

Like another potential lodger, the wind lingers near their cottage, though it quickly—on the other side of the sentence’s dash—turns sinister, as the implicitly mute wind suddenly vocalizes. This vocalization is not the expected request of a lodger, but an underworld sound of “wailing and lamentation” that is so powerful it rattles the cottage door. In characterizing the wind’s sound through such a palpable emotional frame, Hawthorne gives wind a greater role than it plays in other accounts of the Willey Slide (recall, for instance, Silliman’s description at the opening of the chapter, or the many ways that water was cast as the major force triggering the landslide).

In its interaction with humans, wind erases the human trace. Although water—had Hawthorne deployed it in his story—could also erase the human trace, by choosing wind in particular, he was emphasizing the human-earth dichotomy; the story essentially tells the reader: if wind has this power over the human, just imagine the power earth’s other forces wield. When the ambitious youth reaches the cottage, the wind conceals his entry. The youth’s “footsteps had been unheard amid the dreary blast, which heralded his approach, and wailed as he was entering, and went moaning away from the door” (163). Masking the sound of the youth’s footsteps, the wind begins its life as a harbinger of things to come, yet still with the disturbing emotional valence associated with wailing and moaning. The larger point Hawthorne makes in these human-wind intersections is the power contrast between the two: he implicitly juxtaposes the mighty wails and blasts of the wind with the mere breaths and whispers

of the cottage inhabitants. More than merely masking human sound, the wind actively takes human breath and transforms the atmosphere. When another group of travelers passes by the house, the journeyers “were cheering their hearts with the rough chorus of a song, which resounded, in broken notes, between the cliffs,” and they “plunged into the Notch, still singing and laughing, though their music and mirth came back drearily from the heart of the mountain” (167-168). Not only does Hawthorne grant the wind a lifelike quality, but he also provides that vitality with certain quasi-intentions, taking human sounds and deranging them into opposing emotional valences. While it is clear that wind is already powerful in this narrative, Hawthorne heightens aeolian force even more as the story unfolds.

From vitalism, the narrative practically deifies the wind. While the eldest daughter and the ambitious youth “spoke softly,” “the wind, through the Notch, took a deeper and drearier sound. It seemed, as the fanciful stranger said, like the choral strain of the spirits of the blast, who, in old Indian times, had their dwelling among these mountains, and made their heights and recesses a sacred region. There was a wail, along the road, as if a funeral were passing” (168-169). Linking the narrative’s wind with *spiritus* in this passage, Hawthorne connects the ambitious youth with the region’s Native American presence. While distanced through skeptical modifiers such as “fanciful,” and clearly relegating Native American culture to a distant past, the rhetorical construction nevertheless reveals the narrative searching for appropriate

language to describe wind's vitality. This wind-as-spirit frame suggests an underlying reason for the wailing and moaning: the mountains are the appropriate abode of the spirits, not humans.

Yet humans have their own impact upon the land, and Hawthorne figures this anthropocentric force in the footsteps. In the self-delusions of the human mind, one person can have a significant impact, as the narrator describes the ambitious youth's "secret [...] character": "when posterity should gaze back into the gloom of what was now the present, they would trace the brightness of his footsteps, brightening as meaner glories faded, and confess, that a gifted one had passed from his cradle to his tomb, with none to recognize him" (165). The narrator projects himself into the future, a practice many writers applied to the Willey family after the landslide. Contemporary newspaper articles, geologists, and guidebooks imagined the disaster—from the family itself to the accompanying organic debris like shattered tree trunks—as future fossils. The Willey disaster forced them to apply geological theorization to present-day humans. But whereas, in these contemporary accounts, the earth controls the narrative of human trace, the ambitious youth mistakenly imagines control over his own future. In his hubristic delusion, he imagines his metaphorical imprint upon the earth as brightening, not fading in time. Earthly impact, in other words, is the central kernel of the youth's ambition: the hubris of a human to think he governs narratives only the earth can write. The central ways of envisioning this deep-time hubris, for Hawthorne, is the footmark.

Through this figure of the footmark, the narrative asks the reader to contrast the power of the earth with the power of the human. As opposed to mere wind erasing the sound of the stranger's footstep, the geologic setting's footstep (in the form of a stone "thrown" by the "old Mountain") is described as both "heavy" and clearly audible from a distance (164). By setting up both human and geological footsteps, this story asks us to contemplate the relative impact of two forces, organic and inorganic. The concept of footsteps also engages the central puzzle of the entire Willey Disaster, as many writers and the public at large openly wondered what could have led the family to leave their home, where they would have survived the landslide. Their footsteps—their literal stepping foot outdoors—led to their demise. Hawthorne appears to play with this central question by melding together the footstep motif with the concept of ambition. In a way, Hawthorne was merely activating the underlying meaning of "ambitious," which comes from *ambire*: "amb" meaning "around" and "ir" meaning "go." The Willeys literally went around their house and died. The physical manifestation of ambition within this story is the idea of footsteps exceeding their bounds: "going around." In the end, it is the ambitious youth's literal and metaphorical footsteps that lead to the total erasure—at least on his terms—of his earthly impact.

This ambition, as Hawthorne frames it, is infectious, spreading from the youth himself to—in less deluded terms—the mountain family (167). That is, the family members' mild ambitions lead to their own "going around"—a mental wandering that

leads to their physical wandering outdoors and to their doom. This story is told using the family hearth. In addition to footsteps' contrast with the wind, Hawthorne also contrasts ambition with the fire around which the family gathers. He instills the story with two motivational forces: to remain the humble family around the fire or to be infected by the youth's footsteps of deep-time ambition. Each of the family members' future-focused musings, while humble compared to the ambitious guest's musings, nevertheless center around breaking the family circle.

Each of their dreams, in other words, crystallizes around ambition (albeit mild), instilling a moral habit that—as the story's structure and the etymology of “ambition” imply—causes them to leave the house when disaster strikes. After her husband says he is contemplating “things, that are pretty certain never to come to pass,” Esther asks: “Is the man thinking what he will do when he is a widower?” (166). (Unfortunately, the story gives no motivation for Esther's cryptic question; the plot moves in an exceedingly brisk manner, essentially involving this chat around a fire before the final landslide.) Her inner projection would break up the family fire circle by intimating her own death. And the husband, for his part, imagines a “slate gravestone,” which is just as good “as a marble one,” with “just my name and age, and a verse of a hymn, and something to let people know, that I lived an honest man and died a Christian” (167). He has a clear vision of how he will project his will into the far future, planning the very etchings on his rocky memorial. His death-drive accompanies other future-oriented ambitions that

would break up the fire circle: a farm in another township and a term at the General Court, rather than the humble farming and lodging business that organizes the family under one roof. Indeed, the short story itself appears to protect the fire circle, as most of “The Ambitious Guest” — aside from the final landslide— consists of the family and stranger interacting around the hearth fire.

As the infection spreads, even the children imagine “wild wishes, and childish projects of what they would do, when they came to be men and women” (167). Breaking up the fire circle with his rhetoric, one boy wishes they could drink from the basin of the waterfall (167). The daughter dreams of departing from her nuclear family to start one of her own with a partner. As these mental footsteps spread further, even the aged grandma says, “you’ve set my mind a wandering,” and imagines earthly agency beyond death, rearranging her carefully tailored burial clothes when she is in the grave (169-170). The reason the entire family flees the house when they do—the timing that leads to their demise—is that they are all so engrossed in the grandma’s “ghastly conception” (170).

Regardless of what precisely triggered them to flee when they did, though, it is clear that the wandering stranger’s wandering thoughts set them to mentally wandering as well. Each is trying to control their deep-time impact (i.e. how they are arranged or remembered after death), and it is precisely this lingering upon earthly impacts that leads to their footsteps—their marks—being wiped from the earth. (Although, for the

family at least, their death makes them better known than they likely would have been otherwise.) The contrast between the wandering thoughts—coalescing around the emblem of footsteps—and the family’s fire circle is the central engine of tension in the narrative. The grandma is contemplating leaving the family circle via her demise; the seventeen-year-old daughter of leaving through marriage; the mother through her own death; the father through social elevation and death, and the child by visiting the waterfall. Each—in their own way—harbors a future projection that would break the home fire circle, the very place they would have been safe had they only remained. Each mind, in other words, is marked by ambition, a going outward—a footstep—that triggers their decision to flee the home: just as they are mentally leaving the fire circle, they physically leave it in the face of danger.

This fixation on earthly impacts continues until the landslide reasserts its power to drive earthly narratives, making the final impact:

For a moment, the old woman’s ghastly conception so engrossed the minds of her hearers, that a sound, abroad in the night, rising like the roar of a blast, had grown broad, deep, and terrible, before the fated group were conscious of it. The house, and all within it, trembled; the foundations of the earth seemed to be shaken, as if this awful sound were the peal of the last trump. Young and old exchanged one wild glance, and remained an instant, pale, affrighted, without utterance, or power to move. (170)

The exfoliation of rock and accelerating avalanche unveils itself initially as sound and vibration. Invoking the linguistic patterns ascribed earlier to the wind—words like “blast” and even the bare mention of sound entering from outside, which was so closely

linked with wind—it is as if the wind itself has transformed into the landslide. Not stopping at rattling the door, these vibrations seem to originate deeper in the earth, in its lower-most layers. While the phrase “foundations of the earth” implicitly invokes biblical beginnings, the narrator reaches for the opposite end of universal time, grasping for language to describe this embodiment of looming catastrophe. The “roar of the blast” becomes, as a fresh layer of earth is about to be deposited atop the entire Willey family, the “peal of the last trump.” Combining the sounds of the wind with the trembling of foundations amplifies the entire scene such that doomsday’s final trumpet blow is the closest analogy capturing this geologic disaster. Keeping in mind that Hawthorne excised the historical storm altogether, it is all the more remarkable that everyday aeolian force triggered this moment of de-stratification.

Wind, then, represents the central force of the story. It is present in the Willey family’s living, and it is there—even metaphorically—in their dying. This airy force has a greater earthly impact than the wildest dreams of the ambitious youth. In one sense, wind fulfills the guest’s ambition in *contrapasso* fashion. The ambitious guest sought earthly immortality. He wanted to leave a trace that would never cease. After retelling the major plot points of the actual Willey Disaster, from the poignancy of fleeing from their safe abode to the landslide breaking into “two branches,” the narrator changes the story from the newspaper accounts, writing: “Their bodies were never found” (170). The fictional ambitious guest fulfilled his desire to leave a trace—fulfilled, albeit, on

earth's terms, not his own.²⁰ They are as mere undiscovered fossils in a narrative written by earth's forces. In the intersection of human and geology, Hawthorne asserts humans as objects whose earthly impact—footsteps—are erased with a breeze. By writing a story about terrestrial traces, Hawthorne practiced the lessons of his geologic schooling. Yet he also pushed further than his catastrophist forbears, investing wind with a power the likes of which savants had never imagined.

Yet he also, in the very telling of the story, invests the humans with their own power to counterweight the earth's. In imagining the inner life and social interactions of the Willey family, Hawthorne was also memorializing them. Their bodies hardly left a trace—in the world of Hawthorne's story at least—but they *have* left a trace in words and story. That is, their trace is discernible in the writer's achievement, rather than in physical manifestations. The wind erased the family members, but Hawthorne reclaims them. Confronting the obliterating power of stratigraphic force, humans have their own wind in the form of the human voice, and they can use this voice to stack their own vertical layers in the form of the written word, its own type of immortality.

Humanity's Stratigraphic Estrangement

Expanding beyond a close reading of "The Ambitious Guest," the story resonates with geology's estrangement of the human during the long nineteenth century. The layered earth opened up an imaginative potential for writers during this period—a potential reaching beyond the literary associations of eighteenth-century geology's

fantastical theories. In proclaiming the smallness of the human, strata itself estranged both the human and earth history.

Hawthorne appreciated strata's strangeness, even going so far as to curate articles in *American Magazine* that articulated humanity's new stratigraphic perspective.

In "The Fossil Elephant," for example, an anonymous author writes:

When we contemplate merely the surface of the globe which we inhabit, we see nothing that would lead us to suspect its history. [...] But, if we penetrate beneath the earth's surface, and examine the different layers which compose it, the position of those layers, their mutual relations, the nature of their substances, and the remains of organized beings which they inclose, we meet with disclosures so unexpected, that the mind will not at first credit them. By such proofs as these, man learns that the globe has long existed without his presence, and that, for a long time, it was a mere lifeless desert, wholly devoid of every species of animated nature. (391)

In Hawthorne's magazine, the transition from surfaces to earthly depths marks the transition from ordinary earth narratives to the extraordinary, from the everyday to the utter strangeness of vertical knowledge. Enlightenment is not a bursting forth into the sunlight, but rather, a burrowing deeper into the layers of Plato's Cave. The terrestrial surface, in this article, is a plain of perpetual present tense, devoid of history.

Remaining on the surface, traditional narratives of the earth continue unchecked. But as soon as humans dig into the earth—as soon as they claim verticality—an alternative, even transgressive, vision arises. Indeed, these layers and fossils tell a story so untethered from the accustomed narratives of the earth that the story is, at first, unthinkable.

Strata's major revelation in this short magazine article is the major revelation of nineteenth-century geology writ large: the realization that earth's history is primarily a story of the non-human. In addition to articulating this new story of human smallness, these layers also unearth a story of radical transformation. As the article continues: "He sees that, even after the appearance of life, there were great and terrible changes in the condition of the earth, and that these revolutions destroyed multitudes of living beings," including species "which are no longer found on earth" (391). Thus the narrowing of the human element in earth's story is intimately connected with terrestrial revolutions in general: vertical knowledge places humans in perspective while also providing humans with a story of transformation.

Yet the imaginative potential of earthly layers is never homogenous. All strata are not created equal. Curating another article, called "Extinct Animals," for his magazine, Hawthorne presents the idea that "fossil bones are not scattered indifferently and at random among the different layers which envelope the earth" (408). Rather, "the deeper we go beneath the surface, the more do the animals differ from those which now inhabit our modern world" (408). The earth, in other words, contains a *telos* of estrangement: the deeper humans delve, the more earth estranges them from the familiar, surficial narratives.

In effect, the earth becomes more literary below the surface. In the calculation of Hawthorne's *American Magazine*, geological depths correlate with literary depths — with

imagination itself. Perhaps Hawthorne's awareness of this connection between verticality and imagination is the reason he allows his story's victims to remain buried within the earth, rather than recovering several bodies as the historical Willey account dictated. Ensnared within the earth, the human element of the story becomes figmental, more open to creative additions and expansions. For earthly depths are the grounds of discoveries so phantasmic during the nineteenth century that they also served as the narrative structures of discovery for literary writers—a means of translating nonfiction into fiction.

This association between depths and the literary went both ways, as geology books likewise turned to the literary to express earth science's vast conceptions. This is especially the case with introductory geology books, such as the geologist Gideon Algernon Mantell's 1844 *The Medals of Creation*. Using a trope exhibited in numerous geology textbooks of the day, he figures strata as veils that geologists lift as they peer into deep time. Despite geologists' skills, it is not easy to wrest earth's history from behind the veil: "In vain we endeavour to penetrate the veil which shrouds from our view many of the mighty events that preceded the history of our race" because, "of the innumerable beings, which through countless centuries, 'The Earth has gathered to her breast again, / And yet again, the millions that were born / Of her unnumbered, unremembered tribes—' how few, comparatively, could even the transcendent genius of Cuvier reveal!" (873). These lines, which were incorporated into many contemporary

geology textbooks, use poetry to envision the immense quantity of non-human creatures within earth's expansive pre-human history. The most stratigraphic of literary genres, with its intentional layering of lines, poetry was also an ideal container for easing a general public into strata's estranging story because poetry was trusted and valued within antebellum culture. To begin conveying temporalities and quantities beyond the limits of human comprehension, these writers turned to specialized language—words defamiliarized from everyday prose, and charged with the grandeur of literary form. For many geologist-writers, the deeper they delved into strata, the more poetic they became because the oldest layers are also the most veiled by time, and thus in greater need of poetic imagination and the twists of a trope to make these estranged stories more legible to the public. Poetry, in this sense, is an act of geologic excavation, allowing science writers to bring earth's shocking stories to the mental light of day.

Likewise, the site of the Willey slide—especially the landslide layer—had an estranging quality for nineteenth-century visitors. For many writers, the Willey slide represented an alternative temporality—an event outside the historical memory of nineteenth-century America. The event itself was thought by many to have a discernible impact far into the future, as Silliman asserts: “centuries may roll by, and the catastrophe of August 1826, will still remain recorded in characters that can neither be effaced, nor misunderstood” (222). The avalanche scars themselves are so expressive that Silliman figures them as written marks upon the earth. He expresses a supreme confidence in the

landslide's ability to communicate to humans for years to come—a deep-time memorial to a single-day event in 1820s America. Indeed, this sense of projecting the land—and humans—into the far future was a common way of responding to the slide. In *Principles of Geology*, Charles Lyell participates in this defamiliarizing projection, as he speculates on the status of future fossils:

Many sheep and cattle were swept away, and the Willey family, nine in number, who in alarm had deserted their house, were destroyed on the banks of the Saco; seven of their mangled bodies were afterwards found near the river, buried beneath drift wood and mountain ruins. The geologist should remark that the lower alluvial plains are most exposed to such violent floods, and at the same time are best fitted for the sustenance of herbivorous animals. [...] We may expect the imbedded fossil relics to be principally referrible to this class of mammalia. (290)

Lyell combines the Willey family, sheep, and cattle into the same description, activating the sense of estrangement nineteenth-century thinkers experienced when contemplating this disaster. The family, in its violent burial within the earth alongside their animals, was translated into another time—a temporal transformation *precisely marked by that new stratigraphic orientation*, deeper within the earth. Upon glossing over the gruesome details (far less vivid than many of the newspaper articles, which seemed to relish the severing of skulls and other sensational details), this slight estrangement from the human then immediately dives into the distanced voice of the geologic gaze, as Lyell constructs a future stratigraphic story. Based on the tragedy's destruction of livestock, and the inviting habitat in the valleys below mountains, Lyell surmises that the fossils in these locations would primarily consist of herbivorous animals. There is a sense,

though, because of the way he collapses humans and cattle, that he implicitly yokes humans into this fossil calculation as well. Because of the degree of destruction, and its sweeping of both human and non-human, this event forced people to imagine contemporary humans as future fossils.

The event forced humans to use the kinds of tools with which they had learned to construct narratives about the deep past, and apply this vision to the nineteenth-century present. Unsettling to many, this combined temporality was also thrilling. For tourists, the landslide stratum was the very means of accessing—of mentally apprehending—the site’s alternative temporalities. Indeed, when Silliman visited the site in 1828, a board nailed to a pole indicated where the bodies had been found, and where remnants of the family’s clothing could still be found (221). Many historical documents touted the region as a place where tourists could witness both eternity and the Willey family’s moment in time. Guidebooks demarcated that time stratigraphically: the tourist could stand on the same earth that covered the Willey family (Sears 85). That succession of strata was a crucial part of tourists’ ability to feel and experience another time, as strata were the means of lifting time’s veil. As one sermon asserted, “There on that spot of earth, in that point of time, are epitomized the changes of all earth through all time” (qtd. in Sears 80). The Willey slide, in layering a fresh stratum of earth while erasing an American family, lent a literary quality to strata itself, as it allowed

Americans to access times beyond the present, to imagine geologic impact upon both the past and the far future.

Like contemporary geologist-writers, Hawthorne also embraced the connection between stratigraphic depths and literary imagination in “The Ambitious Guest” beyond the fact that he rendered the event into a short story. Similar to the way geologists turned to poetry to ease readers into expansive visions, Hawthorne turned to literary reference to convey the magnitude of the 1826 landslide. His use of eschatological biblical references can be placed within this larger context of deploying the literary to ease contemporary readers’ comprehension of large-scale stratigraphic movement. In his story, the family hears “a sound, abroad in the night, like the roar of a blast” that magnifies—growing “broad, deep, and terrible”—until it was “as if this awful sound were the peal of the last trump” (170). Where other writers made recourse to Noah’s Flood to capture the vision of the Willey slide, Hawthorne continues his aeolian embrace by reaching for the end of time. Indeed, the sound of the final trumpet resonates with the patterns of deep-time distraction Hawthorne has been creating throughout the story. As Paul writes in his letters to Corinthians and Thessalonians, that final blast of a trumpet separates the awake from the asleep. The trumpet blast marks both an ontological transformation and a major transition in universal time: “Behold, I tell you a mystery. We shall not all fall asleep, but we will all be changed, in an instant, in the blink of an eye, at the last trumpet. For the trumpet will sound, the

dead will be raised incorruptible, and we shall be changed" (1 Corinthians 15:51-52, *New American Bible* 263). Paul's doomsday prophesy contains similar temporalities as the Willey slide, as it juggles the instantaneous nature of the slide itself—as quick as a trumpet blast—and yet marks an entry into deeper stretches of time. The analogy with doomsday holds out both perversity and hope. It is perverse in the sense that the "last trump" marks—physically—a burial, not a raising. Yet, there is the implicit hope, given the Willey family's character and Christian markings throughout the story, that their agony was only temporary, in contrast to the ambitious youth's agony (recall the story's final lines: "Wo, for the high-souled youth, with his dream of Earthly Immortality! His name and person utterly unknown; his history, his way of life, his plans, a mystery never to be solved; his death and his existence, equally a doubt! Whose was the agony of that death-moment?" (171)). There is a sense in which the narrative has finally found its "blower"—that prime mover behind the wind, as suggested by another main reference to the final trumpet in the New Testament, 1 Thessalonians 4:16: "For the Lord himself, with a word of command, with the voice of an archangel and with the trumpet of God, will come down from heaven, and the dead in Christ will rise first" (*New American Bible* 316). Despite tragedy, there is an implicit consolation in Hawthorne's rhetoric, as readers—familiar with these passages—would have known that the primary force behind that "peal of the last trump" was "the Lord himself." And though there was a physical layering of fresh earth covering the Willey family, readers would be

assured knowing the last trumpet peal marked a temporary burial and a permanent rising. The youth's "agony" implies that he was not saved, perhaps due to his excess of earthly ambition.

Layered on top of this literary-geological resonance is the idea that Hawthorne is also physically describing the 1826 landslide when he reaches for the phrase "peal of the last trump" (170). As the rocks, tree trunks, and vegetation peeled off the White Mountains, that physical exfoliation and descent would have been the direct cause of any sound the Willey family heard. The last trump, for Hawthorne, is a peeling off of one layer to create another, experienced not by a fanciful creature in deep time, but by humans in the contemporary nineteenth century. That sensation of experiencing deep time *instantaneously*, as the Willey family were translated into eternity and as tourists imagine deep temporalities within the resulting stratum, found the language not of Noah's water, but of eschatological wind.

In addition to this purely sonic resonance, Hawthorne adds yet another connection between his literary container and the stratigraphic event. The very shape of the trumpet blast as it changes through time resembles the physical shape of the avalanche scars upon the White Mountains. Hawthorne describes a sonic escalation, as the sound grows from the usual wind blast into a "broad, deep, and terrible" noise that seemed, by the end, to shake "the foundations of the earth" (170). Silliman describes the same shape as he scrambled up the avalanche scars, noting how the scar started

narrowly at the summit and widened and deepened toward the bottom “till it becomes a frightful chasm, like a vast irregular hollow cone, with its apex near the mountain top, and its base at its foot, and there spreading out into a wide and deep mass of ruins, of transported earth, gravel stones, rocks and forest trees” (222). To convey the geological magnitude of this landslide, Hawthorne not only reached for a biblical vehicle, but he also paid attention to how precisely this literary connection unfolds through time, providing an aural resonance between the in-the-moment sound of a landslide or trumpet blast and the physical scar such a mass movement of earth leaves upon the land.

Using his literary prose to conjure the resulting landslide, Hawthorne writes: “Down came the whole side of the mountain, in a cataract of ruin” (170). The boy may not have been able to convince his family to visit the waterfall, but the wind managed to bring the waterfall to them in the form of an earthfall. This of course leads to the central miracle most contemporaries marveled at: “Just before it reached the house, the stream broke into two branches—shivering not a window there, but overwhelmed the whole vicinity [...] and annihilated everything in its dreadful course. Long ere the thunder of that great Slide had ceased to roar among the mountains, the mortal agony had been endured, and the victims were at peace” (170). Continuing the resonance of the final rapture, Hawthorne modifies the story by stating plainly that no bodies were discovered. Poignantly, the catastrophe ends with smokes in the morning, signaling

the dying of the element that could have saved them, had they only remained circled around it: "The next morning, the light smoke was seen stealing from the cottage-chimney, up the mountain-side. Within, the fire was yet smouldering on the hearth, and the chairs in a circle round it" (170-171).

Reacting to the realization of deep time, Hawthorne embraces earth's newfound volatility by rewriting the possibilities of stratigraphic forces. Much like Lyell's yoking of humans with non-human animals, Hawthorne also engages in an estrangement of the human, a distancing that resonates with the way contemporaries read the Willey family—and, by implication, humans in general—as proleptic fossils. Hawthorne provides glimpses of this defamiliarization by, for instance, referring to the family as a "mountain brood," as if they were a nest of animals perched on the side of the White Mountains (164). But he reserves the most intense estrangement for the end, when he leaves the reader with the historical fact that there were no human witnesses to attest to the final moments of Samuel and Polly Willey, their children, and the two hired men. The region's survivors were left to recreate those final moments, to imagine actions and motivations based on the final result—practicing geological speculation that bordered on the interior speculations of fiction writing.

Tracing past life based on present circumstances is, fundamentally, what stratigraphy and paleontology do, but instead of an ancient past, people were forced to use the *methods* of reading the deep past to render the *present* legible. This juxtaposition

of temporalities inspired many responses to the Willey slide. Reading the Willey family, in Hawthorne's narrative, is a rather easy endeavor. Because the family was rooted in the region, because they had mostly lingered around the fire until those last few flights of fancy courtesy of the ambitious guest, they had friends and loved ones to perpetuate their memories. "All had left separate tokens," according to Hawthorne, "by which those, who had known the family, were made to shed a tear for each" (171). Thus the most estranged figure in the story—the character most resembling the proleptic fossils—is the ambitious stranger himself, who left no imprint on another human, and thus no concrete personal narrative to connect to a particular token. In other words, he left no human history, and so was fully open to speculations. In stratigraphy and geology in general, deep-time speculations are only as strong as the "grounds" on which they are based. Not every stratigraphic story is equally discernible, and some are more parsimonious than others. As Hawthorne makes clear, the ambitious stranger's stratigraphic story was the most nebulous of all: "There were circumstances, which led some to suppose that a stranger had been received into the cottage on that awful night, and had shared the catastrophe of all its inmates. Others denied that there were sufficient grounds for such a conjecture" (171). In Hawthorne's literary retelling of a stratigraphic event, the bodies are never found. Thus the ambitious stranger is, finally, translated into deep time, not by his own force as he had hoped, but by the earth's.

By adding the stranger, Hawthorne was also asserting his own power as author, the small human facing earthly immensities. For, within the frame of the story, Hawthorne took someone who may not have even existed, and gave him life—at least in story—in addition to the Willeys. There is a God-like quality to this power of storytelling. Hawthorne is telling the reader that art is what humanity has against the eradicating forces of nature. Humans may be small, but we leave traces through art and culture and history.

Beyond “The Ambitious Guest” and throughout his writing career, Hawthorne continued to delve into the connection between stratigraphic depths and estrangement. The image he returns to in novel after novel is the image of a thin crust overlying nothingness. A stratum rendered unstable is Hawthorne’s way of capturing volatility and transformation, defamiliarizing his characters from the reality they thought they knew. In his 1852 novel *The Blithedale Romance*, for instance, strata are intimately connected to seeing anew and self-reform. Disillusioned with the reform community, the bachelor-poet and narrator Miles Coverdale turns to geological metaphors to convey the estranging effects of reformers and idealism:

I was beginning to lose the sense of what kind of a world it was, among innumerable schemes of what it might or ought to be. It was impossible, situated as we were, not to imbibe the idea that everything in nature and human existence was fluid, or fast becoming so; that the crust of the earth in many places was broken, and its whole surface portentously upheaving; that it was a day of crisis, and that we ourselves were in the critical vortex. Our great globe floated in the atmosphere of infinite space like an unsubstantial bubble. (141)

At Blithedale, both the world and definitions of the human were transformed, rendered fluid, or at least highly malleable. The solid earth—the crust—was breaking, and the inner, fluid realm was surfacing, upheaving what was once considered stable. When Hawthorne reaches for the image of upheaval to convey Coverdale’s sense of social and cultural estrangement, he reaches for one of the greatest physical forces he can imagine: that moment the bowels of the earth spring forth to rewrite the stratigraphic story. This crustal vision then expands outward even further, as Coverdale imagines the earth as a bubble within infinite space, as if the crust is the only shred of stable ground available amid an earth that is mostly void. The volatility of this inner stratigraphy is the reason Coverdale leaves the utopian community to reacquaint himself with a more solid conservative realm: “No sagacious man will long retain his sagacity, if he live exclusively among reformers and progressive people, without periodically returning into the settled system of things, to correct himself by a new observation from that old stand-point” (141). For Hawthorne, by 1852, strata are intimately connected with reform, but for Coverdale at least, even reformers need to return to the old systems if only to see a new pathway for self-transformation.

Even beyond his writing, Hawthorne continued to explore the connections between strata and estrangement, burrowing into the imaginative potential of the layered earth. Although Hawthorne’s published commentary on the Willey slide ends with his 1835 short story, the witnessing of alternative temporalities that the event

afforded continued to fascinate him, spilling out occasionally through his actions. In particular, the association between mountains and the imminence of eschatological temporalities continued to follow him. About twenty years after he visited the site of the Willey Disaster, he climbed another mountain with a group of friends. As his publisher James T. Fields recounts in the 1870s in *Yesterdays With Authors*, “One beautiful summer day, twenty years ago, I found Hawthorne in his little red cottage at Lenox, surrounded by his happy young family” (52). They visited a friend together, and the next morning Dudley Field invited them and a few other friends to “ascend Monument Mountain” near Stockbridge, Massachusetts (52). It was a storied group, including Oliver Wendell Holmes, Evert Augustus Duyckinck, Herman Melville, a few other male friends, and “several ladies” (52). The entire group was merry, reading a poem about Monument Mountain by William Cullen Bryant, toasting the poet’s health, and over all shouting and laughing as they traveled upon the quartzite cliffs.

Although scholars have not connected this mountain climb with Hawthorne’s more somber climb among the White Mountains, his actions suggest the intertwining of these two peaks. As Fields observes: “Hawthorne was among the most enterprising of the merry-makers; and being in the dark much of the time, he ventured to call out lustily and pretend that certain destruction was inevitable to all of us” (53). In the midst of all this merrymaking, Hawthorne’s dark edges nevertheless surfaced, as he takes on the mantle of the prophet, facetiously foretelling the entire group’s imminent demise. In a

way, he continued to imaginatively witness the Willey slide, and the associations among human ephemerality, mountains, and eschatology were apparently so strong that he could be on any mountain and step into that scenario he wrote about so many years before. Having devoted the cognitive space to plotting the hidden interactions and meanings of the Willey Disaster, that mix of temporalities apparently was always hanging in the air, ready to be inhabited by him, if only in jest upon a mountaintop among friends. Later that evening, the group ate dinner at Dudley Field's house, and, perhaps reminded of his own mortality during his mountain climb, Hawthorne was especially exuberant, "rayed out in a sparkling and unwonted manner" (53). They discussed the "physical differences between the present American and English men, Hawthorne stoutly taking part in favor of the American. This 5th of August was a happy day throughout, and I never saw Hawthorne in better spirits" (53). Climbing Monument Mountain in 1850, he engages in a make-believe that suggests he was thinking about a different mountain and moment of time. And though the emotional valence contrasts with the serious tone of "The Ambitious Guest," the multiple temporalities and mixing of strata and imagination retained their imprint upon his mind. Geological settings were, for Hawthorne, an occasion to contemplate deep time, the beginnings and endings of one man's, one group's, and humanity's life on earth.

As the impact of the Willey slide faded from popular American memory, tourists still visited the Willey House, but the meaning of the landslide changed. In particular,

the imaginative potential of the site's strata grew during the ensuing decades as scientists debated the initial trigger of the slide. In Hawthorne's 1835 narrative, the elemental forces of the earth far outweigh the impact of humans. Indeed, by granting wind an outsized role, and explicitly contrasting the wind with the feebleness of humans, Hawthorne created a striking portrait of the human-geological power divide. But as society began to appreciate the global stratigraphic impact of humans, thanks to George Perkins Marsh, the interacting elements of the Willey slide took on a different meaning. Geographer George Perkins Marsh himself, the subject of my last chapter, takes up the Willey Disaster in the 1874 edition of *The Earth as Modified by Human Action*. He clearly recognizes the role of water in the event, as he organizes the subsection "Mountain Slides" within Chapter 4: "The Waters." Using the rhetorical turn he so often deploys in his narrative, he emphasizes the way human action exacerbates environmental destruction: "Terrible as are the ravages of the torrent and the river-flood, the destruction of the woods exposes human life and industry to calamities even more appalling than those which I have yet described" (284). Although he recognizes the tragedy of the Willey family, even the comparative geographer, he nevertheless places the tragedy in a larger global context: "Earth or rather mountain slides, compared to which the catastrophe that buried the Willey family in New Hampshire was but a pinch of dust, have often occurred in the Swiss, Italian, and French Alps" (287). While

the Willey slide gave America a storied landscape, the event still does not match the intensity of geologic forces atop Europe's great mountains.

Debating among his own versions of stratigraphic stories, Marsh at first mentions the expected surface-oriented explanation, as humans cutting down trees destabilizes mountain sides: "The slide in the Notch of the White Mountains, by which the Willey family lost their lives, is an instance of the sort I refer to, though I am not able to say that in this particular case the slip of the earth and rock was produced by the denudation of the surface" (284). But much like his grappling with the geologist-priest Antonio Stoppani's expanded view of human agency, Marsh soon transitions from geographic surfaces to geologic depths to explain the slide: "It may have been occasioned by this cause, or by the construction of the road through the Notch, the excavations for which, perhaps, cut through the natural buttresses that supported the sloping strata above" (284). In the nineteenth century, as humans developed eyes that—for the first time in human history—began to properly appreciate the articulated layers of strata, events once thought to primarily originate from above (a rain-burst, in the case of the Willey Disaster), were suddenly visualized from below. Accompanying the raising of humanity's consciousness of its own impact upon the earth, strata became the concept through which humans apprehended their geological leverage—a leverage that only continued to escalate into the twentieth century and beyond. Although strata physically and temporally dwarfed humans throughout much of the nineteenth century,

as the century progressed, it became more apparent how thoroughly humans could write themselves into the earth's layers, projecting—often unintentionally and after-the-fact—a memory much further into deep time than Hawthorne could have imagined.

As this chapter has shown, Hawthorne's story reveals how strata became a vibrant source of literary inspiration during the nineteenth century. The subsequent chapters follow through on this imaginative potential of the layered earth, focusing in particular on the relationship between strata and reform, itself a type of imagination, or thinking anew.

Although literary engagements with geology and geological engagements with the literary continued to evolve through the nineteenth century, "The Ambitious Guest" itself remains a fossil registering a moment—or, more accurately, many moments—in time. On top of recording Hawthorne's direct encounter with the Willey site, the story records the upheavals coursing through geology in the 1820s and 1830s. This was a time when forces and their impacts were increasingly called into question. The standard model geology—a theory of the earth that held sway since the Revolutionary War—was so embattled as to become untenable precisely when Hawthorne graduated from college. The absence of water in "The Ambitious Guest" resonates with the mercurial, unsettled nature of geology during this period. Indeed, wind itself embodies the state of earth science as Hawthorne wrote his story. Yet wind also represents a deep tradition

of savants reaching for new types of forces or elevating minor ones, as they sought to lay claim to the title of terrestrial Newton.

Schooled in an older generation of geotheries by his Bowdoin College professor Parker Cleaveland, Hawthorne plays the part of a savant himself as he amplifies the power of wind in his own story. The geologic school of Hawthorne is catastrophist, but it is also so much more. He may have been predisposed to investing forces with outsized intensities, but he was also a student of the everyday, taking the opportunity to geologically theorize his surroundings and fiction alike. And with his sister Elizabeth, he revealed a penchant for a fantastical geology that negotiated the line between human and inorganic earth. Wind was the secret vitalizing force. Wind was Hawthorne's way of estranging a story from the familiar narratives his readers knew. Wind is the ethos animating "The Ambitious Guest." It is the spell by which he changes nonfiction into fiction. And fiction is the tool he uses to write against the wind. Thus he transforms the immense scales of stratigraphic force into the very thing humans have to survive such obliterating powers.

Most critics see the ambitious guest himself as the major creative contribution Hawthorne made to the historical account of the Willey Disaster.²¹ But it turns out that another character addition—a geologic force—was equally inventive. By omitting water as the geologic force triggering the landslide, Hawthorne was engaging with some of the most central cultural discussions of his day. Hawthorne was a geological theorizer, and

the Willey Disaster compelled him to judge humans and the inorganic earth by the same measure. By subsuming both human and wind into the trace, he weighs the differential impact of these forces, asserting the power of mere wind over the earthly impact of any human. The eponymous visitor in "The Ambitious Guest" talks about his glorious destiny in terms of building "my monument" (166). In the long nineteenth century, "monument" was a synonym for "fossil."²² And it is precisely during this time period—the 1820s and 1830s—that fossil correlation coalesced into geology's leading innovative method. The new science of fossils was largely the reason the standard model fell and the neptunist-plutonist debate became obsolete.²³ "The Ambitious Guest" thus resonates with the very *cause* of much of the intellectual upheaval within early nineteenth-century geology. The fabric of Hawthorne's short story, from its metaphors to its geologic characters, proclaims an intimate knowledge of the earth and a willingness to allow strata to inspire his literary imagination. In 1948, the understanding of Hawthorne's relation to geology was such that Randall Stewart could assert the following: Hawthorne "could scarcely [...] have sympathized with Emerson's wish [...] for leisure to 'run to the college or the scientific school which offered the best lectures on Geology'" (249).²⁴

Now, at least, we can say Hawthorne would have joined him.

Notes

¹ As the Rev. Carlos Wilcox writes in a letter published in Silliman's journal, "The road over which we passed was like a bed of ashes two or three inches deep; and the country around us exhibited the usual effects of a long drought (223).

² According to Randall Stewart, "Hawthorne was later to regard the Raymond years as the happiest of his life; he often told his family and friends of this glorious epoch when, as he expressed it, he 'lived like a bird of the air'" (5).

³ Some scholars, such as Kenneth Walter Cameron, suggest that Hawthorne began thinking about his story closer to the event itself, when news spread in September 1826 (2).

⁴ Arlin Turner writes that "Hawthorne's summer travels in the early 1830's can be traced with some certainty" (77). His two nights at Crawford's Notch is based on a 16 September 1832 letter to his mother.

⁵ To the public, though, Hawthorne was not associated with "The Ambitious Guest" in 1835; prior to 1837, his work appeared anonymously (Sears "Hawthorne's" 365). For more on the early publishing history of "The Ambitious Guest" and Hawthorne's implicit view of the story, see Doubleday 404. Aside from the intrinsically compelling story of a landslide, Hawthorne was doubly compelled because he was still trying to make his living as a writer. He writes the story early on in his career, when he is still finding his place in the market. Capitalizing on a major landslide was likely, at least in part, his strategy as an upcoming writer.

⁶ In the litany of narrative transformations Hawthorne made to the newspaper accounts of the Willey Disaster, scholars rarely mention this seemingly simple geologic edit, and when they do, it is never deemed significant. In his 1955 study, Kenneth Walter Cameron mentions how Hawthorne "ignored the details of the heavy rains," though this observation is not seen as particularly significant and is lost amidst a litany of other changes (28). And John Sears observes how Hawthorne omits mention of the Deluge (*Sacred Places* 80). Rebecca Belcher summarizes the litany of changes scholars usually recognize in the story: "He made the oldest daughter seventeen years old, instead of thirteen, added a grandmother to the family, subtracted the hired men, and wrote of a stranger, a young man who could be a romantic interest for the seventeen-year-old girl" (17).

⁷ This is not to say that wind did not play any role in the historic Willey Disaster. Although contemporaries were in agreement that water was the major force, Silliman writes how the mountains “had been thoroughly soaked with heavy rains, thus loosening all the materials that were not solid, and the trees pushed and wrung by fierce winds, acted as so many levers, and prepared every thing for the awful catastrophe” (220).

⁸ As Rudwick explains: “Erosion by a sudden and violent rush of water, at some remote time, often seemed the most likely causal explanation of many valleys: the well-attested effects of violent flash floods were a persuasive small-scale analogue” (103).

⁹ My approach also expands the way scholars engage “The Ambitious Guest” in particular. Geology has largely been overlooked in relation to Hawthorne. To generalize the critical reception, “The Ambitious Guest” has largely been viewed from six different critical perspectives. The most popular approach to the story has been to uncover texts that influenced Hawthorne. The work of the 1950s scholars—from B. Bernard Cohen to Kenneth Walter Cameron—painstakingly compare and contrast the story with contemporary newspaper accounts, pointing out the ways Hawthorne transformed journalist accounts into literature. Since the 1950s, this approach requires a greater degree of archival work to present any innovative arguments. James Devlin in 1973, for example, argues for the influence of German Romantic poet Gustav Schwab, while Mario D’Avanzo in 1976 asserts the influence of Jonathan Edwards. A second, minor approach, has involved hypothesizing Hawthorne’s own judgment of “The Ambitious Guest,” as Neal Doubleday does in 1966, based on the fact that Hawthorne at first skips over the story when compiling his *Twice-Told Tales*. Another approach has involved largely eschewing the fixation on comparison and contrast in favor of analyzing the story itself. Sidney Moss in 1967, for example, uses myth criticism to analyze the story, seeing “The Ambitious Guest” as a parable in which the mountain, or God, is benign if people are faithful servants. And more recently, Belcher in 2008 reacts to the idea that critics have neglect analyzing the story itself, and so she focuses on Hawthorne’s narrative techniques. A fourth group of scholars analyze how the story has influenced other thinkers. James Grossman in 1970 hypothesizes that Bartolomeo Vanzetti—of Sacco and Vanzetti fame—read the story intensely. And Rebecca Bedell in 2001 argues that it inspired artwork by Thomas Cole, and that, in particular, Cole was attracted to the strong moral within the story. Bedell’s chapter is also the closest critics have come to placing “The Ambitious Guest” within a geology context, though she does not delve into Hawthorne’s relation to geology, as her focus is on Cole’s relation to geology. Perhaps the most compelling scholarly work on “The Ambitious Guest” has been by critics who analyze the larger, cultural work of both the story and the event within antebellum American culture. Sears in his 1982 article and 1989 book chapter, for

instance, explains the many ways the Willey Disaster resonated with 1830s New England culture within the larger context of the rise of tourism in America. And Eric Purchase in a 1994 dissertation and 1999 book solely focuses on the Willey Disaster for his entire work, analyzing the event from the perspective of emerging land theories, especially speculation. A sixth approach to "The Ambitious Guest" followed the early 2010s excitement surrounding literary Darwinism. In his 2011 essay, Ian Marshall takes an evolutionary psychology approach to "The Ambitious Guest," arguing that Hawthorne appeals to genetically imprinted land preferences within his readers.

¹⁰ By recognizing Hawthorne's fascination with geology, I should acknowledge that this chapter participates in the larger trend of reading "The Ambitious Guest" through antebellum cultural phenomena. Geology was undoubtedly a popular science during this period. Some of the most insightful works on this short story have focused on cultural resonance. For Sears, the story "acquires a deeper significance" if it is "read as an expression of the culture of New England in the 1830s" (355). In "Hawthorne's 'The Ambitious Guest' and the Significance of the Willey Disaster," Sears places the story within several historical contexts: Puritan traditions of providential events; the practice of connecting American landscapes with legends; the rise of catastrophe narratives; the cultural fascination with ruins; and shifting concepts of home and family. From early nineteenth-century tourist culture to the search for a "storied landscape," scholars have discovered many cultural resonances within Hawthorne's short story, and an exploration of his geological fascination adds a crucial dimension.

¹¹ Hawthorne's geological schooling, while kindred to the origins of geothory as a genre, technically occurred during the empirical turn in geological studies. Responding to this earlier, more cavalier age of geothories, nineteenth-century geology increasingly grounded itself in closely studied fieldwork, carefully connecting theories to specific observations of the earth.

¹² There are, of course, many other documents that reveal aspects of Hawthorne's geological interest. While Hawthorne was open to the grand imaginative possibilities of geology, he was also very much grounded in the geology of the everyday, a perspective he shares in his journal. Writing in his *American Notebooks* on 31 July 1838, for example, he relays the news that he visited Hudson's Cave in Massachusetts, and then goes on to minutely describe the cave's geology. He even corrects the common name, noting: "It is not properly a cave, but a fissure in a huge ledge of marble, through which a stream has been for ages forcing its way, and has left marks of its gradually wearing power on the tall crags" (40). Here we have Hawthorne returning a decade later to the geological theorizing roots he originally set down in *Fanshawe*, as he contemplates the relation between a force and its impact, unfolding a geological scenario in his mind. Several

days later, on August 11, he orders his geological theorizing into a more compact statement of force and impact: "Hudson's Cave is formed by Hudson's brook" (45). Hawthorne was a geological theorizer of both the everyday and the fantastic.

¹³ As George Merrill explains in his history of American geology, Cleaveland took "front rank in forwarding the science of mineralogy in America," and later "became an influential lecturer in medical chemistry" (45).

¹⁴ At Bowdoin, Cleaveland taught mathematics, natural philosophy, chemistry, and mineralogy (Merrill 45). Turner writes that Cleaveland "was the most distinguished faculty member and perhaps the one friendliest to students" (36). Merrill adds: "In external appearance Cleaveland is said to have been stern and austere, and on any sudden provocation he was sometimes passionate and violent. But he was nevertheless large-hearted and possessed an exhaustless vein of kindly and generous feeling" (45). He taught for about half a century, dying at the age of eighty as he was preparing for class (45-46).

¹⁵ Aside from Cleaveland's explicitly asserting the primacy of neptunism over vulcanism, he makes his position clear in his framing. He explains neptunian theory as a matter of fact: "At some former period this globe has [...]" (723). In contrast, he constantly undermines vulcanian theory in his description: "In the theory of Dr. Hutton, so ingeniously illustrated, but unsuccessfully supported [...]" (725). On top of this, Cleaveland grants his neptunian description about two pages, whereas his Huttonian description is granted a mere single page, half of which comprises refutations.

¹⁶ At the same time, to his credit, Cleaveland acknowledges the fact that the evidence against neptunian theory was building to a near crescendo by 1822. "It seems [...] to be rather incumbered with difficulties," he confesses (725). The stopgap reasonings preventing neptunian theory from falling were increasingly burdensome: "It is obliged to admit the existence of certain operations, which cannot be repeated even on a small scale, and whose processes cannot be described" (725).

¹⁷ Despite taking a side, Cleaveland's treatise nevertheless reveals the incapacity of neptunian theory to capture geologic reality. The standard model was embattled, as every geologist knew. Huttonianism was becoming more and more reasonable with every defection of Werner's acolytes. By the mid-1820s, geologists were increasingly realizing that neptunian and vulcanian theory need not be mutually exclusive: vulcanian theory, after all, technically claimed *both* water and fire as significant forces, and this vision of the earth would prevail by the time Hawthorne graduated from college.

¹⁸ By 1850, though, catastrophists were increasingly isolated (Hallam 57).

¹⁹ The first mention of footsteps places the concept in relation to the wind: “But the family were glad again, when they perceived that the latch was lifted by some traveller, whose footsteps had been unheard amid the dreary blast, which heralded his approach, and wailed as he was entering, and went moaning away from the door” (Hawthorne 162-163).

²⁰ One foreshadowing is the way the ambitious guest incites “abstracted reverie” (166). While “abstracted” refers to his psychological state and ambition, it also alludes to his geological demise. “Abstract” comes from *abstractus*, meaning “drawn away,” and the youth himself is detached from earth’s surface, literally drawn away by the landslide.

²¹ Sears calls Hawthorne’s addition of the traveler “the crucial innovation in his story. Into the garden of felicity steps the snake of restlessness” (82).

²² Many geological treatises in the long nineteenth century refer to fossils as monuments. One example is James Hutton in his 1788 “Theory of the Earth” (Rudwick 170).

²³ For more on the demise of the neptunist-plutonist controversy alongside the rise of fossil correlation, see Hallam 25.

²⁴ Indeed, this chapter modifies scholarly views of Hawthorne, his relation to science, and his own writing practice. In his influential book, *Genesis and Development of a Scientific Fact*, science theorist Ludwik Fleck characterizes the structure of a scientific community. This community, or what Fleck calls a “thought collective,” consists of a group of “persons mutually exchanging ideas or maintaining intellectual interaction” (39). He envisions a thought collective as a series of concentric circles, ranging from the esoteric innermost circle to the exoteric outermost one (105). A thought collective can form around “any work of the mind,” such as a literary genre or scientific idea, and any single individual belongs to “several exoteric circles but probably only to a few, if any, esoteric circles” (105). The inner esoteric circles include “specialized experts,” then “general experts,” emanating outward in gradations toward the exoteric circles including “educated amateurs” and readers of popular science (111-112). Hawthorne was a member of nineteenth-century geology’s thought collective. Hardly a specialized expert in geology, Hawthorne was at least an educated amateur. He deserves a spot within the exoteric circles of nineteenth-century geology. If scholars used Fleck’s framework to plot the way Hawthorne’s relation to science in general has changed over

the years, they would see him move inward from the outskirts of the scientific community. Earlier scholars, such as Randall Stewart in his 1948 biography, focused on the negative repercussions of excessive scientific practice: the Dr. Cacaphodels, Rappaccinis, and Aylmers (248-9). “It could not have been unintentional,” writes Stewart, “[...] that his blackest villains [...] are men of scientific training” (249). More recent scholars have recovered a Hawthorne who appreciated science, and even promoted it. Scott Ellis sees a Hawthorne who “reveals admiration for industrial machinery” [2016] (133). N. Sibel Güzel sees a Hawthorne who was a “keen observer” of cholera epidemics [2013] (55). Sandra Burr positions Hawthorne within the nineteenth-century botany craze, arguing that *A Wonder-Book for Girls and Boys* was “a key text in the history of science education” [2010] (72). Many of these scholars, though, tend to abide by the traditional unidirectional science-and-literature model. When it comes to tracing an author’s relation to science, it is usually a story of influence: a trajectory from science to literature. In this context, science is only ever a theme, a context, an appropriation. The modern disciplinary divide—C.P. Snow’s “two cultures”—gets projected into the past. By illuminating Hawthorne’s membership in nineteenth-century geology’s thought collective, this binary disciplinary divide and reductive vector of influence can be reimagined. As Laura Dassow Walls asserts, “If nineteenth-century boundaries were fluid and permeable, it is now all the more necessary not to solidify them in retrospect, anachronistically” (12). Hawthorne did not just absorb science into his fiction, at least when it came to geology; to state this would be to mix up the physical *presence* of science in a literary work (a trajectory from science to literature) with the *quality* of engagement. A Hawthorne who practiced science—who is a part of geology’s thought collective, and not relegated to a cordoned off literary realm—is a different Hawthorne. In short, my chapter revises the critical narrative defining which stories are considered Hawthorne’s “science stories.” When critics write about Hawthorne’s relation to science, they are usually basing their claims upon such narratives as “The Birth-Mark,” “Rappaccini’s Daughter,” and “Dr. Heidegger’s Experiment.” From Aylmer to Rappaccini, and from Heidegger to Chillingworth, these doctors and “men of science” foreclose possible configurations between science and literature because they are positioned as Hawthorne’s primary engagement with the discipline. Because of the critical characterization of many of these science practitioners, scholars often reach for narratives of critique, revealing an ethically minded Hawthorne concerned with the excesses of scientific practice. Thus far, Hawthorne’s relation to science has been dominated by a focus on technology and experimentalist sciences. Some of the numerous approaches to Hawthorne’s experimentalist characters include: Carol Marie Bensick’s *La Nouvelle Beatrice: Renaissance and Romance in ‘Rappaccini’s Daughter,’* Taylor Stoehr’s *Hawthorne’s Mad Scientists: Pseudoscience and Social Science in Nineteenth-Century Life and Letters*, Sam Halliday’s *Science and Technology in the Age of Hawthorne, Melville, Twain, and James: Thinking and Writing Electricity*, Barbara Eckstein’s

"Hawthorne's 'The Birthmark': Science and Romance as Belief," C.R. Resetarits's "Experiments in Sex, Science, Gender, and Genre: Hawthorne's 'Dr. Heidegger's Experiment,' 'The Birthmark,' and 'Rappaccini's Daughter,'" Mary Rucker's "Science and Art in Hawthorne's 'The Birth-Mark,'" Scott Ellis's "Science and Technology in Hawthorne's Short Fiction," Aaron Cobb and Eric Starling's "Cautionary Hawthorne: Science, Ethics, and God in the Teaching of 'The Birth-Mark' and 'Rappaccini's Daughter,'" and Walter Squire's "Hawthorne, Scientific Anxiety, and American Mad Scientist Films." What happens, though, if natural historical disciplines like geology are given more leverage in defining Hawthorne's relation to science? We necessarily receive a different Hawthorne because he does not relate to the experimentalist sciences such as chemistry in the same way he relates to geology. Hawthorne, in contrast with experimentalist disciplines, *practiced* geology, at least recreationally and to the extent he inscribes his geological thoughts into his journal, fiction, and editorial practices. He knew, from intimate experience, the full import of his geologic fictions. Moving from a two-cultures Hawthorne to an embracing thought-collective Hawthorne demands a rethinking of any scholarly contribution that implies a relation between his science and his literature. Seeing a Hawthorne who practiced a science will necessarily add nuance to these readings, while also providing a model for interdisciplinary studies. Moreover, recognizing Hawthorne the literary geologist modifies our understanding of Hawthorne's career as a writer. Asserting a relation to science on the metaphorical level, James Keil calls Hawthorne a literary archaeologist. "Literary archaeology" in this context refers to Hawthorne's writing practice: his strategy of recreating "not only the cultural past but the cultural present by 'recycling' cultural documents" (238). Hawthorne dug into his readings like "an archaeologist uses her digs: as a site and source of composition" (238). Keil recognizes a change in Hawthorne's literary practice starting in 1836: a change from the literary archaeologist to the romantic writer, from reproduction to invention, and from Nina Baym's classical to romantic vision (239, 244). In other words, Hawthorne in 1836 transitioned from writing-as-assemblage to writing-from-experience. In light of recovering Hawthorne the literary geologist, we can modify this binary division of his writing career and also shed light on what may have been Hawthorne's direct inspiration—never mind the cultural work—for switching out water for wind. On the one hand, the Willey Disaster resonates with his literary archaeology method. Hawthorne, as Keil points out, was "alert for specific incidents that he could imaginatively re-assemble and re-present" (247). As implied by the details Hawthorne provides based on the tragedy itself, he likely read multiple accounts of that 1826 landslide; thus "The Ambitious Guest" represents a re-assembling of the many published accounts. On the other hand, Hawthorne the literary archaeologist dug into old texts precisely, as Keil points out, because he believed America lacked "architectural ruins" (244). As a cultural event, the Willey Slide—as much of Sears's work points out—provided a counter to America's perceived lack of architectural ruins. Geological

features and geological catastrophes stood in for ruins, investing the land with narrative resonance. When it came to the Willey Disaster, the historic moment of de-stratification was apparently so fascinating that he abandoned, at least in part, his method of literary archaeology. He turned into the literary geologist in 1832, when he took his lifelong interest in geology and visited in person the site of the Willey tragedy. "The Ambitious Guest" shows Hawthorne experimenting with a blended writing process, as the 1834-submitted and 1835-published story anticipates his 1836 turn to experience. Aside from his theorizing of geology and the human, "The Ambitious Guest" represents a melding of his neoclassical and romantic writing practices. The event itself was so compelling that he quit his secluded method in search of a first-hand account of the place itself. But is Hawthorne's visit to Crawford Notch in 1832 really a different practice from literary archaeology? Is hearing the story of the Willey Disaster from locals, or marking the place described in the many newspaper accounts, significantly distinct from the reading? Did Hawthorne's visit to the Notch of the White Mountains *alter* the way he wrote about the Willey Disaster? Evidence suggests that Hawthorne did indeed change his account of the 1826 landslide based on his 1832 visit. More than water, more than mass earth movements, when Hawthorne visited the Notch, the force he likely witnessed first-hand and in the moment was *wind*. The White Mountains are one of the windiest places on earth. The summit of Mount Washington in particular—which Hawthorne climbed during his visit to the Willey site—commonly gets wind gusts in excess of one hundred miles per hour and average wind speeds of over thirty miles per hour (Green 65). Indeed, Mount Washington held the record for highest recorded wind speed on earth—231 miles per hour—for much of the twentieth century. Thus Hawthorne likely used his direct experience of the White Mountains to revise the geological force underlying the Willey Disaster. Even though geologists agreed that aqueous force was the main trigger for the historic landslide, and that water's geologic power in general far outweighs wind's, the landscape nevertheless suggested a revision of the historic record. Wind does not have a significant impact in geological settings outside of desert environments, but it apparently made a sufficient impact upon Hawthorne. Aside from his engagement with nineteenth-century geology, his transformation of water into wind represents his anticipating his 1836 turn toward a writing practice grounded in experience. His amplification of wind's power in the story likely grew out of his encounter on Mount Washington; the experience allowed him to envision a greater role for wind in his rendering of the Willey Disaster. When it comes to "The Ambitious Guest," Hawthorne the literary geologist used his direct experience of the land to revise his literary archaeological findings. Thus recognizing Hawthorne's relation to geology revises scholarly conceptions of his writing career, providing a vision of Hawthorne who was simultaneously a classical and romantic writer leading up to his more consistent turn in 1836. Rather than an inert layer only to be tread upon, strata itself became a force during the Willey slide, as rocks exfoliated from the mountainside

to create a new layer in antebellum America. Calling Hawthorne a literary geologist acknowledges how an 1826 moment of de-stratification changed the way he wrote. This moment estranged him from a cloistered writing practice by compelling him to visit Crawford Notch for himself, incorporating the region's geologic textures into his work. In "The Ambitious Guest," Hawthorne likewise estranges the reader from the historical Willey Disaster by heightening wind's role in triggering the event, but also—literally—by adding the figure of the stranger.

Chapter 2: Geologic Revolutions: William Maclure and the Radical Realignment of Economic Class

*A Counterfeit - a Plated Person -
I would not be -
Whatever Strata of Iniquity
My Nature underlie -*
—Emily Dickinson, Poem 1514 [1879]

Just as Hawthorne confronts the smallness of the human by articulating a new role for humans (as witnesses), the prominent geologist William Maclure likewise finds a new place for them in the cosmos. Maclure advocated for geology's ability to challenge the traditional, shallow-time, biblical fundamentalist interpretations of earth's crust. Rather than an earth history received from the book of Genesis, he argues for an earth history perceived directly by the senses. He wanted, in other words, a geology that left room for doubt.

In response to the newfound knowledge of humanity's smallness, Maclure proclaims the need for a new creation story. Indeed, humanity's stratigraphic absence occasions the need for an entirely new theology—a theology that challenges the older one that placed humans at the center of earth history. This new theology, while placing humans in planetary perspective, nevertheless affirmed the agency of humans. Humans have constructed the world, and they can topple it. They do not have to wait for authority to change the world—they can transform the world themselves, and they can use the layered earth to help them.

Rather than lockstep allegiance to a six-day creation story and a six thousand year old earth, Maclure read a different story in earth's strata. This new creation story proclaimed the idea that the earth had neither a beginning nor an end. It told of constant change and crustal revolution. Living through the same upheaval within earth science as Hawthorne, Maclure witnessed this story like few other Americans because he was among the most-travelled researchers of the day.¹ Closely analyzing earth layers during his travels, he saw firsthand that "Whatever stability may be in the interior of the earth, every thing on its surface is changing [...]. By the organic remains found in most parts of the earth's strata, [...] we have the proof of a great difference in the forms, size and nature of animals which formerly inhabited the earth and sea" (*Opinions* 3:177). These layers, he learned, primarily told the story of the nonhuman. "No bones or remains of the human species" have been found "in any strata" from "an ancient date," which "leads to the supposition, that man was one of the last formations" (*Opinions* 3:177).²

This vertical diminishment of the human inspired Maclure's careful, highly empirical approach to earth studies. In the face of deep time, humans had "lilliputian senses" (*American Journal of Science* 7:263). Thus it is important, in Maclure's view, to be open to unexpected geological forces. As he writes, "It is probable that nature has many ways of acting that our short lived experience has not yet brought us acquainted with, for it is only yesterday that we were capable either of observing or registering the

natural phenomena, and [...] an immensity remains yet to be examined" (*American Journal of Science* 16:352).³ When studying strata, Maclure was skeptical of the imagination, choosing instead a descriptive geology that grew out of his reverence for the divide between human and earth history. Deep time led to deep observation: "Great care ought to be taken to fill up the chasm that time has made in the continuity of the rocks" ("Essay on the Formation of Rocks" 332).

Maclure's new theology sought to project earth's narrative of unanticipated forces and radical change onto the human, transfiguring society in the process. Although he often repudiated connections between geology and the imagination, he nevertheless espoused highly imaginative beliefs regarding the impact of empirical geology on humanity.⁴ In particular, he wanted to harness humanity's direct engagement with earth materials to radically transform the senses and perceptions of Americans. This distinguished American geologist was also a dedicated student of society, highly cognizant of the divide between consumers and producers. He believed the false narratives of the powerful could dupe working class people only insofar as they allowed their bodies to be undisciplined. Thus the science of geology—and particularly, minerals and strata—became a way to realign economic class in the nineteenth century, as it sought to reattach word and substance, sensory perception and mineral. For Maclure, the study of geology enacted the American Revolution within the body itself, physically changing its ability to perceive its surroundings. Earth materials, in other

words, were the sacraments of his new theology, adhering strata's message of change to the human sensorium.

Some scholars recognize the full extent of Maclure's revolutionary thought by claiming him as a precursor to Marx (Doskey xv). During his geological travels throughout Europe, he would record in his journal the various ways the ruling classes and religion systematically oppressed the lower classes (Warren 5). In his political essays, he divides society into two classes: the producers (or workers) and the non-producers, or consumers (or, as he put it, the upper stratum, socially and economically) (*Opinions* 3:286). The power relationship between the classes, for him, was reminiscent of the geologist and the raw material: "In political regions," he writes, "statesmen and diplomatists are the principal actors, kings and emperors their tools, the produce of the toil and labor of the industrious millions the materials they work on" (*Opinions* 3:172). Equality for Maclure meant an equal distribution of property, knowledge, and power, with the major leverage being education reform. His new theology—his revolutionizing of the human body in light of strata's story—is founded on the details of his pedagogy.

In Maclure's mind, America held out the promise of this equal distribution because of the American Revolution and the ideals on which the new country was founded. America had the potential to set itself apart from Europe's rule by the rich. America, he believed, could tell a different story, and he grounded this story within the earth itself. There was a revolutionary difference, for Maclure, between American and

European strata. Just as European politics was twisted by unequal distributions of power, European strata were older and highly contorted by mountain chains. In contrast, American strata were younger, extending in continuous layers of earth so neatly packed that the country stood as a macrocosm of a mineral cabinet (i.e. a container organizing earth materials into compartments—a popular way to study the earth in the nineteenth century). America's layers showed the proper relations between *geological* strata just as he hoped America would establish the proper relationship between *social* strata.⁵

While scholars traditionally place a firm barrier between Maclure the geologist and Maclure the political radical, geology was integral to Maclure's conception of reform.⁶ Virtually every aspect of his everyday, empirical geology was connected to a much grander vision of the social and economic possibilities of the human. He sought to fashion a science and society founded on individuals perceiving what was in front of their eyes, rather than theologies *telling* them what to see.

Earth science was Maclure's way of envisioning social revolution because geology was the revolutionary science of the time. The layered earth was a powerful conceptual tool for Maclure, allowing him to not only re-envision social strata, but to also make sense of major geologic controversies.⁷ Like Hawthorne, Maclure grappled with competing theories of the earth, including neptunism and vulcanism (also called plutonism). As a geologist attuned to social implications, he recognized the theological

implications of these stratigraphic theories. In responding to crustal debates, he used the same methods he brought to geology and strata writ large: he sought to separate theology from strata in order to establish America's stratigraphic story on the direct experience of the layered earth.

Ultimately, Maclure's reform *is* his theology. His method for reforming the world—for aligning senses with earth's materiality, rather than unthinkingly accepting human-centered narratives—was to expunge old theologies from anything he encountered. Expunging these theologies from the human was his way of revolutionizing society, and it was also his way of ensuring science would become independent of religion and capable of interrogating any received narrative. Such a science could view the earth and, if the layers told a new story, reject the old. His theology was, in other words, *anti*-theology—always extricating the theological in order to reform the world around him and compel others to trust the narratives told by the human body. His gospel is the message of earth's unceasing transformation.

By foregrounding Maclure, I am focusing on what I like to call “ordinary geology.” Literary scholars have adeptly teased out the cultural valences of sensational geologic events such as earthquakes, volcanic eruptions, floods, and—in the case of the Willey Disaster—landslides. From Dana Luciano's study of the New Madrid earthquakes to Charles Edwin Clark's early analysis of the 1755 Cape Ann earthquake, scholars have illustrated how the environment unsettled America both materially and

metaphorically. I build on the foundation of their work by excavating how even the most common geologic materials were deployed for radical ends during the nineteenth century—how even the most ordinary task of studying strata was itself an unsettling act, no earthquake necessary.

“Ordinary geology” is the earth science of the everyday. Ever the empiricist, Maclure primarily practiced ordinary geology by exhaustively traveling the United States and grounding his analysis in description.⁸ This chapter extends the unsettling quality of geology that past critics (and my first chapter) have examined by locating geology’s disquieting tendency within mere minerals and stationary layers of stacked earth. In her edited volume recounting the story of the 1811-1812 New Madrid earthquakes, Luciano chronicles the over 1,800 tremors whose “effects were felt for over a million square miles. They cracked sidewalks in Washington, D.C., damaged buildings in Savannah, Georgia, destroyed huge tracts of forest, and permanently altered the course of rivers” (1). This unsettling sense of movement becomes the running metaphor for her illuminating collection of essays, tracing “a criticism that remains on the move” (22). Geology is such a powerful critical tool because it acts simultaneously as text and pretext: critics can focus on the sensational parts of geology and quickly reduce these aspects to a core theme, such as “movement.” As Luciano writes: “The earthquakes themselves, from this perspective, are not the main event: they

are at once a pretext for, and a hyperbolic illustration of, the unsettled meanings of this place and time” (5).

Even more hyperbolic is the way the seemingly settled earth was fundamentally unsettling—how contested theories of the earth rendered even the firmest ground fluid in the early nineteenth century. If the unmapped is a regenerative space, as Luciano’s volume asserts, then nineteenth-century America was vastly more regenerative than even these essays lead readers to believe because below even the most well-mapped surface lies a space of serious argument in the nineteenth century: contested ground in the form of strata. In the long nineteenth century, America realized that, despite a surficial mapping, the depths of America were not only unmapped, but were also spaces where even basic observations placed humans within warring political and scientific camps—perception itself became a political topic. Ground that had once felt rather firm now became a space of contention, and Maclure, traversing the states and territories during his travels, was determined to piece together the mineral patterns and strata successions until this space too was mapped. In this chapter, geology is both text and pretext, revealing how Maclure found a new place for the human by replacing theology with a new grand narrative in geology.

Re-Envisioning Social and Geological Strata

Maclure’s theology involved a new way of thinking about the world. In particular, it gave him a means of envisioning a more democratic future for America by

contrasting its strata with Europe's. This section's strata-as-metaphor leads into the next section's more direct strata-as-pedagogy; for Maclure did not stop at merely analogizing earth, but he also *physically* used the earth to revolutionize the human.

Looking upon the American people during the opening decades of the nineteenth century, Maclure saw two layers—the many workers (producers) and the wealthy consumers (non-producers). Geologic metaphors intimately structured his view of these two layers: “When the hereditary power of the few, rules,” he writes, “the pyramid of society is placed on its apex, any derangement of which causes the whole to tumble in confusion and crush all under it. In elective governments of universal suffrage, the pyramid of society is solidly fixed on its broad and permanent base, and a movement however violent at the apex, or upper stratum does not effect [*sic*] the solidity of the foundation” (*Opinions* 1:447).⁹ He envisions a pyramid in all its materiality. If the layers of strata composing this structure were re-formed—literally, if the broad rock formation took its true stratigraphic orientation as the base—then a change at the top, such as a newly elected leader, would not plunge society into chaos. The idea of transforming earth layers allows him to conceptualize the ideal human government, and he strives to create the correct social stratigraphic orientation by spreading knowledge of actual geological strata—using the study of rocks to create the change necessary to fortify such a citizen.

As a geologist of social strata, Maclure liked what he saw. Looking back on the opening decades of the nineteenth century, he saw a world that was transforming the orientation of its strata. He writes: “The pyramid of society is now settling down on its base, in place of tottering on its apex; and political economy, as well as most things, must change to suit the interest of the numerical majority” (*Opinions* 3:116). Society changes via stratigraphic shifts—he envisions radical social change as a settling of the broad, deep strata of democracy. He celebrates this new stratigraphic era, even though society is only on the cusp—still very much on uncertain ground. The cornerstone of his theology of freedom is the correct orientation of layers. Crustal revolution provides the leverage for human revolution.

Mirroring Europe’s intricately contorted geological strata, society’s strata were distorted by class and the convolutions of old theologies. To create a more just future, society must strive for greater equality among class divisions (*Opinions* 3:48). Geology is part of the ethics of seeing correctly: diffusing knowledge to topple inequality among the masses and church and state. In its struggle against the powerful, geology’s diffusion reforms political strata, placing layers on their correct foundation. Maclure de-stratifies society by spreading knowledge of strata.

For him, the major stratigraphic moment within the country’s social layers was the American Revolution. Maclure was a proud American ever since he emigrated from Scotland and took America as his main home at the end of the eighteenth century. He

may have spent years traveling in Europe, but he considered himself American. Part of this admiration comes from his respect for the American Revolution and what it meant for social strata. The Revolution, he believed, re-formed society's strata. America's Revolution introduced "election by universal suffrage," which destroyed "the obstructions of hereditary power," and civilization has been improving ever since (*Opinions* 3:77). He traced progress through many means, from his own geological lectures to the diffusion of technology: "Steam-boats, locomotive carriages, rail-roads, etc. annihilating space and time, approaching the utmost corners of the earth, within the tangible distance of all ranks and professions [...]. The diffusion of useful knowledge, both moral and physical, will extend by those means to the utmost ramification of the globe" (*Opinions* 3:77). Knowledge was key to revolutionizing social strata and fulfilling the vision of his new theology founded on direct perception.

America's geology in particular, for Maclure, could serve as the model for the type of society his new theology envisions. Toward the end of his geologic treatise, Maclure sees America as divided down the Alleghany Mountains: an eastern America and a western America. The east is like the apex of the triangle, and the west is like the base. The East represents property and the rule of the few: there is a monopoly of property and power (*Observations* 126-7). The West—particularly, the Mississippi basin—provides the geologic and geographic substrate for a free and equal government (126). In the West, there is only one harbor, and thus no need for warships, and so

leaders will not wrest control from the people in the name of supporting an army. In this geologic configuration, the West represents peace and the East represents war, as the East needs to protect its many ports from warships, and thus tax the people. The west is “bottomed” on a free and equal representation, governed by the majority (126). He implicitly invokes his pyramid here: the West has a correct foundation, geologically. And while he hopes the majority will continue to govern, he realizes that the few are always conniving (127). Rather than a solitary message, Maclure’s thoughts participate in a larger antebellum conversation, particularly engaging the genre of exploration and expansion. As part of this larger conversation, his language is strikingly similar to physician and author Daniel Drake’s language in 1815, when Drake figures the West as the core of national strength, excelling in agriculture, because it is secluded from foreign luxuries (Sundquist 132). Yet Maclure goes further than these other conversations because he does not stay upon the geographical surface—he leverages the power of verticality.

Geologically, Maclure saw America and Europe in stark contrast. One represented the new theology, and the other represented the old. He figures Europe as a land of non-circulation: assassins, greedily safeguarding their mineral trade secrets, lurk to kill mineral enthusiasts encroaching upon their turf. Although he was hoping to travel into Hungary to study its geology, Austrian police prevented his way; robbers roamed the countryside of Spain, preventing his geological travels (*European Journal* 497;

“Essay on the Formation of Rocks” 332). This difference is also marked stratigraphically. Researchers believed the United States was primarily composed of Secondary rocks—that is, sedimentary—with straight, even strata, and few mountain chains, all facilitating transportation by both land and navigable rivers (*Observations* 80). The land itself was considered more knowable—more amenable to the protocols of science. Temporally, if strata were originally deposited horizontally, that means any difference from the horizontal—any disrupted or eroded stratum—provides insight into the relative age of the land.

As Maclure knew well, Europe was a place where strata underwent numerous derangements and the rock layers were highly confusing, mixed up in multiple mountain chains (“Essay on the Formation of Rocks” 267). America, by contrast, with its easily demarcated strata, was a land of newness. Maclure boasted that American geology was so fortunate—with such well-defined boundaries—that more accurate knowledge could be gathered in one year in America than a lifetime in Europe (*AJS* 7:257). His words were grounded in direct experience: Maclure spent years trying to figure out the geology of Europe and less than a year creating his geologic map of America.¹⁰ As America defined itself against Europe in so many other domains, it was also defining itself against Europe by its very geologic foundation. America, in his mind, was a new land, the seat of science—the land where new narratives, perceived by the individual’s senses, could undermine any theological impositions.

Indeed, America was so vastly superior in its regular stratification that, Maclure predicted, geologists would visit the United States just as antiquarians flock to Greece and Rome (*AJS* 7:259-260). With its uninterrupted strata, America became the experimental space of the world—a space set aside, seemingly specially manipulated to test geological theories; it was the place where the reality of stratigraphic sequences could be witnessed—a touchstone, if you will, for geological theories (*Observations* 15). America, having the most extensive strata in the world, is the land where geologists could form general principles (*Observations* 59, 28). It is the land where geologists can travel extensively, both horizontally and vertically, making expansive observations (*Observations* 60). Having only one mountain chain (*America in 1809*), and no volcanics, America seemed—geologically—like a land before time, without the violent upheavals marking Europe’s strata. Its preponderance of sedimentary rocks made America especially suitable for testing the Wernerian succession of strata.¹¹

Maclure’s new theology required a new land—a new Land of Canaan—and America’s stratification perfectly fit his requirements. It is easy to see how American geology was enrolled into the grand narratives of expansion, a time when the West fueled the excitement of antebellum Romantic primitivism, and literature emphasized a Revolutionary break from British constrictions (Sundquist 132). As Eric Sundquist writes: “Throughout the antebellum period poetic and political visions often shared the belief that the civilizations of the past were to be telescoped into the future of America

and made a function of its limitless vistas of space” (129). As this chapter reveals, these limited vistas—which conjure the sense of endless, uninterrupted horizontal views—were also translated vertically, into the depths of the earth. Strata seemed endlessly layered, and in remarkable order. The “old world antiquity” pitted against “new world virginity” found expression in rock formations themselves, Europe being a geologically old landscape compared to America’s geologically young landscape (Sundquist 131). “The American geography,” Sundquist continues, “was to embody the destiny of a new democratic nation that now more than ever imagined itself as a ‘city upon a hill’” (133). This hill, as this chapter shows, appeared through the formation of strata over time—not only American geography, but also American *geology* was to embody this destiny. Not just horizontality, but also verticality.

Radical Geology and the Politics of Perception

It was not enough to merely envision this new theology. Maclure had to find a way to instill it into Americans themselves. To body forth the revolutionary potential of the layered earth—to realize the stratigraphic possibilities of America—citizens themselves had to change. In Maclure’s mind, geology offered much more than the conceptual terms for envisioning social change. Geology was the very means by which Maclure sought to elevate the social and economic standing of the laboring masses. By using the study of geology to reform the sensorium of individuals, geology continues

the American Revolution. Geology, in short, represents a corporeal revolution, creating the kind of citizen the American Revolution only began.

The beginning of Maclure's theology is in the details of his pedagogy, and that particular revolution begins with perception. In his view, progress, whether in science or for the individual laborer, begins when we see our surroundings for what they are—or, as he puts it, "facts." But this immediacy is constantly threatened and distorted by what he calls "the jaundiced eye of system" ("Essay on the Formation of Rocks" 343). Systems impose false beliefs, allowing a foothold for the powerful to oppress the powerless. Thus the goal, to prevent the system from infiltrating our vision, is to attach "as much as possible things and substances to the signs or words which denote them" (*Opinions* 3:206). In a world in which malicious systems seek to tear apart signifier and referent, substituting a false signified, the most powerful antidote is to reaffirm the attachment between thing and sign, substance and word. As Maclure writes: "Our senses are the conduct-pipes through which we receive all our ideas and knowledge" (204). In order for perceptions to "become clear and an exact copy of every object they attend to, they ought to be disciplined and rendered acute, quick and sensible to the most minute difference in quantity or quality of every thing submitted to their examination" (204). Honing our senses can give us an experience of near-immediacy, in which the object becomes the idea, impervious to any systemic distortions.

When he imagines training the senses, Maclure is thinking about the way a disabled person lacking one sense can strengthen the remaining ones through constant practice (204). This augmentation-through-disability, Maclure asserts, suggests that children can likewise hone their senses from the start (204-205). Every sense can be improved through practice “and made capable of transmitting to our minds more just and accurate ideas of all external objects” (205). Children, he argues, should be instructed about “the properties of things,” “disciplining the senses” through various guessing-then-measuring exercises (206). Earth science, for him, can combat the distorting power of systems because a geologist is trained to be intimately aware of the connection between rock and word, substance and idea. Fundamentally, mineralogy is the science of attaching names to substances. It thus comes as no surprise that the apotheosis of disciplined senses comes in none other than the form of a geologist: “By feeling any cloth or substance,” he explains, he wants to “declare its quality without seeing it; like the geologist Werner, who, when blindfolded and his hands behind his back, could tell the name and nature of any specimens of minerals put into his hands” (207). Geologists are, in a sense, the priests of his new theology because they are so attuned to their senses—so capable of seeing beyond received narratives to the narrative perceived by the body. In the geologist’s mind, word and substance are so thoroughly connected that a single sense provides the necessary data to identify the material. There

is a superhuman quality to the scene, as if Werner, in a parlor game, is acting the part of a magician able to conjure a name through a slight mineral in the hand.

By training one's sensory perception, Maclure believes people can protect themselves from the powerful few. In Maclure's idiolect, "system" is never a vaguely nefarious force seeking to derange one's vision—it is always embodied by particular entities. In his geological journals, two of his perennial antagonists are organized religion and theology.¹² As he traveled through Europe observing strata, he was constantly facing what he saw as the effects of these antagonists: strata, belief, and the material reality of poverty and ignorance became so thoroughly fused within Maclure's thinking that the one—geology—became the antidote to the other.¹³

In contrast to the geologist, the ruling classes and religion detach ideas from words, allowing unjust governments to deceive and deaden the senses of citizens. In his essay, "Words without Ideas," he writes: "Natural or revealed theology, ideas attached to mere words without any substances or figures that can be formed by the mind, is the dexterous management of words, polemic sparring, the '*ne plus ultra*' of literature" (*Opinions* 3: 172). Theology is the ultimate literature—language so ornamental that it has become untethered from the reality of substances. "The fictitious dogmas of the church," he cautions, "are so multifarious, complicated and variegated, from the earliest fables of antiquity to the latest exertion of the imagination in the formation of new religions, as to beggar description" (172). Theology is akin to the malignant forces of

fiction, a common concern expressed even in late eighteenth-century novels. Thus far, he argues, civilization “has been principally based on the complicated and intricate arts, delusions and contrivances of church and state, depending on the vague, mysterious nature of metaphysics, theology, political intrigues, etc., resting on the *use and abuse of undefined words*” (*Opinions* 3:83, emphasis mine). Maclure sees corruption within language at the heart of nineteenth-century society. Words have been torn apart from substances, and when language is no longer tethered to reality—when their definitions vanish—the abuse of power is not far away.

This assessment of language in the opening decades of the nineteenth century may seem entirely grim, but it is actually the background for hope because this system of twisted, untethered language vanishes as quickly as a shadow in direct sunlight. The division and diffusion of knowledge in the past half century, Maclure argues, has transformed the world, “progressing so far as to bring all classes, ranks and descriptions of men, so much nearer a par as to render a complete change in politics, religion, commerce, laws, regulations etc.” (*Opinions* 3:41). Education is the great equalizer, and the nineteenth century is the dawn of a new era, in Maclure’s view. It is an era where the old linguistic untethering no longer predominates, no matter the might of the ruling classes. As he writes, “What blindness and folly for the rulers of church and state to follow the example of their ancestors, to think of deceiving the millions with the same hocus pocus ledger de main tricks, which succeeded some centuries ago (*Opinions* 3:41).

The old theology of received narratives is no match for the new theology of perception. Even within his scathing rhetoric, he focuses on the central deranging force of language, this time taking form in the phrase “hocus pocus,” in which language has so thoroughly twisted itself that it resembles magic or what Maclure calls “priestcraft.” In ages past, people were tricked by the thought of divine hereditary rights of rulers and “the exclusive agency and authority of God assumed by the priest,” but now, more knowledge is diffused by a three-cent weekly periodical published “by hundreds of thousands” than “could be found in thousands of volumes on metaphysics or theology!” (*Opinions* 3:41). The relative power dynamic between religion and the masses has shifted, in Maclure’s view, thanks in part to the proliferation of cheap printing.

Aside from the penny press, though, individuals could also liberate themselves through the disciplining of their senses via the study of geology. There is a sacramental quality to his use of earthly materiality, as if minerals and rocks and layered earth mystically realign the human with the revolutionary nature of the layered earth—a transubstratification, if you will. For the antidote to the ruling class’s derangement of language is the connection between material substances and abstract words, and that is why he so firmly believed in the importance of geology as an educational basic. What, after all, could be more grounding than rocks? Believing it would “require a union of the millions [...] to effect a radical reform of church and state, or produce a more equal division of property, knowledge and power, the *sine qua non* of freedom,” he was

nevertheless encouraged to note how the spread of knowledge in antebellum America was already beginning to transform the country. He was delighted to observe how, as he put it, “The rapid division of knowledge (which will equalize the other two) [is happening] in our union, and the working classes and spinning girls of New England are attending lectures on geology” (*Opinions* 3:115-116). He notes that the first American lectures on mineralogy occurred only thirty years earlier in Boston. Knowledge and freedom are in direct relation with each other, and in his trinity of property, knowledge, and power, knowledge is the place where activism can have an impact: if you share enough knowledge with the masses, if you discipline enough senses, then universal suffrage will eventually follow and the other two factors—property and power—will also equalize. The work and revolution begin not in violence and the sudden overthrowing of governments, but with education.

This context makes clear how Maclure saw geology as integral to politics: both aimed at a radical transformation of nineteenth-century America. Geology, in Maclure’s hands, becomes a multivalent tool for creating and spreading freedom; progress occurs when “positive examination” supplants theory and conjecture (“Essay on the Formation of Rocks” 335). Thus every student who acquires a firm connection between signifier and referent, word and thing, plays a part in the larger progress of America.

Education is the foundation of Maclure’s new theology. Yet he carefully specified that the solution lay not in just any education, but in a specific pedagogy. For

him, there were two kinds of education: “the productive and the non-productive, the useful and ornamental, the necessary and amusing” (*Opinions* 1:48). He insisted on a distinction between what he calls the evidence of the senses and the forces of imagination because this line of demarcation is the way to expose the “artificial superiority of class” (48). The foundationless education of the rich, for example—its reliance on ethereal notions unhinged from the materiality of rocks and minerals—would not fight the hegemony of the ruling classes. Productive education with its focus on foundations, by contrast, would bring “comfort and happiness” to the millions, and should therefore be the focus in any representative government. The problem is that schools, colleges, and universities, more often only taught students “the ornamental killing of time,” or what Maclure called the inordinate focus on dead languages (48).

To spread his new theology, Maclure advocated a fundamental reform of education in the nineteenth century, eradicating the old “system” of passing down dead languages: “founding our useful knowledge on the real properties of things, in place of the vague, imperfect and imaginary fancies conveyed to us by a careless, indolent and apathetic use of the senses” (*Opinions* 3:205). To make way for this new education, older education systems need to give way: “It might, perhaps, be more useful to occupy the time of children, during the ages from seven to nine years, in the discipline of the senses, than rigorously to confine them, according to the old system, to reading languages, and construing Latin and Greek” (*Opinions* 3:205). This view of education is evident

throughout Maclure's life, even seeping into his less polemical and more scientific texts, such as his *Observations on the Geology of the United States*, in which he wants to transform higher education, noting how little it would take to implement his material education: "less than half the time necessary to give a smattering of any of the dead languages at our academies, would be more than sufficient to give our youth a complete knowledge of the common and useful applications of earths and rocks" (viii).

Maclure has certainly laid down the pedagogical gauntlet, but the question remains: how exactly do you spread the gospel of this new materialist theology? For Maclure an "idea" was the "representation in the mind of a thing thought of" and "natural history," therefore "ought to be taught *by the objects themselves*" (*Opinions* 1:49, *Opinions* 3:50, emphasis mine). In fact, "no exact idea of a visual object can be obtained, without an equally exact figure in the mind" (*Opinions* 1:49). Only once the idea of these materials is formed can students begin to "furnish appropriate language to convey the ideas to another" (*Opinions* 1:57). As usual, Maclure reserves his more colorful language—and, ironically, his most literary—for his vituperative statements *against* the literary: "To begin by literature before the mind has acquired ideas, is like attempting to polish a sponge" (*Opinions* 1:57). It is not clear if he is aware that his anti-figurative assertions often rely, in their force, upon figurative language, but the point is clear enough: education fundamentally begins through an intimate interaction with earth materials themselves.

Letting the objects themselves teach means that much of the pedagogy relies on the material set-up, such as *how* to facilitate the human-material connection. In separating the useful from the ornamental, Maclure thought of several subjects, such as the art of drawing and the utilitarian parts of chemistry (*Opinions* 1:48). Yet it is earth science that most fully captures the radical transformation he wants to impart upon the working classes, and thus geology lies at the foundation of his pedagogy. Indeed, Maclure goes so far as to assert: “Mineralogy, or the properties of the different substances that cover the surface of our part of the globe [...] ought to be the first, and perhaps the only subject, of children’s instruction” (*Opinions* 1:50). This is a stratified education in which the demarcation of strata is based upon human reach: people should study the materials they can physically reach and commonly interact with: “for the investigation of the properties of matter existing at thousands of leagues from us, with which we have no necessary connection, is not immediately useful to us” (50). Such useful substances, whose properties people should become acquainted with, include clay, for example, a substance used for “brick-making, furnaces, crucibles, potters” (50). Common materials are the substances that can most directly elevate the working classes: the strata within reach and the rocks amenable to making a living. Ordinary geology.

Mineral cabinets play a crucial role in Maclure’s pedagogy, providing substances that enable a radical transformation of individual and social agency.¹⁴ They are the tabernacle of his new theology. He recommended that “a cabinet to be collected by the

youth themselves:" after they learn the names and qualities of minerals, they then gather "a few during every ramble," break specimens for their drawers, and then "render them familiar with all their external properties" (*Opinions* 1:50). This process of connecting mineral and word is iterative, and "should be so often reiterated that they could not possibly forget them" (*Opinions* 1:50).¹⁵ Rather than a sedate hobby of the leisured rich, the mineral cabinet thus becomes a radical way of reapportioning the social strata of nineteenth-century America. Mineral cabinets, stuffed with precious specimens, however, were anathema to Maclure because a gem on a pedestal could not be handled and scratched and streaked in order to learn its properties. A cabinet should never be reduced to a showpiece. Nothing better illustrated his point than the image of the expensive, cordoned-off mineral cabinet, which was a symbol for everything he deplored: the rich upper classes hoarding knowledge, preventing learning even in the substances themselves. And let us not miss the delicious irony of Maclure's turning the *very symbol* of moneyed leisure—the mineral cabinet—into the opening salvo of a radical transformation of agency.

Beyond discrete minerals, though, mineral cabinets also allow this radical pedagogy to confront the layered earth. The layered quality of mineral cabinets—one shelf stacked on another—evokes the stratified earth. Geology, for Maclure, requires a greater exertion than mineralogy because geology is mineralogy applied to the "relative position of the rocks on the surface of the earth" (*Opinions* 1:51). Rather than roaming

surfaces to extract minerals, geologists delve into depths—by necessity—to piece together the secret by which these layers are ordered. “The practice is laborious,” Maclure admits, “and requires much traveling and examination of the different ranges of mountains,” and yet, remarkably, the theory can be taught in five lessons (51).

Maclure co-opts Werner’s stratigraphic succession to implement his own stratigraphic succession of social and economic classes.¹⁶ Geology here is both the medium and the message insofar as the entire stratigraphic pedagogy begins with the teacher making “a circle on a slate to represent the earth” (51). Knowledge advances with each successive layer of earth, beginning by drawing a line for the Primitive class of rocks, and then sharing twenty to thirty labeled specimens with students; they should then “test all their properties and [...] investigate them so thoroughly, as to have their names and qualities so associated together as to recur immediately to the mind on seeing them” (51). The following four lessons proceed in a similar manner, but only after each layer is adequately learned. The second lesson involves drawing a line above the Primitive, representing the Transition rocks, and then exposing “30 or 40 specimens of transition rocks, also accurately ticketed,” to the students; the third lesson starts by drawing a line above the Transition line, representing the Secondary rocks, and then sharing specimens; and the fourth and fifth lessons, using the same method, involve alluvial and volcanic rocks. So the method is fundamentally similar to the basic human-

material meeting of mineralogy, but geology includes more theory as the human mind orders the layers of earth objects.

The ironies of Maclure run as deep as the strata he studied. Despite his radical strategies to equalize economic class, Maclure retired rich in his early thirties after a series of business ventures, including shipping textiles to America (Warren 7). That allowed him to spend the rest of his life studying geology and advocating for reform. He firmly believed in private property, and though he was a generous philanthropist, there is little indication that he recognized the dissonance between his radical economics and his privileged finances. There is a reason that, when scholars think class revolution, they talk about Marx and not Maclure.

Yet Maclure's finances meant that his radical geologic pedagogy—the vehicle of his new theology—was not merely the pipe dream of a would-be lesson plan. He was willing to mobilize his considerable resources in the name of transforming America. For much of his life, following his retirement from business, he acted the part of the geologist and philanthropist with great munificence. In his letters, while he was traveling, he often instructs various friends and teaching associates—his disciples—to take care of or guard his mineral collections, and he would frequently share boxes of minerals with various individuals, schools, and societies. In an 1829 letter to his teaching associate Marie D. Fretageot, Maclure refers to “150 boxes of minerals that were collected” for “the Youth of the Union” (*Partnership for Posterity* 565-566). During

classroom lessons, these specimens were paired with his maps, including his own map of the United States. With the aid of his maps and the corresponding “tickets on the papers that cover the specimens,” students could see the geology of vast regions without the expense of travel (566). Thus his influential geological map of America was directly tied to this amelioration of working class students. To provide as much knowledge of American geology as he could, he was especially rigorous in collecting rocks, “with a specimen taken every half mile” (566).

Whenever Maclure mentions these pedagogical specificities, the social goal is never far away. In the same letter quoted above, he states his objective this way: to “find cure for that disease [*sic*] of ignorance in the human species” (566). Beyond geology, Maclure championed many other methods for elevating the masses.¹⁷ Yet his contemporaries were quick to discount Maclure’s social idealism, yoking his entire philosophy with the failed communal society he helped build in New Harmony, Indiana, alongside Robert Owen. Regardless, his actions to elevate the working class are still felt to this day. Although many of the libraries he founded failed over time, New Harmony’s Working Men’s Institute is still a place of learning today. Maclure thought deeply about education, and geology represented the key by which he could free the economically oppressed, radically reforming them by transforming their sense of self—literally, what their bodies are *physically* able to do, in the case of honing the senses. Geology is not just the circumstantial subject of his pedagogy—it is integral to his

radical agenda to reform America. Maclure realized, though, that in order to be a source for enhancing people, geology itself has to be purified from the old theology. Just as he uses the earth to expunge old theology's hold upon the human, he uses his new theology to expunge the old from earth science in general.

Demarcating the Divine in Early Nineteenth-Century Geology

Stratigraphic debates lie at the center of Maclure's new theology—his project to perceive the layered earth himself without succumbing to the familiar, shallow-time earth narratives of the Books of Moses. His approach to reforming economic class mirrors his approach to reforming antebellum earth science. Even geology could be infiltrated by theology. Responding to the grand theories of the earth, Maclure sought to resituate America's stratigraphic story upon the direct experience of strata. For Maclure, these geotheories—neptunism and vulcanism—were emblems of theology's intrusion into earth science.

The warping power of "system" colluded not only with the dominant powers to oppress the working class, but it also colluded with particular scientific practices and theories to spread false assertions about the earth, in a contest of stratigraphic stories. Much like his social solution for elevating the masses, Maclure sought to lay a strong foundation for American geology by remembering the fundamental power of reattaching words and substances.

Maclure understood the reductive way society interpreted neptunism and vulcanism (plutonism).¹⁸ For many Americans with a passing knowledge of geology, neptunists were reduced to fundamentalist Christians searching the earth to confirm Noah's flood in the rock record, while plutonists were vilified as sacrilegious in their assertion that the earth record did not support the concept of a biblical beginning.¹⁹ But this oversimplified dichotomy belies the messiness of these two theories of the earth and the fruitful way they made early nineteenth-century geology crystallize around the concept of strata.

Werner himself, the geologist most closely associated with neptunism, complicates the idea that his theory aligned with a biblical view of earth history. Werner had no intention of aligning his system with the biblical story. As historian of geology Alexander Osipov writes, "There is no indication in his writings, published or unpublished, that any of the floods which are an important part of his theory was the biblical flood" (259). In fact, Werner was accused of being an atheist. One of the more judicious ways of phrasing the fault line between Werner and neptunism is this: "Although his theories, being basically neptunistic, were more acceptable to the defenders of the biblical account of creation than those of the vulcanists, he himself was in no way engaged in the religious aspects of the controversy" (Osipov 259). Although many geologists, such as Nicolaus Steno and Johann Gottlob Lehmann, did try to align

their earth theories with the Bible (a trend to which Maclure directly responds), Werner was not one of them (259).

In a similar way, Hutton does not neatly align with the way popular culture characterized vulcanism. Like Werner, Hutton formed his theories of the earth without being swayed by the biblical accounts of strata, though, as historian of geology V.A. Eyles points out, Hutton's eclectic works (he wrote treatises in both philosophy and farming, among other subjects) "show an overriding intent to fit all the subjects he discussed into the framework of his deistic philosophy" (579). His major geological contribution is the 1795 text, *Theory of the Earth*, which he presented in shorter forms and in lectures in the years leading up to the book's publication.²⁰ Hutton asserted that sedimentary rocks were not part of the "original crust, but formed by a 'second cause' and had originally been deposited at the bottom of the ocean" (Eyles 580-581). The present land must have been consolidated from "loose incoherent matter at the sea bottom" and then elevated to its current position. He believed these sediments were fused "by the great heat which he believed to exist beneath the lower regions of the earth's crust" (581). He argued that the earth needed an expansive amount of time to accomplish the present situation of strata—an argument embodied in his famous phrase that, when studying strata, he could see "no vestige of a beginning, no prospect of an end" within these earth cycles.

In straining theology out of strata, Maclure was responding to popular conceptions of Werner and Hutton's geotheries. But he was also responding to an even longer tradition of biblical geology. As Eyles points out, in the eighteenth century, there was an "almost universal belief that the fossiliferous sediments had been deposited by, or during the retreat of, the Noachian flood" (580). In this biblical earth system, no rocks were older than 6,000 years. Thus Werner's and Hutton's theories mark a major shift in earth studies: the shift toward eliminating theology from the stratigraphic story. Before Hutton, as Eyles writes, "many geological observations had been made and recorded in the literature; but previous attempts to synthesize these observations into a general 'theory of the earth' were unscientific and had not proved acceptable" (580). By pointing out the theological underpinnings of both geotheries, Maclure was, in one sense, continuing the de-theologizing trend that Werner and Hutton began.

Like Hawthorne's geology professor, Maclure came of age precisely when these competing geotheries were at the height of conflict. Neptunism and vulcanism impacted the way Maclure learned and practiced earth science in the opening decades of the nineteenth century. Yet Maclure makes no mention of Hutton in his writings, and biographers indicate there is no evidence that Maclure ever read Hutton.²¹ This is not surprising because "it was not until after 1830 that [Lyell's] theories began to gain general acceptance," after Lyell's *Principles of Geology* (Eyles 584). During Maclure's active days as a field geologist, Werner's theories were the paradigm in which data were

either in accordance or discordance. Werner was the touchstone for many young geologists in the first few decades.

While he admired Werner's nomenclature, he was repulsed by the fixation on earth origins, which he saw as highly speculative and unscientific (*Observations* 59). On the one hand, Werner is the epitome of Maclure's undergirding philosophy: he was a researcher who connected word with substance, creating the first lithologic nomenclature, and founding a system that was easily testable insofar as it relied upon the relative situation of rocks (*Observations* iii). On the other hand, the very names Maclure so admired were fundamentally wedded to a speculative theory of earth origins, founded on the idea that the great strata of the world were layered in a particular sequence.

For Maclure, this tension between speculation and sensory evidence boils down to one's field method. He asserted that there were two ways to study the earth: by closely examining a small portion or by surveying the grand outlines (*Observations* 11-12). Without even naming him, Maclure is signaling his contention with Werner's methodology. It was well known that Werner developed his ideas through a small data set, located in Saxony. In addition, in Maclure's view, fixating on the minute description of a small region leads to a proliferation of nomenclature, confusion, and "embarrassing description" (12). As usual, Maclure reaches for his most literary language when forming his vituperative statements: "microscopic investigations or the minute analysis

of insulated rocks and detached masses [...] would be like the portrait painter dwelling on the accidental pimple of a fine face" (60). In contrast, Maclure wants a geology of "great and permanent outlines of nature," general laws, and not "accidental deviations" and "exceptions" (60).

Geology had a tendency, in Maclure's view, to rest upon received narratives, and thus continue the old theologies of the crust. Maclure, in contrast, had an exceedingly empirical and sober view of geologic study: he realized that earth sciences were mostly speculative up to this point, which was a disservice to the science (iv). It seemed to Maclure as if each new theory refuted the previous one, and that any devotion to origins was a waste of life and talent. Speculation led to outlandish theories, but also to a constraining of nature: he felt restricting nature to two geological forces was too limiting, and that other forces should be recognized, and that even more may be recognized in the future, as humans experienced more earth processes (vi). Theories were constantly coming up short, in the face of nature. He pictured nature working in gradations, defying the artificial boundaries geologists impose on agency (*Observations* 53). As a geologist, Maclure fundamentally emphasizes aligning his scientific goal with the description of minerals and relative position of strata (*Observations* 60). Indeed, strata is his vision of scientific method and progress: he wants to draw great outlines and trace a dividing line between the classes of rocks. Strata is the organizing principle here, and though nature may resist his lines of separation, stratigraphic stories become

the way to mediate any disagreement. For example, aqueous force is associated with horizontal stratification, and that fact alone allows Maclure to scan the countryside and quickly give a rough assessment of geological force (“Essay on the Formation of Rocks” 273). The major geologic task for Maclure, throughout his life, was to understand how better to align the stratigraphic story with our sensory evidence rather than with the theologies of earthly origins.

Maclure believed theories of creation infiltrated both major theories of the earth. This is Maclure’s way of understanding early nineteenth-century geothory: “At present, the dispute seems to rest between two antagonists, the disciples of water, and those of fire; called Neptunians, and Plutonists or Volcanists [*sic*]. They both found their theories upon the same general supposition; that is, that the earth at the time they began their formation was in a fluid state: but they differ in the agent that nature may have employed to produce that state of fluidity” (342). Maclure begins his definition of these two theories by glossing their difference, but also acknowledging their fundamental similarity—a similarity not only in materiality, but also in belief. Maclure does not deploy the word “disciple” lightly—in his idiolect, that word carried highly negative connotations, aligned with the deranging power of systems.

As Maclure further delineates: “The Neptunians assert that the whole earth was dissolved in water, and the Volcanists [*sic*] that it was melted into the fluid state by fire. These two theories, as objects of discussion to exercise the talents and imaginations of

the literary world, would be innocent and harmless" (342). Maclure's classification of these geologic theories alongside literature is, as always for him, a damning statement. But he does efficiently define the crux of the problem: the two theories posit the same phase of matter, but entirely opposite forces. How do we reconcile such opposing theories? Although these theories would be ineffectual in the literary world, "when we consider that nine tenths of geological observations have been collected with a view to support one or other of the theories," to prove one correct and the other false, "the injury done to science, and the obstructions thrown in the way of its progress are incalculable" (343-344). The jaundiced eye of system arises yet again, this time to derange the recording of sense perceptions: the theories cause the disciple's eye to only select facts in accordance with the disciple's theory of the earth, building a corrupt foundation of 'evidence' merely to support a preconceived view of the earth.

For Maclure, both the neptunists and plutonists are trying to fit nature into the confines of their imaginations; they injure science through partisan observations; and they create theories that vary by the dictates of intellectual fashion, not the evidence of the senses (*AJS* 16:352; "Essay on the Formation of Rocks" 342). They are trying, in other words, to impose a received narrative upon the stratified earth—the major project of old theology. He also has a more personal grievance with these theories, lamenting that his geological map was not as widely noticed as he had hoped because he sided with neither the neptunists nor plutonists (*Opinions* 1:187). He muses bitterly, "had I

described the wing of a fly, or attempted to prove that basalt was formed by the medium of fire or water, it would have been republished in most of the periodical works on the continent of Europe" (187). Geology, in Maclure's view, is useless as long as it fixates on theories of formation rather than collecting facts free from system ("Essay on the Formation of Rocks" 343).

For Maclure, old theology's derangement of perception has a lot to do with what he calls the "confusion of names" ("Essay on the Formation of Rocks" 335). "A Neptunian geologist travels over a country," Maclure asserts, and names the rocks using his system, while the vulcanist "travels over the same ground," and describes it *using different terms* (335). Werner was the first to classify rocks, and so "his disciples of course were the first who made any geological observations; and as they seemed all much interested in putting this class of rocks into the Neptunian origin, they passed slightly over them, and described them by Neptunian names" (335).

Maclure especially singled out neptunism as a theory that warped language because of Werner's insistence on categorizing basalt (an extrusive igneous rock, in today's parlance) as part of the flat, or floetz, rocks—basically, that is, asserting that basalt was a sedimentary rock (*AJS* 1:212 1818). This multiplying of terminology is particularly insidious because "Nothing renders the learning of a science more difficult and complicated than a great number of names for the same substances" (*AJS* 7:258 1824). The proliferation of names prevents the working class youth from becoming

geologists—preserving geology only for those who have the time to study the complicated nomenclature.

For Maclure, theology's infiltration of strata goes both ways. Aside from theology affecting the descriptors geologists use, the stratigraphic story also fundamentally affects theology. "It is, perhaps, an historical fact," observes Maclure, "that all geologists who have formed their systems on the examination of the northern parts of the continent of Europe, where there are no existing volcanoes, are neptunists (*"Essay on the Formation of Rocks"* 264). By contrast, "those who have examined Italy, or other volcanic countries, previous to the formation of their systems, are more or less volcanists, which tends to prove, that opinions are the result of our knowledge, and our knowledge the consequence of the different situations which chance or choice has thrown us into" (264). In other words, geologists' beliefs are first formed by the landscapes they initially witness, and from them they form their theories. Strata initiate belief. This is a rather inventive deflation of the neptunist-plutonist debate: rather than take a side, Maclure undercuts the entire debate, asserting that their beliefs come from an original sensory perception that has been expanded beyond its evidence.

Even though neptunism traditionally accords better with biblical conceptions of strata, Maclure recognized an underlying theological bias in both theories. Sometimes he is subtle, only hinting at the root problem, as in his geological treatise, when he writes, "When we overleap those limits, and suppose a total change in nature's laws, we

embark on *the sea of uncertainty*, where one conjecture is perhaps as probable as another” (*Observations* v, emphasis mine). The “sea of uncertainty” is an especially apt image for Maclure’s critique: it connotes the idea that the theories are unhinged from the land—the stable ground of Maclure’s sensuous truth—while also invoking the fundamental biblical character of both theories, insofar as Maclure was highly skeptical of the theory of original fluidity (“*Essay on the Formation of Rocks*” 263-264). At other times, Maclure explicitly asserts what he thinks about earth theory’s relation to theology: he clearly states, for example, that he wants to banish theology from strata (*Observations* 14-15).

This link between theology and both neptunism and plutonism started early within Maclure’s geological thinking. As he traveled through France in 1812, he began to grapple with a geologist’s theory for the vulcanist origin of igneous fluidity, admitting that the theory is “perhaps the least complicated,” but that both earth theories “are so far beyond the sphere of our observation and comprehension that there is no place for rational analogy. Where is the immense quantum of water cries the Vulcanist, and the fire, retorts the Neptunist. Perhaps one might query where is the necessity of a total fluidity of the globe. Nothing that exists in the operations of nature confirms it” (*European Journal* 594). Yet again, Maclure undercuts the entire argument: where theorists quibble about the quantities of water and fire that theories require, Maclure asks why both espouse original fluidity.

Neither theories, Maclure asserts, hold water, because that essential fluidity is founded on biblical geology: “’Tis always the creation of Moses from which all systems originate, and our observations must be cast in the mold of a speculative theory. One fact that is confirmed by the observations of all parties is that the rocks called Primitive are under all the others” (594). At their foundation, both theories are built on a theological assumption, that the earth was once entirely fluid. Certainty, for Maclure, comes through stratification: we can say with certainty that the Primitive underlies the other rocks. The geology of Moses tells a stratigraphic story that is fundamentally at odds with Maclure’s scientific-socio-political agenda: where Maclure seeks direct contact through the senses, the biblical geologists seek adherence to a received narrative.

Years later, on 13 March 1836, a few years before his death, Maclure looked back upon an eventful life, and returned to this same topic of biblical geology, this time with a different tone: awe at what geology has wrought in the ensuing decades. Talking about fashion, he asks: what “warrants a reverence or veneration for ancient customs?” (*Opinions* 3:175). He continues:

On the contrary, do not the changes and variations which take place every day, year, and age denote any thing but fixity in the habits of our species? Moses’ genealogy of the earth and all upon it, being created in six days, about five or six thousand years ago, was generally received as an incontrovertible fact, that no one dared to doubt; now geology has progressed so far as to investigate so many great changes, both in animate and inanimate matter, as to raise great doubts when, if ever, the earth was made, and to encourage the anti-christian suppositions of the naturalist Lamarck, that nature began her work by organizing zoophytes, polypuses, etc., and, by practice becoming more perfect, at last formed man; or the supposition of Laplace, the astronomer, that the

planetary system was formed by a kind of nebulous inspaces which, congregating round a centre, formed the planets. (*Opinions* 3:175)

Geology's ability to question received narratives is a spark welling up into a conflagration through other scientists dealing with cosmogony. Lamark reads the biological progression of strata, while Laplace makes recourse to a nebulous force.

That semicolon between "doubt" and "now," marking the change from biblical geology to empirical geology, is a watershed moment in the history of geology: it represents the movement from intellectual stagnation—the inability to even doubt—to an inundation of alternative narratives, all on a foundation of new stories founded on the strata. "Strata" is the concept that allows that semicolon to exist—that gives voice to that doubt. All of a sudden, geologists have a chronological order of biological changes and transformation in geological agency, allowing stories that provide leverage against any infallible stratigraphic decree, be it Wernerian or biblical. Do fables refer to a race of giants on earth? There's no proof in the strata, Maclure asserts with confidence (*Opinions* 3:177).

At times, Maclure is aware of the impossibility of fully separating imagination and sense perception, theology and the geologic. To create this divide, he sometimes has to pile caveat upon caveat, to make it clear just what he is asserting. He admits, in "Essay on the Formation of Rocks," for example, that he does not comprehend the creation or annihilation of matter, and thus when he writes "origins," he refers to the last change needed to make the present formation and the forces nature used (269). But

imagination seems hardwired in the human, he has to admit. "Our species," he writes, "is the only one that dreams awake" (*Opinions* 1:58). And because science is fundamentally a social practice, always involving humans, theological dreams have seized science as well (*Opinions* 1:58). Even geology has its dreams, Maclure asserts: "The conjecture how nature made the earth, without any proof of its ever having been made, is the geological dream" (58). Strata give no indication of that creation, in his view, for they seem to connote perpetual process, constant alteration, one stratum piled on another in endless succession (*Opinions* 1:59).

It is in this historical context that we can adequately appreciate his treatise, *Observations on the Geology of the United States*. Maclure sees himself as forging the stratigraphic story of America. Geology is a science in ill repute by the start of the nineteenth century, as it is associated with flights of fancy, unhinged from observation. And Maclure wants to revolutionize this science in America so he can lay American geological sciences on a foundation apart from Europe—a geology not of partisanship, but of partnership; not of speculation, but of sensory evidence; a geology that does not change with the pendulum swings of fashion, as he saw Wernerianism begin to wane after Werner's death, and he perceived the ascendancy of fire. Maclure believed the growing evidence for plutonism was not a paradigm shift, but just another change of fashion.

In the face of all this fugitivity—this stratigraphic partisanship—Maclure sought to found America’s stratigraphic story on the direct experience of strata. As he writes in his treatise, “Were it possible to separate this metaphysical part from the collection and classification of facts, the truth and accuracy of observation would be much augmented, and the progress of knowledge much more certain and uniform” (*Observations* 14). But imagination is too great a pleasure, mankind too intoxicated with the “idea of acting a part in the creation [...] that we can scarcely expect to find any great collection of facts, untinged by the false colouring of systems” (14-15). These words must have felt especially ironic to Maclure, as his geologic map of the United States was colored by hand—in vibrant green, blue, yellow, gray, red, and orange—to mark the system-tinged stratified nomenclature of Werner.

Although he disavowed the attachment to origins, the labels—Primitive, Transition, Secondary—can never completely exorcise the implied Wernerian sequence. Maclure may have erased the term “formation” from their names, and added the more denotative “rock,” but the sequence is nevertheless still implied. He tries desperately to manage the theology-geology divide in the American stratigraphic story, and although he sees the false coloring of system as more or less inevitable, he still holds great hope. As he writes in the 1825 issue of the *American Journal of Science*, “To collect facts, without being warped by an attachment to system, is the surest mode of advancing geology, as well as other sciences; and it gives me pleasure to see our young geologists so far on the

right road. They have proved that they are fit to walk alone, and to make the best use of their senses" (254-255).

Although Maclure explicitly disparages imaginative forays into earth science, he nevertheless retains, like Hawthorne, an abiding connection between geology and the imaginative realm. It takes ingenuity to connect the social and the geological so thoroughly, especially the way he uses America's stratigraphy to envision a more fully democratic future. For Hawthorne, strata are connected purely to the imagination; for Maclure, that imaginative vision has a more focused social purpose.

In the nineteenth century, as America read its earthly depths, stratigraphic difference was particularly framed in terms of the mind, with journeys into the earth—to lower strata—being profoundly marked by the imagination. Maclure, recognizing this connection between depths and imagination, advocates for staying upon the thin veneer of humanity's layer. The focus, he argued, should be upon studying human remains in strata, and not diving into the center of the earth with speculation (*Opinions* 3:178).

Earthly surfaces are marked by the immediacy of witnessing, while depths are marked by speculation and imagination. He admitted that humans are ignorant of the globe's interior: as the physical human capacity to study rocks decreases with earthly depths, imagination must by necessity increase ("Essay on the Formation of Rocks" 261).

In fact, Maclure categorizes rocks based on human agency, with the dividing line of strata acting as the inflection point where positive analogy changes to conjecture

("Essay on the Formation of Rocks" 266). In other words, the earth itself—strata—is divided into two classes: the observed and the speculative. The deeper humans go, the more unknown, speculative, and imaginative the earth becomes—less scientific and more literary. Indeed, there was something almost magical about the Primitive formation, or what geologists considered the lowest most layer of earth's rocks: it was thought the earth processes that formed Primitive rock no longer took place: they were rocks with invisible agents. The Primitive was thought to be eternal—fully open to humanity's speculations of origins.

Analyzing the layered earth, nineteenth-century thinkers confronted an array of possible pasts, freeing them to envision—as Maclure did—a radical future. Strata are the sites of the imaginative—the deeper humans delved, the more estranged the earth became from surficial familiarities. Geologists speak of "formation," or units of genetically related rock. But geology itself became the site of re-formation, of a radical change. The site of change depends on the particular human interacting with the strata. In the case of Maclure, the site of transformation involved the economically oppressed discovering a means to transform their sensory perceptions. For Marsh, in the final chapter, environmental awareness was the focus of transformation, as humans began to apprehend their own limits and kinship to geological forces.

As both Hawthorne and Maclure show, the very ground of geological science was in contention during this time, and the point of contention *was* force—the force of

fire, of water, and the human. As strata rubbed up against the human, that meeting of human and rock placed humanity in perspective. For Maclure, the perspective of deep time instilled within him a deep caution and careful empiricism. It inspired him to create a new theology that would give voice to earth's decentering of the human. Strata was an unsettling concept, both scientifically and socially. It is no coincidence that Maclure strove to increase the social, economic, and political force of the masses at the same time that force was the central debate in geology. The political and the geological were integral for Maclure.

Thus Maclure's geology was intimately connected to the political.²² Indeed, the political practically necessitated this layered vision, his constant effort to get to the bottom of the stratigraphic story—to place that story on its correct foundation, both geologically and socially. The crisis, in Maclure's case, is fundamental inequality, and it flashed up like no other when he intimately encountered American geology. Geology disciplined the senses to fully realize the citizens of the United States—it enacted the sensorium revolution Maclure hoped for, increasing the agency of working class people.

Aside from this literal augmentation of the working class, the spread of geological knowledge acted as a thermometer for the spread of freedom: geology is the subject, the rhetoric, and the means by which America would become truly free. It is not merely that American geology reflects Maclure's social aims—it is the tool to create that change; they are one and the same. In nineteenth-century America, geology became the

site to expand the capabilities of the working class and to combat inequality in the name of freedom. Wai Chee Dimock contests the idea that “there can be a discrete, bounded unit of time coinciding with a discrete, bounded unit of space: a chronology coinciding with a territory” (28). Strata in the nineteenth century contested any monolithic ordering of time and space. For strata show alternatives. Alternative worlds, alternative times, and alternative theologies. Witnessing an alternative time means the present moment does not have to be the way it is. Strata opened up that conceptual possibility—it was the space where, the deeper you go, myth became reality.

Understanding the significance of strata was such a powerful threshold: as humans descended vertically, toward the realm of unknown worlds, they were simultaneously defamiliarized: the literary and the stratigraphic became one. Luciano calls this “thinking the otherwise” (13). That is precisely what strata enabled in the nineteenth century. Envisioning a different past world leads directly to envisioning a different present and future—a lesson Hawthorne and Maclure knew well, and a lesson, as we will see in the next chapter, that allowed Dickinson to translate stratigraphic force into the human force of imagination.

Notes

¹ Indeed, Maclure [1763-1840] is arguably the *most* prominent American geologist of the first two decades of the nineteenth century. To give an idea of Maclure's pivotal role in the growth of geologic studies in America, in George P. Merrill's classic 1924 history, *The First One Hundred years of American Geology*, only two chapters out of fifteen are titled using a single geologist's name, and the first one is labeled, "The Maclurean Era, 1785-1819" (ix). Maclure's role in geology was highly lauded for decades. His first biographer—Samuel George Morton—gave a speech in 1841, a year after Maclure died, to the Academy of Natural Sciences of Philadelphia, drawing a contrast between the state of science in America in 1841 versus the 1810s, when Maclure was most active: "Thirty years ago all our naturalists were embraced in a few cultivators of Botany and Mineralogy, while the other branches were comparatively unheeded and unknown" (7-8). The laborers were few, aside from the occasional "solitary individual who pursued the sequestered paths of Science, filled with an enthusiasm of which the busy world knew nothing" (8). In contrast, "how widely different is the scene which now presents itself to our view! We see the unbounded resources of the land brought forth to the light of day, and made to minister to the wants and the intelligence of humanity" (8). Maclure receives the plurality of praise among these rare solitary scientists in the early republic: "Among the most zealous and efficient of these pioneers of discovery was WILLIAM MACLURE" (8). In the decades following Merrill's history, researchers further contextualized Maclure's stature, placing him in his proper context within the history of geology. Yet he nevertheless looms large as the preeminent American geologist during the opening decades of the nineteenth century because he created one of the first geologic maps of the United States and, as George W. White writes, "Maclure's articles and book are the first connected account originally written in English on the geology of the United States" (*Dictionary of Scientific Biography* 615). First published in 1809, Maclure's book is called *Observations on the Geology of the United States*, and he firmly believed, as he wrote two decades later in the first volume of *Opinions on Various Subjects*, that the accompanying map "was the first that had been published of any entire country and the most extensive by far that has been made" (187).

² This supposition was further supported by the variety of human remains discovered on earth's surficial layers: "Had man remained on the surface of the earth as long as the extinct animals, it is probable that his bones and remains might have been equally varied in size and form, as those great and stupendous remains of animals now on the different parts of the earth, where it has been carefully examined" (*Opinions* 3:177).

³Paralleling the diminishment of the human, Maclure believed that humanity's imagination also fell short of earth's expansiveness: he did not believe in "limiting nature to the confined scale of our imaginations" (*American Journal of Science* 16: 352).

⁴Maclure repudiated geology's connection with the imagination because imaginative geology was associated with the cavalier eighteenth-century practice of geotheorizing. Maclure valued practical geology, and he saw geology's practicality decreasing when the focus was on earthly origins ("Essay on the Formation of Rocks" 343).

⁵Maclure constantly switched between geological and social strata throughout his writings. In his journal, he quickly transitions between geology and the working class. As a typical example, in *The European Journals of William Maclure*, he moves from geological strata one day to social strata the next. Observing rocks in France ("Ausauge, top of the Cantal") on 26 November 1807, he notes the thick snow, the wind, and the variable temperature on the different sides of the mountain, before observing the layers of compact basalt atop gneiss and granite, and the way vertical schist transitions to horizontal schist (94). He accompanies these field notes with a stratigraphic sketch of the schist's variable layering. The next day, in St. Flour, he starts the journal entry with the observation that "the situation of the laborer here, as in most other places in France, [*sic*] much ameliorated since the Revolution" (94). The laborers used to make eighteen sous and pay "nine for a bottle of wine. Now, they have forty sous and pay only four for a bottle of wine. They can, for the most part, read and education has made considerable progress" (94). From stratigraphic position to the relative position of laborers within French society, Maclure's juxtaposition of these two concerns—geological strata and the plight of the laborer—should come as no surprise. Indeed, geology becomes the means by which Maclure seeks to elevate the social and economic standing of the laboring masses.

⁶Maclure's first biographer, Samuel George Morton, started the trend of separating Maclure the geologist and Maclure the social reformer. Morton, for instance, saw Maclure as a successful geologist, but as a failed social reformer (27). Maclure's most recent biographer, Leonard Warren, while more nuanced, continues this separation by writing about "the fields of geology and of educational reform" as two distinct foci for Maclure, rather than a united focus (15). Researchers see these seemingly extra-geological aspects as quirky outliers, or else reduce them to mere nationalistic geology, rather than a smaller component of a much grander vision of the possibilities of geology.

⁷The concept of strata was perhaps Maclure's single most powerful organizing principle for earth studies. He categorizes rocks based on their stratification and the

orientation of their stratification; when he goes into the field to study rocks, he often looks precisely for the succession of strata; most of his measurements are relative to strata, such as the way a stratum is angled, how continuous it is, and the quality of soil it decomposes into. Indeed, for Maclure, geology is *synonymous* with the study of strata. As he writes in the “Education” chapter of *Opinions on Various Subjects* [Vol. 3], geology is defined as “the application of mineralogy to the relative position of the rocks on the surface of the earth” (51). Geology is essentially mineralogy applied to earth layers. In other words, if mineralogy focuses on the description of discrete substances, geology focuses on the spatial organization of these substances within earth’s layers. Maclure was actively trying to differentiate true geological study, which he saw as expansive, from mineralogy or the myopic fixation on small rock samples. As he writes, “the nature of the ore or mineral, with a description of its relative position in regard to the surrounding substances, is the *principal object of geology*, which cannot be understood by microscopic investigations or the minute analyses of insulated rocks and detached masses” (*Observations* 60, emphasis mine). Defining geology as the position of minerals within strata reveals Maclure’s economic and utilitarian use of geology: strata as a way to easily locate, and thus extract, resources; the concept of strata transforms into a tool for consuming the land, participating in what Eric Sundquist calls the literature of exploration and expansion (Sundquist 131). The fundamental unit of stratigraphy is not the rock in itself, but rocks in relation to each other. Traversing the terrain of an entire country is a daunting task for a single geologist; to cope with this challenge, Maclure constantly observed which rocks and minerals are often found together. Modern geologists use the term “companion minerals” or “companion rocks.” For example, if geologists see a formation of limestone, they will also likely find nodules of chert (microcrystalline quartz, such as flint, which is black chert); and if geologists find the mineral azurite, they will probably find malachite nearby. Certain minerals are companions to each other, much like Haraway’s companion species, where “‘the relation’ is the smallest possible unit of analysis” (20). The same can be said for strata insofar as companion minerals are the nascent strands leading up to a stratigraphic story. Finding a companion mineral (i.e. the relation between two discrete earth materials) is a step away from a stratigraphic story (i.e. the relation between two layers of earth materials). Companion minerals are, for Maclure, the basic building blocks of the stratigraphic story, transforming the minerals and layers into patterns that are thereby knowable and predictable, allowing geologists to orient themselves vertically. He moves from discrete mineral associations into an understanding of earth layer associations—from the surface to the depths, as Crèvecoeur predicted. Thus companion minerals, strata, and relation become the fundamental tools by which Maclure translates the earth into story, necessitating such statements as, “geology must rest, more upon relative positions, than upon the constituent parts of rocks” (*Observations* 46). This relational geology is why, throughout his geological treatise, Maclure frequently lists

which rocks are found with other rocks—he connects lithologies in space, relating one substance to another in order to tell a story. He positions geology as a science of relations, not merely the science of describing an autotelic earth object. And relations—an ordering—are the foundation of story. His goal, when he sets out into the field, is “to find out the key to the original order of stratification” (*Observations* 25). The concept of strata is so crucial to Maclure’s epistemology that he even uses it as a metaphor for the addition of scientific knowledge, writing in the *American Journal of Science*, “though no advocate for the infallibility of stratification, [...] yet it is probable, that some such arrangement is necessary, to facilitate the acquisition of the science, like the shelves of a library” (7:264). The delineations of strata—even with a faulty theory—provide a foundation on which knowledge can be added and emended. Stratum layered over stratum becomes the means by which knowledge progresses—both the subject of study and the very framework for conceptualizing advances within geology.

⁸By “exhaustively traveling,” I am referring to the fact that Maclure was thought by other researchers in his day to be perhaps the most traveled American geologist. Introducing an extract from Maclure’s letter in *The American Journal of Science*, Benjamin Silliman acknowledges, “few men have seen so much of the structure of our globe” as William Maclure (1:210). Morton remarks on Maclure’s traversing “the most interesting portions of the old world, from the Mediterranean Sea to the Baltic, and from the British Islands to Bohemia” (10). And his “observations were made in almost every state and territory in the Union, from the river St. Lawrence to the Gulf of Mexico” (11). Indeed, in his biographer’s hands, Maclure becomes a near-mythic figure—a solitary romantic hero undertaking a “herculean task” to map the entire United States: “He went forth with his hammer in his hand and his wallet on his shoulder, pursuing his researches in every direction, often amid pathless tracks and dreary solitudes, until he had crossed and recrossed the Alleghany mountains no less than fifty times” (Morton 10). His travels are literally marked by exhaustion: “He encountered all the privations of hunger, thirst, fatigue and exposure, month after month, and year after year, until his indomitable spirit had conquered every difficulty, and crowned his enterprise with success” (Morton 10-11).

⁹Many of Maclure’s thought processes, throughout his entire oeuvre, can be placed onto this geologic conceptual structure, either on the apex or the base of the pyramid: church and state vs. the millions; system vs. facts; other sciences vs. geology; producers vs. non-producers; language tethered to material vs. language untethered from material; fiction vs. simple narratives; false foundations vs. true foundations; theology vs. the sciences; sounds vs. the tangible; ornamental, amusing education vs. useful, necessary education; hereditary power of the few vs. elective government of universal suffrage; despotism vs. democracy; the few vs. the many.

¹⁰ Although scholars have pointed to geologic maps of America predating Maclure's, such as the maps by Jean-Étienne Guettard [1756] and Comte de Volney [1803], they overlook the way Maclure's map—whether he intended it or not—is the first American map positioning strata using the sequential terminology of Abraham Gottlob Werner, from the lowest “primitive rock,” to the next layer of “transition rock,” followed by the “secondary rock” and the “alluvial” (Maclure's 1817 map). I write “whether he intended it or not” because, although Maclure admired Werner's terminology as the most widely accepted terms in geology, he was more circumspect regarding the terminology's implied origin of each rock layer. Regardless, he uses the terms in his map's key, and the terms themselves—from the lowest Primitive to the higher and younger Secondary—imply a stratigraphic relationship for the colored portions of his map. On top of this, he provides five stratigraphic cross-sections transecting the mapped regions (Plate II). In contrast, both Guettard's and Volney's maps lack labels implying a clear stratigraphic (i.e. vertical) positioning of the various rock types. Guettard's map uses shading to illustrate three “bandes” marked by rock types: the Bande Sableuse, Bande Marneuse, and Bande Schisteuse ou Métallique, with the interpretive emphasis placed not on these broad bands, but on particular localities of specific rock and mineral resources (with no stratigraphic marker whatsoever). Volney's map provides no key, and thus no indication of stratigraphic layering in the map itself. As John W. Wells points out, an *errata* page indicates Volney intended his map to be colored based on different rock regions, such as green for “le sol calcaire” and red for “le granitique” (199). Even with this terminology and coloring, though, the terms themselves do not place the various strata in a vertical position, unlike Maclure's use of “primary” and “secondary.” In other words, Maclure's map is the beginning of graphic depictions of America's stratigraphic story: placing the various layers in vertical relation to each other, even if it is only implied through the terminology.

¹¹ Werner [1749-1817] was the most well known geologist of Maclure's time (Ospovat 257). Werner was first known as a mineralogist, discovering eight minerals and naming over two dozen other minerals (259). As Alexander Ospovat notes, Werner is considered the founder of historical geology because he was “the first to work out a complete, universally applicable geological system. It was he who, more than any other, made geology into a science and an academic discipline” (259). This is the system Maclure inherited, informing both the words he uses to describe the land and the very objects his eye notices. Throughout his life, Maclure wrestled with Werner's theory of the earth, and so it is useful to provide a reminder of the system. The concept of strata lies at the heart of Werner's theory. The main thrust of Werner's theory is that there is a succession of strata on earth's crust because a universal ocean once engulfed the entire earth, leading to the major rock classes either precipitating or depositing sediments

within this ocean (259-260). But this universal ocean is not uniform and constant over time: as the ocean's qualities, such as depth and chemical contents, varied over time, the waters triggered the formation of distinct classes of rocks. Thus stratigraphic structure and relations became "the most important clues to the understanding of the history of the earth's crust" (260). Specifically, Werner argued that the universal ocean formed five rock classes. The first class is the Primitive period, when the ocean was especially deep and the waters calm, allowing the formation of crystalline rocks like granite. The waters then became agitated, leading to the extinction of some animals and the formation of the Transition period, which Werner added later to explain rocks that appeared crystalline but contained fossils (260). As the universal ocean continued to lower, and the storms intensified, a larger extinction event occurred, followed by an even larger inundation than before, leading to the broken strata of the floetz, or flat, period, including what geologists call today sedimentary rocks. The fourth and fifth classes of rocks are the volcanic and alluvial periods, which Werner saw as local phenomena currently observable on the earth. In total, Werner defined five periods of rock formation, with the first three composing a majority of the crust. Thus water, in Werner's system, is the major agent of rock formation. Comparatively, in both time and impact, volcanic rocks were dwarfed by the magnitude of the universal ocean, according to Werner's system. As a teacher, Werner was a highly compelling figure, lecturing for forty-two years at the Bergakademie in Freiberg, Saxony, and inspiring generations of young geologists to confirm his sequencing of strata. As the oft-recited history of geology goes, these students found counter-evidence in the rocks themselves, and these contrary stratigraphic observations slowly built up until Werner's paradigm was toppled.

¹²Maclure's journal repeatedly makes clear his view on organized religion and theology. On 25 November 1807, in between an opening description of a wintery scene amidst rugged Alpine rock and a closing description of basalt layers overlying gneiss, Maclure writes: "The people: simple and ignorant. The priests have retained their consideration and labor hard in the calling for the propagation of ignorance, superstition, and hypocrisy" (93).

¹³This antagonism, for Maclure, starts in realm of the senses and language: "the priest and politician [...] practice the deception or play the farce, which deadened the senses or paralysed [*sic*] the faculties of our barbarous ancestors" (*Opinions* 3:41). For Maclure, theology deranged humanity's relations: "what a proportion of the laws, faith, customs, habits and practices of church and state are founded on fiction, — mere reminiscence and shadows of ancient barbarous dogmas, customs and practices handed down through the delusive pages of history, poetry, romances, etc.!" (*Opinions* 3:171). Each iteration through the ages unhinges language from its referent all the more, until society as a whole seems founded on a lie.

¹⁴Indeed, mineral cabinets play a crucial role in Maclure's life as whole. Speaking to the Academy of Natural Sciences of Philadelphia in 1841, a year after William Maclure's death, his biographer, Morton, conveyed the influence of the dead geologist, philanthropist, and educational reformer, noting: "There are few cabinets of Natural History in our country, public or private, that have not been augmented from his stores" (29). Maclure was dead, but his life's work was as palpable as the feldspars and quartz crystals on the shelves of American mineral cabinets. In Maclure's mind, the study of minerals was so important that he argued mineralogy "ought to be the first, and perhaps the only subject, of children's instruction" (*Opinions* 1:50). Although his dream of a nation of adolescent mineralogists never quite came to fruition, his insistence raises the question of what kind of potential for insight he saw in the crystal lattice structures of minerals in the early nineteenth century that could warrant such a peculiar claim. In the late eighteenth and early nineteenth centuries, the very design of mineral cabinets constructed scientific settings of exclusion and hierarchy. As the geological historian Martin Rudwick explains in his aptly titled *Bursting the Limits of Time*, by the late eighteenth century, museums had moved from being "'cabinets of curiosities,' collections of objects chosen for their rarity or oddity" to "systematic 'inventories of nature,' in which common or frequent objects were appreciated almost as much as the rare and exceptional" (40). Cabinets, moreover, were more than mere organizational structures neatly compartmentalizing labeled specimens; they also implicitly delineated who was and was not allowed into these spaces. The very layout of these museums distinguished between casual visitors there to admire the conspicuously displayed sensational items from serious researchers who were drawn to the more apparently "ordinary" items. These ordinary items were concealed in carefully marked boxes available only to those in the know. The strict social hierarchy of mineral cabinet culture resembles the larger hierarchy of geologic studies during this period. Rudwick locates the elite savants at the top of this social hierarchy, supported by the local experts, mapmakers, printers, engravers, "invisible technicians," and "women of all social classes" (37). In this culture, minerals permanently changed social spheres more frequently than people did. A farmer could potentially discover a mineral one day, and then—after donating it to a researcher—be forever excluded from seeing it again. When social elevation *does* occur within this setting, it is usually associated with already well-off families striving for ever-higher social echelons. Art historian Rebecca Bedell points out how mineral cabinets adorned American parlors alongside "potted palms and china shepherdesses" (3). Even in a person's home, she notes, "these mineral cabinets served not only as objects of adornment but also as signs of social respectability and intellectual engagement" (3). Their cultural capital did not interest Maclure, however. Rather, Maclure harnessed the popularity of this geologic spectacle to transform the perceptions of working class Americans.

¹⁵ In addition to reinforcing the attachment between signifier and referent, this mineral cabinet pedagogy also fortifies the health of the students; as Maclure notes, “the investigation, studying and collecting of specimens in the fields and on the mountains, affords the most healthy and necessary exercise” (*Opinions* 3:206).

¹⁶ Strata are the means by which he elevates, both literally and metaphorically from the ground up, the children of the working class. As with any incursion of theory into the purely (at least, as he sees it) empirical, Maclure is quick to point out where sense experience stops and imagination or theory begins, acknowledging that his lesson presents an ideal strata succession insofar as “this regular super-position of strata, does not exist now on the whole surface of the earth,” since some locales only have Primitive, and in others, either Transition or Secondary may be missing, having never been “laid there” or having “been removed by some accident or convulsion of nature” (*Opinions* 1:52). He also acknowledges that, because the Transition class is difficult to demarcate from the underlying Primitive and overlying Secondary, it may be most efficient to start with the Transition rocks as your stratigraphic line of distinction, and then winnow each rock into the overlying or underlying class, according to its characteristics (*Opinions* 1:52). Although this lesson appears to have developed over the years, it remains fundamentally the same as he describes it seven years prior (in 1821) in a letter to Benjamin Silliman, who excerpted it for the *American Journal of Sciences* (3:363). The major difference is that, instead of dividing the earth into five layers of rock types, he only advocates teaching four classes in 1821. This omission is significant because he omits the class—volcanics—that lie at the heart of stratigraphic controversy in the nineteenth century. Maclure’s view of this debate changed over time, as evidenced by his changing pedagogy.

¹⁷ Another major philanthropic enterprise included publishing: Maclure acquired a printing press to starting his own journal out west. In addition, wherever he lived for a long duration of time, he would inevitably found a school, having been greatly influenced by the Pestalozzian education system. Indeed, he introduced Pestalozzi’s teaching methods to America—methods that would be taken up, a decade later, by the Transcendentalists Bronson Alcott and Elizabeth Palmer Peabody, and that would influence generations of teachers, including Maria Montessori.

¹⁸ Likewise, scholars also tend to simplify the major nineteenth-century geothery debates. One major simplification is the fixation on terminology at the expense of a more contextualized, nuanced view of the history of geology. In his book, *Lyell and Darwin, Geologists: Studies in the Earth Sciences in the Age of Reform*, Rudwick declares that the labels *uniformitarianist* and *catastrophist* “have now become a pair of

polysyllabic millstones around the neck of the history of geology" (xx). Before the terms "uniformitarianism" and "catastrophism" arose, however, another pair of polysyllabic millstones ruled geology: *neptunism* and *plutonism*.

¹⁹Maclure likewise appreciated strata's illustration of endless change and the way this lack of a beginning challenged biblical interpretations of earth history: "The earth and all that is on it must either be from eternity or was made. As far as our observations have gone, there are perpetual changes, but no principles of a creation or something out of nothing" (*Opinions* 3:176).

²⁰Hutton holds an eminent place within the history of geology. At his tomb in the Greyfriars Kirkyard, Edinburgh, the following is inscribed in capital letters: "The founder of modern geology." Unlike Werner, however, Hutton was not praised as a founder of geology while he was alive. His concept of deep geologic time and the idea that present geological processes can explain past geological phenomena were the basis of what would later be called "uniformitarianism." Aside from his theory of the earth, Hutton made many other contributions to geology, from modeling rigorous geological methods that are still used by geologists today, to his advances in the study of strata—he noted, for instance, that some rocks do not exhibit stratification (Eyles 583).

²¹If Maclure did not read Hutton's book, then what was his conception of plutonism relative to neptunism? In "Essay on the Formation of Rocks," Maclure reveals his conception of these theories amidst his critique, noting how the sheer variety of theories indicates a reliance on imagination over fact: "The field of fancy is undoubtedly very extensive, where it is not limited by some reference to facts on which theories may be founded; we accordingly find great variety in the methods different authors have taken to form the earth" (342). Here Maclure makes a subtle point that is more explicit elsewhere: in his phrasing, it is as if geologists themselves are forming the earth, playing a part in the creation.

²²Maclure often uses the stratigraphic to express his politics, sometimes rather playfully, as in this 11 August 1826 letter to Fretageot, in which he writes that he is glad the "general eating room and Kitchen will soon be in operation, without which you cannot establish any equality of food. And it will also tend much to equality of knowledge from the sociable intercourse that may take place if mixed with Judgement, a strata of common sense and reason between two stratas [*sic*] of ignorance" (*Partnership for Posterity* 412-413). Here, "sociable intercourse" is figured as strata of ignorance, surrounding Judgment, which is a stratum of common sense and reason. Maclure's writing, unfortunately, is often opaque, employing complex and counterintuitive syntactical structures. In the above quotation, Maclure could also be defining

“Judgement” as a layer of common sense and reason sandwiched between layers of ignorance. Regardless of the exact meaning, the over all effect is clear: the language of strata intimately connected with his conceptual understanding of the world, including his social concerns for equality and knowledge.

Chapter 3: Unsettled Strata: Emily Dickinson, Geologic Community, and the Poetry of Stratigraphic Uncertainty

Geology [...] made it clear that the universe as a whole and even our own planet is operating on a time frame grossly asymmetrical to the human life span. This asymmetry of scale makes human knowledge infinitely problematic. There is no way of reconciling the gulf between the space and time we have at our command and the space and time we need in order to understand the full range of cause and effect.

—Wai Chee Dimock, *Through Other Continents: American Literature Across Deep Time* [2006]

In the *longue durée* of the planet, Emily Dickinson discovered the *longue durée* of the soul. Like Maclure and Hawthorne before her, Dickinson confronted the smallness of the human by articulating a new role for humanity. In this cosmos, forever transformed by the realization of deep time, Dickinson used poetry for human survival. She turned stratigraphic forces into poetry, and she harnessed this telluric dynamism to empower the human voice.

In the process of transmuting strata into speech, Dickinson implicitly asks a question: What is Women's voice? Her answer: Women's voice *is* poetry. In her cosmology, women are poets, in the Greek sense—they are makers. And they can leverage the volatility of stratigraphic debate to carve out a place for themselves in both earth science as a discipline and the cosmos as a whole.

Dickinson's grand narrative arrives in the modest form of a six-line poem, "Though the great Waters sleep" (Poem 1641 in Franklin's numbering). In 1884, two years before her death, she writes:

Though the great Waters sleep,

That they are still the Deep,
We cannot doubt.
No vacillating God
Ignited this Abode
To put it out. (*Poems: Reading Edition* 597)¹

On the surface, this poem hardly seems to be about geology, let alone strata.² Yet critics read these lines in relation to the same neptunist-plutonist debate taken up by Hawthorne and Maclure. In this geologic context, as expected, “Waters” aligns with neptunism and “Ignited” aligns with plutonism. Dickinson, in other words, writes a poem responding to humanity’s confrontation with the layered earth.

As with any debate, scholars like to analyze whether Dickinson is taking a side between these competing geotheries. Her biographer Richard Sewall equivocates over Dickinson’s view of this dispute, arguing, she “took [Edward] Hitchcock’s side (knowingly or not) [...]. Benjamin Silliman in his *Geological Lectures*, published in New Haven in 1829, had argued against the ‘fashion of the day to attribute almost everything to igneous agency.’ Hitchcock and Emily (she for poetic purposes, at least) disagreed—or did she straddle both theories?” (346). Despite leaving his stance open in the end, Sewall initially leans toward the idea that Dickinson was a plutonist (i.e. “igneous agency”). He is quick, moreover, to paint Hitchcock as a plutonist and Silliman as a neptunist.

What Sewall does not acknowledge, though, is that this so-called debate had been settled for decades. By the time Dickinson was writing her poem, the neptunist-

plutonist debate was already a standard part of any *history* of geology. The grand intellectual battle between the followers of Werner and Hutton was over. There is a reason visitors to James Hutton's tomb in Edinburgh see that he was "THE FOUNDER OF MODERN GEOLOGY." His dynamic, deep-time view of the earth superseded Werner's water-centric theory. Even Hitchcock, who was Dickinson's geology professor at Amherst Academy during the 1840s, observes in his 1841 *Elementary Geology* that most geologists align with plutonism (Hitchcock 297).³ The question, then, is how and why, when Dickinson enters this debate in the 1880s, does she render a *settled* debate mysterious once again?⁴

As usual, Dickinson's poetry does not lend itself to resolution, and a reasonable reader of "Though the great Waters sleep" could interpret her as being on either side of the neptunist-plutonist stratigraphic controversy. As Dickinson scholar Lynn Shakinovsky argues, "Her poems resist closure. Our attention is inevitably drawn to the frame of the poem, and we are invited to play with limits and boundaries, with the contexts within which we read the poems" (23).⁵ Similarly, Dickinson disturbs scientific closure, even masking the very idea that she engages with science in the first place. Through the polysemic qualities of her poetry, she recasts a debate, which has apparently been settled by the men of science, into the language of uncertainty. By unsettling the strata—by returning to an earlier period in earth science—Dickinson

asserts her own stratigraphic story, envisioning a cosmos and a science that makes room for her voice and the voices of all women.

Yet to say her poem ambiguously responds to the stratigraphic debate does not mean her ambiguity remains static, adhering to the form of a singular poem.

Dickinson's "Though the great Waters sleep" is not a singular poem at all: between 1884 and 1886, Dickinson composed seven manuscript versions of the poem. As her poem transforms over time, much like a sedimentary rock itself, it accretes new meanings. Although some versions lean toward neptunism, there is a subtle trend, amidst the prevailing ambiguity, toward plutonism.

Ultimately, though, over the course of the seven manuscript versions, the subtle poetic leanings are overshadowed by a contextual metamorphosis. Dickinson transfigures the entire discussion by turning what was the earth in a stratigraphic debate into a woman within a community of women. Her poem begins its life on scraps of paper that are not explicitly shared with others.⁶ It is easy, in these decontextualized versions, to place the poem within any remotely relevant scholarly context, including the geological. Over time, though, Dickinson alters the poem's secluded material life by physically incorporating it within letters to her community of women, particularly women who were mourning the death of loved ones. In other words, she transforms what could solely be a poetic response to a stratigraphic debate *into* a space for connecting communities of women. Dickinson revolutionizes the masculinist debate-

centered context of a stratigraphic dispute to envision her own geology—a relational geology that gives solace to women.

But Dickinson does more than transform a scientific debate, and she gives more than solace. She gives women voice, and she defines this voice *as* poetry. In order to understand the vital role poetry plays in this context, it is crucial to see the neptunist-plutonist debate in a wider context, beyond an insular disciplinary discussion.

Dickinson recognizes what Wai Chee Dimock calls the “asymmetry of scale” between the earth and the human: the inability to reconcile “the gulf between the space and time we have at our command and the space and time we need in order to understand the full range of cause and effect” (54). The neptunist-plutonist discussion is only a debate *because* of the limits of the human.

This nineteenth-century geologic discussion represents humans grappling with these large, deep-time stratigraphic forces—telluric powers beyond the full intellectual apprehension of humans (especially in the early nineteenth-century, when the stratigraphic debate was central and the outcome more uncertain, a time Dickinson invokes by unsettling the old discussion in her poem). This discussion about the layered earth points to a larger yearning: the yearning of the human to understand earthly forces working within temporalities that exceed the human. Forming igneous and sedimentary rocks throughout earth’s deep history, these inhuman and incessant forces also exclude—and in Hawthorne’s case, erase—the human. These stories of strata are

about acknowledging Dimock's asymmetry, the slow earth processes and the struggle of the human first to apprehend the magnitude of the layered earth, but ultimately to respond with the most powerful tool we have: the human voice.⁷ Hawthorne's imagination, which reclaims human memory from aeolian obliteration, turns into Dickinson's poetry.

In her reply to the earth, poetry is a survival tool. By transmuting the poem's context over time, she transfigures the human into one small element of a mysterious cosmos. In the very act of placing her geologic poem within letters to women, she transforms the way we read the poem. She activates different dimensions. Take this line: "No vacillating God / Ignited this Abode / to put it out" (*Poems: Reading Edition* 597). Where before, in the solely geologic context, "Abode" meant the earth itself, now—connecting a network of mourning women—"Abode" becomes the human. Instead of telluric forces erasing the human, these forces have been metamorphosed *into* the human. That is, beyond the literal inclusion in a poem (another way of metamorphosing into the human), the earth and its forces have transformed, in the new poetic context, into the very thing that can contend and grapple with the temporal excessiveness of the earth. That "thing" is the soul: the vitality of the human to continue, but also—in a more immediate sense—the inner dynamism and fundamental urge to raise one's voice and memory and creative powers in response to earth's vertiginous temporalities.

Her response to geologic time is no poetic whimsy. Dickinson *feels* deep time, and poetry is the means by which she urgently carves out a place for herself, and women generally, amidst the nineteenth century's stratigraphic revelations. For Dickinson, deep time "feels so vast that were it not / For an Eternity - / I fear" this expansiveness would "Engross my Finity" (*Poems: Reading Edition* 376). In this new era of verticality—this realization of the smallness of the human—Dickinson both acknowledges earth's might and empowers the human. The transformed poetic context reveals that she leverages stratigraphic forces to connect and authorize Women, with a capital "W."⁸ They have voice, and that voice is poetry.

This intertwining of geology and gender suggests a feminist science studies perspective, an interpretive lens that remains under-analyzed in Dickinson studies.⁹ Some scholars, such as Robin Peel, go so far as to claim Dickinson was a hidden scientist.¹⁰ She was certainly, like Hawthorne, within the exoteric circles of nineteenth-century geology's thought collective. This geologic community was, for the most part, dominated by men.¹¹ They defined the terms and debates. In most contemporary publications, the figure of the geologist was gendered male. Dickinson unsettles strata, in part, to question that gendering—to enter a discussion and share her own stratigraphic story, asserting her own agency to make meaning. Much like physicist and feminist science studies writer Evelyn Fox Keller's methodology, in which she uses a female scientist to occasion a meditation regarding the alternative possibilities of

science, I use Emily Dickinson's poetic interrogation of science as a means—borrowing Keller's language—“to think about the ways in which science might be different” (Keller 125). Strata in particular were spaces to think otherwise.¹² As for Maclure, for Dickinson, geology was not only a means of studying the past—it was also a way of transforming the present and envisioning a future.

The Geologic School of Dickinson

Without a clearer view of Dickinson's geologic past, it is difficult to fully appreciate the creativity with which she borrowed and changed aspects of both the strata around her and earth studies as a discipline. In order to re-envision, one must first vision. Like much of this chapter, this section works on two levels: there is Dickinson striving to find a place for women in geology, but there is also a higher, more mystical purpose, as she carves out a place for women in this transformed cosmos (i.e. this realm of verticality, proclaiming the smallness of the human). Her geologic schooling primed her for this visionary approach to strata. In particular, earth science primed her in two ways: it revealed a science that was highly dynamic and striving with purpose, and yet, in its gendered exclusivity, it also provided the barrier over which her new geology would climb.

Taught by Hitchcock, Dickinson received a science that was dynamic, expansive, and capable of instilling hope for the future.¹³ As a discipline, geology was the new science, and geologists of the day firmly believed that the science would continue to

progress by leaps and bounds, invariably building—like a growing stack of strata—on past achievements.¹⁴ One book in the Dickinson household was Hitchcock's 1851 *The Religion of Geology* (Giles 5). As Dickinson scholar Joan Kirby writes, this book, at its most fundamental level, "argues that the new geological discoveries are matter for celebration and open the human mind toward boundlessness and circumference; he celebrates change and impermanence as a basis for stability and permanence and argues that decay leads to glorious transformation" (6). In the realm of geology, even a sense of uncertainty and instability is reconceived as a foundation for a later stability.

Indeed, throughout Hitchcock's oeuvre, there is a perennial hope adhering to geology, often leading to a sense of comfort. Hitchcock had a deep faith in science-with-a-purpose, and this value evidently impacted Dickinson, even in sciences other than geology. She found solace, for instance, in his 1850 *Religious Lectures on Peculiar Phenomena in the Four Seasons*. She once told a friend, "when Flowers annually died and I was a child, I used to read Dr [sic] Hitchcock's Book on the Flowers of North America. This comforted their Absence—assuring me they lived" (qtd. in Lundin 33).¹⁵ Hitchcock's science, that is, offered hope in its assurance of the impermanence of death.¹⁶ Perhaps this approach to science inspired Dickinson to use the immensities of stratigraphic forces to give solace to others experiencing their own losses.

Dickinson's physical geologic context provides a fascinating example of the way earth science embraced change and a re-envisioning of the earth. Dickinson was

accustomed to connecting rocks and loss. Her room at home, as is widely known, looked out over the tombstones of Amherst's cemetery. For below these graveyard stones, beneath the layers of unconsolidated sediment, lies the seemingly solid, basement rock. Amherst, as indicated by Hitchcock's 1830s and 1840s geologic maps, is primarily composed of two rocks: granite and sandstone.¹⁷ Fire and water. In his 1841 *Final Report on the Geology of Massachusetts*, Hitchcock celebrates how Massachusetts' granite contains "almost endless" varieties "in the composition, color, and hardness of these rocks" (146).¹⁸ Dickinson's granite was no monolithic stone. And though it was formed in fire, it told a story—at least in 1841, on the cusp of glacial theory—of water's power as a stratigraphic force: "large blocks of it having been removed thither by diluvial action in former times" (149).¹⁹ Hitchcock asserts: "remarkable and very powerful currents of water have swept over this continent from the north and northwest, I cannot doubt" (406).²⁰

Growing up, Dickinson would have heard stories about great floods that carved the surface of the earth in the distant past, strewing these large granite blocks across the geography she knew so well.²¹ Indeed, it must have felt that the ground beneath her feet was highly pliable to human story. For between the 1832 and 1841 versions of Hitchcock's *A Geological Map of Massachusetts*, there are sweeping revisions. West of Amherst, along the Connecticut River, the 1841 map introduces large swaths of Diluvium, a rock—as the name implies—associated with tremendous aqueous forces

from long ago.²² Remarkably, none of the rocks along the earlier 1832 mapping of Connecticut River geology are designated Diluvium. In other words, as Dickinson grew up, she would have been increasingly told that the sand and gravel alongside the nearby Connecticut River were associated, at least in name, with Noah's flood. Before this stratigraphic revision, the layers carried the less storied names of Tertiary and Alluvial. Perhaps she was thinking about this geologic re-envisioning—this sudden acknowledgement of earth layers from a temporally distant torrent of water—when she writes “the great Waters sleep” (*Poems: Reading Edition* 597). For to Dickinson as a young girl, it must have felt like the waters were indeed sleeping, if—in a far off past—they could bring the Flood to Amherst and play marbles with boulders.

Regardless, this abrupt geologic revision reveals how dynamic geology was as Dickinson grew up. The seemingly solid ground could be transformed by the stories humans told about it. What was one day mere sand and gravel could, the next day, be entirely re-written and invested with the power of biblical import. And earth science embraced this change, as Hitchcock eagerly erased his geological map to redraw the contours and content of the layered earth. Whether through this notable, local example, or one of the many other instances of geologic revisions no doubt circulating around her as she grew up, Dickinson learned important lessons. She learned the power of the human voice to re-conceptualize strata. She learned that, despite the smallness of the

human, humans nevertheless retained a powerful element in the form of story. And she learned that these stories could bend and shift the layers of the earth.

If stories could alter the stratified earth itself, then perhaps they could also alter the stratification of earth science as a discipline. Dickinson knew this field well. Scholars analyzing her relation to geology often remark upon her impressive geological vocabulary. Sewall writes: “Her poems show a knowledge of [...] geologic lore far beyond the usual nature poet’s stock in trade. There are more earthquakes and volcanoes in her poems [...] than in the poetry of Keats, Emerson, Browning, and Shelley combined” (345). Such analyses tend to point out the enthusiasm Dickinson expressed for geology in her letters, the way geologic terms get appropriated in her poetry, and the magnetic personality—and influence—of Hitchcock.²³

There is no mention in these accounts, however, of the gender dynamics she would have encountered in her geological readings, including her geology textbook and Hitchcock’s *The Religion of Geology*.²⁴ In the latter, from his opening (and very moving) dedication, Hitchcock registers the prevailing division of labors in the Victorian American household. “To My Beloved Wife,” he writes, “To your kindness and self-denying labors I have been mainly indebted for the ability and leisure to give any successful attention to scientific pursuits. [...] And during the last thirty years of professional labors, how little could I have done in the cause of science, had you not, in a great measure, relieved me of the cares of a numerous family!” (iii). Here, male science

relies on female servitude, as the “self-denying” work of the woman allows the man to undertake the kind of work that affirms the self, creating a public image and reputation within the scientific community. In this gendered scientific economy, the productions enacted by the female (producing children, caring for them) allow the male to undertake the heroic role of scientist, expanding the boundaries of human knowledge. Indeed, Hitchcock’s wife—Orra White—is so self-denying that we do not even learn her name within his lengthy dedication, despite his acknowledging the important contribution of her labor (as illustrator) to his work: “While I have described scientific facts with the pen only, how much more vividly have they been portrayed by your pencil! [...] Your artistic skill has done more than my voice to render that science attractive to the young men whom I have instructed” (iii). Within the process of science communication, Hitchcock assigns writing implements based on gender: the man of science wields the pen, which is the instrument of voice, while the wife wields the pencil, which is the silent instrument of sight.²⁶

Hitchcock’s dedication offers but a glimpse into the gendered scientific economy of Dickinson’s America, in which it is the “young men” whom Hitchcock intends to educate. And it is onto this gendered terrain of geology that Dickinson dares to walk when she uses poetry as a means of intervening in a scientific debate. From her letters and poetry, as well as her friends’ and family’s reminiscences, Dickinson seems to have been well aware of the power differentials described by subsequent feminist theorists,

such as Hélène Cixous, who laments, “far more extensively and repressively than is ever suspected or admitted, writing has been run by a libidinal and cultural—hence political, typically masculine—economy; that this is a locus where the repression of women has been perpetuated, over and over, more or less consciously, and in a manner that’s frightening since it’s often hidden or adorned with the mystifying charms of fiction” (“Laugh of the Medusa” 879).²⁵ Despite the mystifying charms of Hitchcock’s effusive dedication to his wife, his text nevertheless replicates the structures of a nineteenth-century American scientific practice that predicates male voice upon female silence. Although critics have often invoked Cixous to refer to how Dickinson takes up the pen within a masculine writing culture, this struggle for voice is usually focused on her *poetic* voice. I would like to shift the context of this feminist discussion by focusing on how Dickinson struggles for agency as a poet *engaging with geology* and, in particular, the layered earth.²⁷ From the flatfooted specificity of geology’s gendered domain to the heights of telluric transformation, Dickinson’s geologic schooling taught her the power of vision and voice when confronting earth’s baffling magnitudes—a lesson she teaches her own readers in her 1884 poem.

Strata and Soul in “Though the great Waters sleep”

In the face of telluric deep time, Dickinson asserts the deep time of the soul. She does this through increments—the gradual sedimentation of meanings as her poem likewise changes through time. Although the poem unsettles a stratigraphic debate by

embracing ambiguity and resisting scientific closure, some versions of the poem nevertheless lean toward one side of the discussion, while other versions lean toward the other. Dickinson's careful positioning within this stratigraphic debate is important because it unearths a subtle trend: she moves away from the easy, shallow-time, and biblically-interpolated water theories of her youth and embraces the challenging and deep-time fire theories of contemporary geologic studies.²⁸ That is, her later manuscript versions lean toward plutonism.

Yet, in examining the versions of "Though the great Waters sleep," this analysis does not end by merely aligning the American poet with one side of a stratigraphic debate. For Dickinson unsettles this debate not only through her ambiguity, but also through a contextual transformation, as her stratigraphic poem becomes a means of affirming the power of the human soul and the place of women in this cosmos. In the overwhelming knowledge of the layered earth and humanity's new vertical perspective, women have a voice, Dickinson proclaims, and that voice is poetry.

Regardless of the poem's leanings, "Though the great Waters sleep" is fundamentally ambiguous. This ambiguity is the crux by which she opens up a space for women. Specifically, she opens up this space by returning to an earlier time in earth studies. Taking a stagnant geological discussion and unsettling it once again, she brings the reader—and her voice—back to a time when the aqueous-igneous debate *was* vibrant

and vital and new.²⁹ This ambiguity rests on the idea that a reasonable reader could believe the poem takes a stance on either side of the debate.

On the one hand, the persona could be seen as a plutonist, siding with igneous activity. This reading foregrounds the fact that the waters are sleeping: they are inactive, no longer a key force in the production of strata. In this sense, the first thought unit becomes the speech act of consolation, as the persona essentially consoles the reader that the waters, though inactive, are still the epitome of depth: "Though the great Waters sleep, / That they are still the Deep, / We cannot doubt" (*Poems: Reading Edition* 597). Perhaps Dickinson was fondly remembering the stories of aqueous force from her youth and the comfortable intermingling of Amherst's river sediments and biblical narrative. In contrast, the second thought unit, from this plutonian perspective, becomes a celebration of earth's founding on fire: "No vacillating God / Ignited this Abode / To put it out" (*Poems: Reading Edition* 597). God did not spark the embers of the earth only to then snuff out the flame: he made igneous activity the primary force of rock formation, just as this activity is *still* the primary force, according to this reading at least. Indeed, in its assertion of the fundamental power of fire, the poem's structure reconstructs the stratigraphic layering of the earth, as the surficial waters are assigned the top layer of the poem, and the more fundamental and powerful force of fire is assigned its bottom layer. The waters may be deep, the poem says, but fire is deeper and underlies all.

On the other hand, the persona simultaneously appears to assert the power of aqueous activity. This reading emphasizes the temporary nature of sleeping: the great waters are currently asleep, implying that the waters were once active and—if this sleep is only temporary—potentially active in the future. Here, the depths of the waters connote an agency full of mystery, invoking—like Benjamin Silliman and Maclure did years before—the idea that there are forces (including aqueous ones) of which humans are not yet aware.³⁰ These forces can subside, the poem says, and humans are so new to the earth they cannot sense the abiding strength and depth of these powers. The earth and the human exist on vastly different temporal scales. The second thought unit, in this context, could assert that God simply did not ignite this abode in the first place—that igneous agency is a non-entity. Rather than assuring readers that God will not extinguish what he has already lit, the poem becomes an assertion that God did not light the earth in the first place: “No vacillating God / Ignited this Abode / To put it out.” The depths of the waters overwhelm the meager fireworks of the earth, according to this reading. It is also possible, though not necessary, in this reading of the final three lines, to see the persona leaning toward atheism insofar as these lines imply there is no God to enact the lighting. Regardless, what remains between these alternative readings is the prevailing sense of possibility—of syntactic uncertainty—insofar as the poem toes the line between two contested theories of the earth.

By injecting uncertainty into a debate that, by the 1880s, was considered settled within the larger geological community, Dickinson posits a different kind of geology—a geology that is less positivist and, to use Silliman’s language, more speculative. One can almost imagine Dickinson’s reaction to geology’s hubris upon thinking that aqueous force has, as Hitchcock would put it, been almost “universally abandoned” (*Elementary Geology* 297). She playfully undermines this geologic certitude by cloaking the poem with the forms of uncertainty, claiming in the process an alternative, speculative geology. In this ambiguity, the human (in the form of the reader) is rendered small, grasping for a meaning—a shred of confidence—within the layered earth, but coming up short. Earth’s forces, Dickinson says, exceed the limits of the human. Just as humans cannot fathom the immensities of stratigraphic time and force, they cannot fathom this poem. In the end, the crust resists humanity’s simple theoretical frameworks.

It is precisely these unsettled strata that provide Dickinson leverage to add her voice. In revivifying the debate, she asserts her own power to be a part of the discussion. Rather than a stale crustal quibble, the volatility and mystery of the layered earth is celebrated.

But Dickinson’s ambiguity is never static. As subtle shifts attest, her poem leans in the direction of plutonism—the dynamic stratigraphic theory whose stories of continental decay and creation imply far deeper expanses of time than neptunism. Her shifting stance can be read through the seven manuscript versions of “Though the great

Waters sleep.” Together, these manuscripts suggest a new narrative: the poem breaks out of its narrow debate, transfiguring into a larger claim about the vitality of the human soul amidst the *longue durée* of the planet.

Before this grander view emerges, though, Dickinson carefully charts her own path in relation to stratigraphic forces. The first three versions are important because they reveal the trend toward plutonism. Her first version—manuscript A—dates from 1884, when Dickinson wrote a few lines of poetry on a fragment of stationary, as R.W. Franklin explains in his *variorum* edition of Dickinson’s poems (1438). Although Franklin asserts that this poem consists of three lines, when one looks at the actual manuscript, one realizes that, if Dickinson’s manuscript versions were read as the arbiter of stanzaic structure, the poem actually consists of eight lines:

Though the
great Waters
sleep
that they
are still
the Deep
We Cannot
doubt (Dickinson, Houghton Library A122/123)

Here, Dickinson renders the poem in mostly two-word lines, with a large space in between the first and second words, visually dividing the left and right sides of the poem (an effect that is not apparent in the typed version above). This version of the poem reveals that Dickinson originally left out the plutonist side altogether in favor of an ode to water. In other words, the first thought unit of the final poem was, at first, the

entire poem. The narrow circumference of each line forces the poem to stretch downward, physically mimicking the watery depths Dickinson refuses to doubt. This vertical effect is even more pronounced in the manuscript itself insofar as the poem presents two stacks of words—the left side and the right side—with the single-line “doubt” appearing to join the columns at the bottom. The fact that this first manuscript version includes water and excludes fire implies that she begins in neptunism. Structurally, as they are written on the page, the words connote desperation: the poet is so determined to retain water’s claim to depth that she layers her own words in a similar manner, as if formal mimicry could make something true. And despite her rejection of doubt, the poem nevertheless—literally—ends with doubt.

Thus Dickinson’s opening foray into her poem clings to the comfortable, shallow-time version of earth history. Evidently, she was unsatisfied with this ending because she introduces fire in the next version—manuscript B—written in 1884. At this point, introducing fire must have been radical enough for her because subtle formal cues undercut the igneous argument. Writing on a lined, watermarked leaf of stationary, Dickinson separates the two thought units into stanzas, with two blank lines (the largest gap in the poem) dividing the first thought unit from the second. Emphasizing division, she also places a blank line of space between many of the poem’s grammatical units (after “sleep,” “deep,” “doubt,” and “God”):

Though the
great Waters

sleep,
That they are
still the deep,
We cannot doubt.
No vacillating
God
Ignited this
Abode
To put it out - (Dickinson, Houghton Library A477)

Dickinson at last presents both sides of the aqueous-igneous debate, seemingly realizing she needed to grapple with igneous activity and its implied temporal longevity. In this version, the structure of the poem foregrounds the visual pattern of words: in the manuscript, "Though the / great Waters / sleep" is structured similarly to "No vacillating / God" and "Ignited this / Abode," in the way that a two-word line is followed by a one-word. This structure contrasts with the more fluid longer lines of the poem, such as "That they are / still the deep" and "To put it out." Using this structure, Dickinson creates tension between the poem's statement and form: whereas the poem asserts that God does not vacillate, the poem's structure enthusiastically embraces vacillation by alternating the two kinds of structures. Beginning with the two-word/one-word structure, it changes to the longer poetic line, then transitions back to the two-word/one-word structure, and then ends the poem with the longer line. This vacillating structure reveals Dickinson undermining the statement that "No vacillating / God / Ignited this / Abode / To put it out" by deploying the very vacillation it renounces. In other words, the poem's shape contrasts with its semantic meaning, and this contrast

undermines the poem's semantic alignment with igneous force, at least in its closing statement. Dickinson is still clearly foregrounding the smallness of the human—the inability, confronted with these large-scale forces, of mentally apprehending the magnitude of the earth. Despite this ambiguity, there is the basic fact that Dickinson now includes—unlike in the first version—the other major stratigraphic force in the debate: she expands her boundaries beyond the safe shores of water into the expanses of earthly depths and deep time.

Fire slowly makes a larger impression on Dickinson's mind. In the next manuscript version, she goes beyond merely acknowledging the force of telluric fire. This time, subtle formal cues imply a leaning toward plutonism. The third version—manuscript C—was also written in 1884. Unlike the other versions, which were entirely written on a single sheet of paper, this third version is apportioned onto two separate fragments of stationary neatly dividing the two major thought units:

Though the
great Waters
sleep,
That they are
still the Deep,
We cannot
doubt.
No vacillating
God
Ignited this
Abode
To put it
Out (Dickinson, Houghton Library A478)

This version leans more toward plutonism than the previous version because its structure vacillates less. That is, its more consistent line structure reveals how the form accords with the content, at least more so than the previous version. Instead of alternation between the two syntactical structures (the two-word/one-word structure versus the longer lines), this version primarily remains within the two-word/one-word structure: the first thought unit begins and ends with this structure, while the final thought is almost entirely composed of this structure. (Although the final line expands into a three-word/one-word structure, the general shape, when one simply gazes at the manuscript, is akin to the long-line/short-line pattern evident throughout the poem.) In other words, there is more constancy to this poem, rather than vacillation, perhaps subtly suggesting a concordance between the poem's surface meaning and its stanzaic structure. Dickinson no longer uses the poem's structure to undermine the plutonist half of the poem. Thus she establishes a subtle pattern: her first version proclaims neptunism; her second version acknowledges plutonism, and now, in this third version, she uses the poem's form to subtly align with plutonism. Similar to the antebellum geologists contending with the stratified earth and its meaning, Dickinson grapples with stratigraphic force in her poem, increasingly making way for the implications of deep time.

So far, in the first three versions of her poem, there is no explicit indication of a context beyond the stratigraphic debate. She contends with telluric forces in isolation.

This changes in the following versions. No longer content to remain within a geologic debate, she invents a new geology: a geology that relates woman to woman, connecting planetary perspectives to fundamental human situations such as mourning a death.³¹ Like her transition to fire, this contextual transition begins gradually, with Dickinson merely incorporating the poem into a letter and including the theme of death. This fourth version of the poem—manuscript D—has virtually the same structure as the second version, and was also written in 1884.³² Rather than a discrete poem engaging a geologic debate, however, this version incorporates the poem into a letter Dickinson wrote to her sister-in-law Susan Dickinson. Like some of the earlier versions, this version divides the first and second thought units into separate stanzas placed on different pages of the letter. In other words, fire and water are still opposed, gathered in separate places—she is still, as implied, weighing one view of the earth against the other. In this letter, Dickinson replies to Susan’s request for information about American journalist Samuel Bowles (Dickinson, *Variorum* 1439). After mentioning Bowles’ writing style, in which he alights upon a theme and then quickly moves to the next, Dickinson abruptly transitions to her poem, and then follows it with the confession that she cannot find a specific document because her “treasures were misplaced” “during my weeks of faintness” (Dickinson, Houghton Library HBI58).³³ This seemingly commonplace correspondence contains immense implications. No longer merely a poem about a scientific debate, it becomes—in this very moment—a method to connect two women.

Here, geology becomes a way of facilitating communication—science occasions female-to-female correspondence. At the same time, Dickinson begins aligning the poem with death: she is, after all, searching for information to give Susan about Samuel Bowles, who was in 1884 relatively recently deceased (he died in 1878). In addition, this information gathering connects to Dickinson’s own mortality, as she mentions her fragile health. The poem, in other words, begins to shift contexts from a male-defined geologic debate to a female community responding to death—a transition that only expands as the versions of this poem proliferate.

Dickinson ends her poetic transfiguration by transforming stratigraphic forces into forces of consolation. At this moment deep time becomes deep soul—when the new context compels the reader to see the poem anew, outside its original geological implications. The final three manuscript versions—manuscripts E, F, and G—all directly link “Though the great Waters sleep” to the act of consolation after the death of a loved one. Manuscript E, written in November 1884, is included in a thank you note to Dickinson’s Aunt Catherine Sweetser, who sent lilies commemorating the anniversary of the death of Dickinson’s mother (Dickinson *Variorum* 1441). In this letter, Dickinson also mentions the death of her father and her nephew. Manuscript F is associated with correspondence Dickinson undertook in relation to the death of one of her love interests, Otis Lord (Dickinson *Variorum* 1440). And manuscript G is included in an 1886 letter of

sympathy Dickinson wrote to Abigail Cooper, “perhaps on the death of Edward Tuckerman,” as Franklin points out (Dickinson *Variorum* 1440).

Immediately preceding the poem, Dickinson writes: “Is it too late to express my sorrow for my grieved friend? Though the first moment of loss is eternity other eternities remain” (Dickinson *Variorum* 1441). In this context, the poem’s assertion of the waters’ depth and its consolation in a God who refuses to let the lights go out transitions almost entirely out of its original geological context: rather than primarily engaging with a nineteenth-century geological debate, the poem instead—as implied by its context—assures a grieving female friend that death is not final and that there are mysteries and possibilities beyond the grave. Thus from 1884 to 1886, the poem changes from Dickinson’s shifting stance within a geologic debate to a means of epistolary consolation. Rather than remaining solely within the constricting discourse of a masculine geologic debate, Dickinson brings her version of geology outside the debate altogether and uses what was a science poem as a means of connecting women. That is, in challenging the context of masculine science, Dickinson creates another way in which geology acts as a means of hope: geology becomes a way for Dickinson to posit a more relational science connecting women with other women, assuaging grief.

Like the previous section, this transformation has a double vision. Dickinson does not solely find a place for women in geology as a discipline. She is not merely unsettling strata to add her own opinion on a decades-old debate. There is an even

higher purpose to this poetic transfiguration.³⁴ In contending with large-scale telluric forces, Dickinson directly confronts the gulf between the earth and the human. The struggle to understand the impact of igneous and aqueous forces upon the planet is the struggle to apprehend phenomena that exceed the human—processes that are older, deeper, and entirely indifferent to a recent addition called man. Through her ambiguity, Dickinson proclaims the smallness of the human. Her poem casts a cloud over strata, forcing readers to grapple with the layered earth. It does not yield answers easily, and nor does the earth. By translating stratigraphic forces into poetry, Dickinson also reveals a role for humanity. In the face of deep time, poetry means survival. This is what I mean when I write that in the *longue durée* of the planet, Emily Dickinson discovered the *longue durée* of the soul. Her transformed context galvanizes new possibilities: the earth's deep time is transformed into the soul's deep time. The "Abode" of the earth becomes the "Abode" of the human body. She confronts the overwhelming magnitude and scale of earthly power—the equivalent of Hawthorne's wind—with human voice. This is a woman's voice and it is speaking to other women, knitting together a community responding to human ephemerality. She took the opposite of the human—she took impersonal, unremitting forces well beyond the human grasp—and she transformed them into the very thing humans have to repel these forces. Confronted by a stratigraphic awareness and the realization of humanity's smallness, Dickinson gives women the voice of this resistance. She gives them poetry.

Beyond the transformed meaning of “Abode,” Dickinson transfigures virtually every aspect of the poem by placing it within this new epistolary context. On a theological level, rather than taking a side within a geological debate, both thought units now proclaim the constancy of God. That is, the context of consolation activates any aspect of the poem that provides a message appropriate for grieving. The first sentence conjures the divine promise to humanity after the Flood: the waters are held at bay, and God keeps his promise to Noah. Proclaiming the waters “are still the Deep” also conjures creation itself—the opening lines of Genesis, in which waters and darkness and the deep are so intimately connected with the creative energies of God. Thus the second sentence continues this message of divine constancy by moving from the earth as a whole (the Flood) to the human soul: “No vacillating God / Ignited this Abode / To put it out” (*Poems: Reading Edition* 597). The poem becomes a message from Dickinson to the women in her life, affirming the dependability of God: that he guides and safeguards his creation, whether it be planetary waters or the human soul.

Alongside this divine affirmation, there is also a direct message to her community of mourning women—to the women directly receiving her letters of consolation. For “great Waters” can also refer to the floodgate of tears these women were experiencing during the mourning process. Dickinson directly transforms planetary waters (from the solely geological context) into women’s tears. The first sentence, in this transformed context, becomes a message of encouragement: it assures

these women that, when outward mourning ceases, their sorrow is still present. To paraphrase, the opening sentence becomes: Though the floodgates of your tears may cease, / That you still mourn to the depths of your being / We cannot doubt. It is all right, in other words, when outward mourning ends: the absence of tears does not diminish your sorrow.

Each of these transfigured poetic messages helps build Dickinson's community of women: there is the physical community, adhering to the materiality of the letters themselves and their immediate context, sent from one woman to many women; there is the life-affirming message the poem suddenly embraces within this newfound context; and there is the way particular words within the poem imaginatively transform into the community of women itself, as Dickinson builds that community through language. In this poetic transformation, floodwaters become women's tears, the earth itself becomes a woman, and stratigraphic forces become their souls. Poetry becomes the voice of women through the very act of physically sharing these poems, transforming the alienation and silence of mourning into human creation: the gift of words from Dickinson to the women in her life. She tells them that their tears are akin to a biblical deluge, and their souls are as vibrant as the fires of the earth. They speak in the language of the body: the outpouring of tears, and a soul on fire. God "Ignited this Abode"—yes, he "ignited" them in the sense that he formed their most secret self, their soul. But he also "ignited" them in the sense that he gave them something to say: the

Word begat many words, and these words are women, who create more words—as Dickinson does—in the form of poems, fighting against the erasive powers of the earth.

The poem, in this way, transforms into an affirmation of women’s voice. Poetry is the force circulating within this network. It comes from a woman, and it knits together, across time, this group of women responding to human smallness. Thus “We” is no longer one side within a parochial and partisan geological debate. “We” is no longer “we the geologists.” By virtue of its new context, that first person plural transfigures into the female community writ large. “We” transforms into Dickinson and the recipients of her letters, but also beyond even that immediate context: “We” becomes the entire community of mourning women and every woman whose ignited soul seeks poetry to affirm the human voice—the ability of the human to confront the immensities of death, and to create an abiding message. Poems, for Dickinson, are acts of earthly defiance.

Stratigraphic Speculations, or the Politics of Plutonism

Although this chapter has primarily focused on the way Dickinson transforms strata into poetry, the opposite is also true. Perhaps stratigraphic awareness was inevitable for Dickinson. Her poems have a kinship, after all, with sedimentary rocks in the way they grow by accretion. Other critics have articulated similar material models for her poetry. Dickinson scholar Suzanne Juhasz, for instance, writes: “Dickinson structures her poems by the principle of accrual. They are like snowballs that, from

rolling in the snow, grow fatter but do not change in nature. Hence, apposition and parallelism—rarely narrative—organize development in her poems” (88). The multiple meanings of “Though the great Waters sleep” grow by accretion, though this accrual certainly changes the nature of the poem: Dickinson started with the water stanza; she added fire, and then she transformed both into something greater, something beyond the mere material.

Given her own poetry’s sedimentary affinity, there is a way in which her poetry is radically honest with the earth. Her poetry’s ambiguities resonate with the earth’s ambiguities. Nowhere is this clearer than with the plutonist-neptunist debate. Oddly, in her embrace of ambiguity, Dickinson, in one sense, takes plutonism’s side all the more. This is because it is reductive to say that this debate pitted water versus heat (Hallam 226). According to the plutonist theory of the earth, water was actually just as important as fire (Hallam 226, Adams 238).³⁵ Thus in acknowledging the power of both—in resisting the easy path of partisanship—Dickinson approached the earth with honesty. She was not trying to simply raise one element and denounce the other. Rather, her poetry is part of a broader embrace of telluric complexity.

In simultaneously acknowledging the power of both fire and water, Dickinson was therefore leaning even more toward plutonism than previously stated. This plutonic turn is important because it reveals why stratigraphic force was such a powerful concept for Dickinson. It reveals why it could be a vehicle for reform. By

unsettling a stratigraphic debate, Dickinson was also implicitly setting her poem in an earlier time within earth science. During this earlier period, when the neptunist-plutonist debate still raged, plutonism was an even more radical concept than it is now.

As Maclure's biographer Leonard Warren writes:

The Plutonic theory was a more encompassing, dynamic concept of the earth's formation—an ongoing process, with forces always at work, small changes taking place over immense periods, without beginning or end. Hutton's radical notions aroused opposition not only from Neptunists on scientific grounds but also from the establishment, both religious and conservative, who sensed that its spirit, if not its origin, echoed the ominous turmoil of the French Revolution. (57)

Growing out of the late eighteenth century, these stratigraphic debates also implied political states. Neptunism espoused a static view of the earth: rock layers crystallized out of a universal ocean long ago. Earth's dynamism, in short, was primarily in the past. Although these layers could be disturbed, any disturbance in strata was never as potent as the original formation.

Arising alongside the many political revolutions of the late eighteenth and early nineteenth centuries, neptunism represented the status quo and plutonism represented revolution. Plutonism was the dangerous theory—the theory in which entire continents disappeared via ceaseless erosion across deep time, and other sediments coalesced in fire to replace this seemingly solid earth.³⁶ The ground beneath humanity's feet was fluid.

As a student of geology, Dickinson would have learned about plutonism's dangerous past. She evidently appreciated this dynamic stratigraphic theory because

she embraced it in her poetry. This was the theory that could reshape worlds. In claiming the ambiguous earth—in leaning toward plutonism—she was thus harnessing the power of telluric dynamism to make her own radical statement. The vitality of plutonism could shift not only the social strata, as Maclure did, but also the cosmic strata. For in realizing the *longue durée* of the planet, humans were compelled to articulate a new role for themselves. Through her work, Dickinson asks: What role do women play in this new cosmos? By translating stratigraphic force into human voice, Dickinson proclaims that Women's voice *is* poetry. Women wield the power that responds to earth's power. Their words wrest humanity's vitality—the soul, the voice—from the destructive forces of the earth.

Dickinson, in the end, both responds to and exceeds Hitchcock's call for poet-geologists. In his 1841 *Final Report on the Geology of Massachusetts*, he confesses his inability to describe the state's geology "with the vividness and minuteness of the poet [...]. My chief object has been to direct the attention of gentlemen of taste, intelligence, and leisure, to these spots; that sometime or other, their beauties and sublimities may be faithfully depicted [...] in language" (228). Dickinson's stratigraphic poetry is certainly vivid and minute and even faithful in the sense that her ambiguities are ultimately honest with the earth. But they are not mere depictions. They are transfigurations. She *transforms* the elements into poetry. George Perkins Marsh would have appreciated her approach because, as we will see in the next chapter, for him, humans *become* the

elements of nature. Humans, as he learns, are geologic forces that can think, and thus have a responsibility to the planet.

Notes

¹ Because all my readings of this poem are filtered through my central argument, it may be useful to provide a less thematic close reading of the poem. This is a position poem composed of six lines and arranged into an *aabccb* rhyme scheme with a rising rhythm, transitioning from an admission of subdued power to an assertion of faith in the great waters still being the epitome of deepness, and then ending with a claim of conjectural narration in which God does not light fires only to put them out. This is a bifurcated poem, as the thought units are divided into two sections, although these sections are not separated into different stanzas. The first thought unit, set in the present tense, is arranged into an “Although x, y” rhetorical structure that creates an implicit disjuncture between the past and the present: the waters sleep *now*, implying that they were once quite active in the past. This initial thought unit—comprising the first three lines—constitutes an affirmative statement of belief framed in the negative: rather than making an exclamatory celebration of the waters’ depth, the persona is merely stating that “we cannot doubt” that they are deep. The second thought unit—comprising lines four through six—is also framed in the negative, and sees the persona expanding outward from the empiricism of water depths to the relatively abstract and speculative realm of divine agency, claiming that “No vacillating God / Ignited this Abode / To put it out” (ll. 4-6). There is a simplicity built into the syntactical structure of this second thought unit that contrasts with the winding syntax of the first thought unit: whereas the first thought unit creates a grammatical layering with its “Although x, y” structure, the second thought unit—and its claims on the agency of God—receives a unidirectional grammatical structure as the persona simply states that God did not ignite the earth only to put it out. As if to emphasize this simplifying, consoling message, the poet composes the entire last line using monosyllabic words, the shortest utterances of the English language.

² Indeed, in her poetry as a whole, Dickinson rarely uses the word “strata.” The main example is in July 1879, when Dickinson writes to Susan Dickinson and approaches the concept of strata through lyric, writing:

A Counterfeit - a Plated Person -
I would not be -
Whatever Strata of Iniquity
My Nature underlie -
Truth is good Health - and Safety, and the Sky -
How meager, what an Exile - is a Lie,
And Vocal - when we die - (*Poems: Reading Edition* 565)

The published poem—number 1514 in the Franklin numbering—elides a phrase she affixes to the top of the manuscript page in Houghton Library, essentially giving this poem a title: “In petto” (Houghton Library MS Am 1118.5 (B157)). This phrase frames the entire poem. In her 1844 edition of Noah Webster's *American Dictionary of the English Language*, Dickinson could see that “PETTO” denotes “The breast; hence, *in petto*, in secrecy; in reserve” (606). The physicality is analogous to the inner meaning: if people keep something in the breast, they mark a separation between inner and outer; they hold a true intention below the surface, while showing the world a different face. The demarcating line is human flesh and bone, as the phrase stratifies the human body. To popular readers, this title would have had negative connotations, implying the ‘jesuitical’ practices of the Catholic Church insofar as *in petto* or *in pectore* was the action of a pope appointing cardinals, but not immediately announcing their names. (Indeed, just five years prior to Dickinson’s letter, Pope Pius IX declared five cardinals *in petto* (Boudinhon).) Rather than following the religious connotation, though, Dickinson eventually reaches for the stratigraphic to capture this sense of underhandedness, emotional deceit, and the physical and psychical separation between surfaces and depths. Perhaps the all-caps words of her dictionary, layered one over the other, inspired her, because starting ten words above “PETTO” in her dictionary (in the same column on the page), there are several ascending linguistic layers: PETROUS, PETROSILICIOUS, PETROSILEX, PETROLEUM, PETROL, PETRIFYING, PETRIFY, PETRIFIED, PETRIFICATION, PETRIFIC, PETRIFACTIVE, PETRIFACTION, PETRESCENT, PETRESCENCE, PETREAN (606). Seeing this litany of geologic terminology layered above “*in petto*,” which itself denotes a type of layering, may have been a factor in her poetic process, as she reached for apt analogies—all these layers of geologic words sitting atop this word denoting secrecy may have led her to the secrecy of strata. As with Maclure, strata—especially the deeper layers—were shrouded in secrecy. Regardless of what specifically led her to deploy the word “strata,” it is clear that Dickinson’s material world—literally, her dictionary—encourages analogy via linguistic juxtapositions, as the prominent all-caps words are layered one atop the other and apportioned into clean, bifurcated columns. Critics describe Dickinson’s poetry as accretive, and indeed, all-capitalized word over all-capitalized word is the most conspicuous visual marker of her favorite book, her lexicon. If accretion is the principal of Dickinson’s poetic structure, then it is useful to contextualize her “strata” reference by analyzing the layers that come before and after it—its companion strata, if you will. The main capitalized words provide her changing sense of the layered self, as she searches for the most apt image to describe this divided person. The poem begins with “counterfeit,” which confirms the negative connotation of the title, as her dictionary indicates: “A cheat; a deceitful person; one who pretends to be what he is not; one who personates another; an imposter” (199). It is a word that conjures images of forged coins and notes, a connotation that would have been strong in her family of lawyers, and

which her dictionary quickly notes: in law, “one who obtains money or goods by counterfeit letters or false tokens” and “that which is made in imitation of something, but without lawful authority, and with a view to defraud, by passing the false for the true” (199). She develops this false/true dichotomy later on in the poem, as she defines truth against lie. In the same line, she immediately reaches for another image: “a Plated Person” (line 1). This idea of plating plays with the legal tender connotation of counterfeit insofar as she is still dealing with metal. To “plate,” in her dictionary, means “To cover or overlay with plate or with metal; used particularly of silver” (616). We have moved from a sense of opposition—*counterfeit*, against—to a greater sense of stacked layers, as if this person is a layer of sheening silver atop rusted iron. In line two, we realize that the first thought-unit is a disavowal: the speaker is strongly asserting what she is not: neither counterfeit nor platedness define her, she asserts. Next comes the strata, in the form of a dependent clause and prepositional phrase: “Strata of Iniquity” (3). Again, the descriptor carries both a physical meaning that allegorizes its inner meaning, iniquity being defined in her lexicon as “Injustice; unrighteousness; a deviation from rectitude; a sin or crime; wickedness; any act of injustice” (453, emphasis mine). Iniquity conjures the image of a once-straight strata rendered jagged, worn, and crooked. And strata telescopes the verticality of the layering within the poem, from the veneers of plating in the first line to the unknown depths of earth’s crust in the third line. This iniquity, evidently, could deeply underlie her true self, her essential being. In her dictionary, “strata” means “Beds; layers; as, *strata* of sand, clay or coal,” and “stratum” denotes “In geology and mineralogy, a layer; any species of earth, sand, coal and the like, arranged in a flat form, distinct from the adjacent matter” (797). Grammatically, it seems like the iniquitous strata underlies her true self, a modification of the previous images, which posited a shining veneer of falsity atop a duplicitous inner realm. Though Dickinson could certainly be saying the opposite: that the iniquitous layer lies atop her true self. Regardless, in her lexicon, “nature” has twelve definitions, the best fit here being “the essence, essential qualities or attributes of a thing, which constitute it what it is” (552). In other words, she envisions a stratigraphic self: a speaker with distinct layers, ranging from her essential self to the slanted—unequal—self. If we see the dependent clause as modifying the first two lines, we have: regardless of containing wicked layers within my true self, I would not try to deceive others. In other words, our selves may be a mixed strata, but our actions need not be—we can choose to deny the falsity because we are able to discern the strata, to identify and name them, which is what she does in the concluding three lines. Truth is defined corporally (good Health), environmentally or relationally (Safety), and as expansive in physical orientation (the Sky, as well as being the longest line in the poem). If there were any uncertainty about whether her true self was the underlying or overlying strata, she confirms that her true self is indeed the superficial strata—the strata closest to the sky. Where the other images posited the rotted bottom as the true self, she refuses this

definition, claiming the overlying strata as her essence, striving for the sky. She provides, in other words, a different stratigraphic story of the self: the counterfeiters, defined by thin veneers of charity, are defined by their corruptness because they have claimed that identity through their words and actions; she contains greater depths, and though evil may lurk in every self, she is able to discern good strata from false strata, and thus claim the good strata as her essential self. In contrast, a lie represents the constriction of the self (which is why the counterfeiters and plated people are described as veneers): lies are meager. "Exile" is an apt word here. Though she uses it as a noun, the adjective strengthens the constricting connotation insofar as it means "Slender; thin; fine" (317). Exile is a driving away—"To drive away, expel or transport from one's country" (317). An earthquake of the self, in other words—where the actions you take position the strata in relation to each other. One can either claim truth, working out the beast by aligning oneself with the upper strata; or one can render one's self a lie, contorting layers to such an extent that the true self becomes defined by this distortion—such people have aligned themselves with the lower strata, giving in to the beast. The inner layers always emerge, if not in the earthquakes of the self that deform the strata, then after death, as our thin layers—the flesh and bone, the "in petto" of our chests—can no longer hide the secret within our breast. Suddenly, from the predominantly spatial and visual metaphors, the poem ends on an auditory note: the lies are heard after death. Dickinson is invoking the very essence of geo-logy—earth speaks. She has defined her strata; she has countered her own stratigraphic story of the self against another—the layers, in other words, have been rendered legible. We may hide our crooked, deformed strata while alive, but she understands the vocabulary of these layers. She knows how to make them speak. Dickinson's "A Counterfeit - a Plated Person" is part of a larger context that helps to illuminate the way Dickinson thinks about strata. At the bottom of the manuscript page on which this poem is written, is the word "Lothrop," and on a nearby scrap of paper, she wrote in pencil how the "Lothrop Case" exposed fraud (MS Am 1118.5 (B157)). The poem is, in part, referring to literal iniquitous strata—or at least strata that resulted from the iniquity of others—because she is referencing a famous massacre that resulted in a mass grave, a human strata underlying South Deerfield, Massachusetts. Lothrop, or Lathrop, is Captain Thomas Lathrop, who died in the Battle of Bloody Brook (King Philip's War), as the marble monument in South Deerfield is inscribed: "On this Ground Capt. THOMAS LATHROP and eighty four men under his command, including eighteen teamsters from Deerfield, conveying stores from that town to Hadley, were ambuscaded by about 700 Indians, and the Captain and seventy six men slain, September 18th 1675." This was a famous event in the war, and Dickinson probably read and heard much about this battle as towns commemorated the two-hundredth anniversary just four years before she wrote the poem. The men were deeply mourned both during the bicentennial and in the early nineteenth century, as the second half of the August 1838 memorial stone indicates: "The soldiers who fell, were described

by a cotemporary [*sic*] Historian as ‘a choice Company of young men, the very flower of the County of Essex none of whom were ashamed to speak with the enemy in the gate.’” After these words, a few lines of verse are inscribed on the monument. This inscription was widely shared in the bicentennial publications, and descriptions of the history often contrasted the placid late-nineteenth century river scene from the gory scene two hundred years prior—the placid surface from the blood and bodies lying just below the surface. There is definitely a sense of geological layering to the many commemorative writings, using spatial configurations to connote contrast and time. Dickinson was evidently very moved by this loss of life, and the thought of so many bodies, mangled, and lying below a field and stream that seemed so very beautiful and harmonious. That stratigraphic contrast helped create the poignancy in the commemorative publications, while it also marked the present as a shift in time and fortunes, as if the surface-to-depth contrast firmly relegates both the dead and the Indians to a settled past (dead and buried). Confronted by the memory of this famous massacre, Dickinson makes use of “strata” to give order to a painful historical episode, claiming the health and safety this bloody episode so acutely counters. Thus Dickinson makes recourse to the concept of strata to understand an historical crisis, the famed Battle of Bloody Brook, where dozens upon dozens of hacked bodies turned the river red. She translates these physical strata into the intimate lyric space of the self, willing to redefine the foundation on which her own stratigraphic story rests. Strata, that is, flashes up in a moment of crisis, both historical and personal. Indeed, “STRATA” literally overlies a pending crisis of duplicity in her dictionary, as it lies directly atop “STRATAGEM”: “an artifice, *particularly in war*; a plan or scheme for deceiving an enemy” (797). In the contemporary and bicentennial accounts of this battle, the settlers are depicted as innocently taking a break, picking grapes and letting their guard down, as the Native Americans, lying in wait, suddenly descend upon them—the moment that seemed as quiet and placid as the monument now is, was actually a deceptive calm, a stratagem during King Philip’s War. From the physicality of the South Deerfield memorial to the materiality of her dictionary’s layout, layers of earth, violence, and self, intermixed in fruitful, over-determined ways. In geology, we learn that the present is the key to the past; in literature—through Dickinson—we learn how the past can be a key to the present. That is, the concept of strata—the buried layers of a bloody battle—can be used to give form to a painful present memory, or a battle within one’s self-conception. The self is layered, Dickinson asserts, and it is layered like the earth. The “Strata of Iniquity” describes both the mass grave of those ambushed men from 1675 and a layer within the speaker’s very nature. “Human strata” takes on a new meaning when translated into the literary realm. The stratigraphic story relies on a fundamental intersection of human and rock, and that interaction is never immaculate. It is always messy, leading to a rubbing off of one on the other. Reductively speaking, geologists can never properly interpret a stratum without physically interacting with it—there is always a human residue in every

stratigraphic story, whether the story derives more from the strictly geologic or the strictly literary realm. Strata have a way of signifying crises for humans—crises in personal, social, economic, theological, and military agencies. For in order to mark a stratum—a distinct unit—some agent has to die; the very distinguishing essence of “stratum” denotes a change or transformation in agency, as one dies and another lives. Strata thus get inextricably mixed—intimately intersected—with the human. And as we have learned from Dickinson’s “A Counterfeit - a Plated Person,” this contact between strata and human is a place where the personal defines itself against the social and historical. Strata is a resilient term for Dickinson, able to shift to describe so many situations and states of being, just as her lexicon presents so many variations on the word, including stratification, stratified, stratify, stratifying, stratocracy, and stratum (797).

³ As Davis Young explains in his history of igneous petrology, “the igneous origin of basalt has been accepted since the 1820s” (Young 33).

⁴ Though the general argument over strict Wernerian neptunism and Huttonian plutonism can be said to be settled by the mid nineteenth century, this is not to say that there are no dissenting views, or that there are not parallel struggles—reminiscent of the neptunist-plutonist debates—later on within the history of geology. For more about these parallel struggles, see Young’s *Mind Over Magma*.

⁵ To be fully transparent regarding sources, I originally read Shakinovsky’s words as quoted in White 83.

⁶ In contrast, the later versions *are* explicitly shared with others insofar as they are ensconced in letters.

⁷ Neptunism and plutonism are included in these slow earth processes because they represent the asymmetry between human and earth: the limited ability of humans to apprehend large-scale earth processes such as the stratigraphic forces that form igneous and sedimentary rocks.

⁸ Although I use the word “authorize” in several senses of the word, I am primarily using it to mean that Dickinson empowers women.

⁹ Dickinson, though, has been well analyzed from a feminist perspective in general. There is a question in feminist discussions of Dickinson whether she is exploding a masculinist science or working within it. As Betsy Erkkila observes, “Like Kristeva and other French feminists, like Hélène Cixous and Luce Irigaray [...] her

revolution was enacted on the level of language by rupturing ‘everything finite, definite, structured, loaded with meaning’ and thus challenging a metaphysical order and an entire way of knowing and signifying grounded in the transcendent power of the Word as Logos and Father” (22). Although Dickinson is certainly challenging her received scientific context, rendering a settled geology debate uncertain again, and thus rupturing a definite sense of structure, there is also a narrative of uncertainty within the very science she is responding to. The aqueous-igneous debate, for instance, causes Benjamin Silliman to contemplate the possibility of as-yet-unknown agencies, asserting that “we are always prone to reason, on every subject, as if we understood the whole matter; but, the history of science has abundantly proved that philosophy, after building splendid systems, has, in consequence of its own discoveries, been often obliged to return to the humble task of learning its elements anew” (4). Perhaps Dickinson is merely picking up on this strand of uncertainty that lies within the geologic discourse of her day, latching onto the aqueous-igneous debate because it occasions this contemplation of agential possibilities. Geology, for Dickinson, is a means of hope—an idea that she gets from Hitchcock and Silliman, but that she then uses to transform geology in a way Hitchcock and Silliman never imagined: geology as a relational science that facilitates female communication. In analyzing how the history of geology allows one to trace Dickinson’s manner of negotiating the gendered economy of science, I am not simply stating that she is somehow imploding masculine nineteenth-century science; rather, I am revealing how she works both with and against the geologists of her day, adopting this idea of geology as a means of hope in order to then push against the gender constrictions that geology imposes. In terms of Dickinson herself as a feminist, such discussions go back decades. For example: Martha Dickinson Bianchi was referring to much more than Emily Dickinson’s personal politics when, in 1924—thirty-eight years after Emily Dickinson’s death—she “called her aunt Emily ‘an instinctive feminist’ indignant from her youth ‘at being counted as *non compos* in a man’s world of reality” (qtd. in Patterson 7). Bianchi was also invoking the intersection of gender assumptions regarding mental processes in Victorian America. The phrase “*non compos*” refers to one’s mind not being sound. Bianchi implies that this label is an outgrowth of nineteenth-century gender norms. In a world in which economic production, the periodical press, and the book market were all predominantly controlled by men, the definition of “reason” also became a gendered term, with male editors wielding the power to delineate the reasonable from the unreasonable, the logical from the pathologically unsound, and the stable citizen from the lunatic. This intertwining of reason and gender suggests an analysis of Emily Dickinson’s poetry from a feminist science studies perspective because this “‘man’s world of reality’” also applies to man’s narratives of nature, namely, science. My chapter makes at least three important interventions in the way Emily Dickinson’s relation to science is approached. First, when writing on Dickinson and science, scholars tend to focus on her complicated view

on Darwinian science, ignoring the details of the aqueous-igneous debate. Second, I seek to complicate the simplistic view that Dickinson—who rarely takes a clear stance in her poetry—is taking a static side within these aqueous-igneous debates. Indeed, Dickinson’s side within the debate changes over time, as the different versions of her manuscripts reveal. Third, I hope to correct the overstatement of the contentiousness of the igneous-aqueous debates by the time Dickinson is adding her voice.

¹⁰For more by Peel, see *Emily Dickinson and the Hill of Science*, especially her first chapter, “Poetry, Paleontology, and Geology” (13). I originally encountered Peel’s claim in Sabine Sielke’s “Natural Science” chapter in *Emily Dickinson in Context: Dickinson, according to Peel, is a “concealed natural philosopher/scientist”* (qtd. in Sielke 236).

¹¹Although men have traditionally dominated the history of geology, to understand the role women played, see Kristine Larsen’s *The Women Who Popularized Geology in the 19th Century*.

¹²The phrase “thinking the otherwise” is indebted to Dana Luciano’s brilliant introduction to *Unsettled States: Nineteenth-Century American Literary Studies* (13).

¹³The hopeful side of nineteenth-century geology is particularly evident in the writings of Hitchcock. His objective in his geological studies was to place Charles Lyell’s theologically-troubling geological findings (troubling insofar as Lyell challenged the dominant Christian view of a young earth that was 6,000 years old) into a Christian framework. As the scholar Roger Lundin points out, “Hitchcock sought to reconcile orthodoxy and the new geology by arguing that the long history of the earth was merely one more evidence of the constancy and glory of God. The problems posed by the new geology were only matters of perception and interpretation” (Lundin 32-33). For Hitchcock, geology was a vehicle for Christian hope insofar as it was constantly revealing the benevolence of the Lord. He generously reinterprets the older age of the earth as a sign of God’s constancy. This link between geology and hope is also inscribed throughout Hitchcock’s *Elementary Geology*. Geology acts as a means of hope in his positivist attitude, the very pedagogical apparatus of his text, and his narratives of progress and scriptural-geological concordance. It is hard to find a more positivist attitude than the following statement by Hitchcock: “No other science has made so rapid advances within the last half century, as geology” (298). Here, geology is not only a science that progresses, but also the *most* progressive science, shuttling forward at a speed that outpaces the other sciences. For pedagogical purposes, Hitchcock structures his text “in the form of distinct Propositions or Principles, with Definitions and Proofs: and the inferences follow those principles on which they are mainly dependent” (v). Virtually every word of prose in his text is either a principle or a proof: either boldly

exclaiming a belief of geology or linking that belief to empirical evidence. Portraying a sense of harmony, reason, and empirical proof, this principle-to-proof pattern is thus also a subtle way in which Hitchcock inscribes geology as a means of hope. Every abstract principle has its corollary observations on which that principle rests, providing a seamless sense of unity and progress. Hitchcock also enacts this hopeful, progressive view of geology via his narration of the igneous-aqueous debates. When he first broaches this debate, he ensconces the igneous view within the familiar principle-and-proof structure. Referring specifically to “the older unstratified rocks,” he admits, “So rapid has been the change of opinion respecting the origin of the unstratified rocks that from an almost universal belief in their deposition from water, geologists are now nearly or quite unanimous in ascribing them to igneous agency” (244). In other words, he uses the igneous-aqueous debates as a way to portray geology as a means of hope, inscribing the debate within a progressive narrative from darkness to light, as geologists realized that unstratified rocks have an igneous origin. This positivist narrative of Wernerian-Huttonian struggle is also rehashed within Hitchcock’s section on the history of geology (296). He clearly delineates Werner’s and Hutton’s respective positions. Werner, according to Hitchcock, argued that most rocks (both stratified and unstratified) are the result of water deposition, whereas Hutton argued that rocks composing the continents are recycled material from past contents, which were eroded and deposited into basins, and then intruded by melted rocks (296-297). He then situates this aqueous-igneous debate as a discussion that was once active, but is now settled:

These rival hypotheses excited a great deal of discussion, both on the European continent and in England, for a great number of years. The final result is, that the theory of Werner has been almost universally abandoned; especially so far as the unstratified rocks are concerned; while that of Hutton, denominated also the Plutonian theory, has, in its essential principles, been adopted by most geologists of the present day. (297)

Here, Hitchcock measures the intellectual topography of mid-nineteenth-century geologists, concluding that neptunism is virtually “universally abandoned.” Using the language of principle-and-proof, he situates the neptunist-plutonist conflict as a bygone debate, more appropriate for his section on the *history* of geology than the section outlining geology’s contemporary views. Through his positivist attitude, textual apparatus, and narratives of progress, Hitchcock’s textbook paints the picture of a geology that is constantly improving, revealing the designs of God in nature, and providing a means for unanimous consensus on formerly contentious debates—a geology, in other words, that acts as a vehicle for hope.

¹⁴Many geologists beyond Hitchcock believed in this underlying ability of earth science to improve. One example is Benjamin Silliman, who was Hitchcock's geology professor at Yale (Herbert 73). Indeed, Hitchcock often cites Silliman in his writings, actively reading Silliman's views on geology even after his degree at Yale. Silliman's 1829 book, *Outline of the Course of Geological Lectures, Given in Yale College*, is often cited by Dickinson scholars in relation to the igneous-aqueous debates as if Silliman is a well-known geologist whose position on the debate people would be familiar with. Much like Hitchcock's text, Silliman's book also embraces a hopeful, positivist sense of geology. In fact, Silliman—much like Maclure—explicitly contrasts positive and speculative geology in the introduction to his text: "It is obvious [...] that geology is erected upon facts, and not upon mere speculation. [...] Positive geology is incomparably more important than speculative, and it proceeds, like the other natural sciences, upon a careful examination of particulars" (9). Here, Silliman carefully packages geology as a legitimate science (its status as a "hard" science was not assumed at this period) that rests upon empirical observation, which acts as a kind of motor that allows it to "proceed." Paired with this sense of progression is—much like Hitchcock exhibits—a fundamental faith in the concordance of geology with scripture. As Silliman writes, "The writer, after studying the subject for many years, has formed the opinion, that the geological facts are not only consistent with sacred history, but that their tendency is to illustrate and confirm it" (7). Silliman goes beyond mere accordance of scripture and rocks to assert the idea that the natural landscape actually *illustrates* scripture, actively embodying written revelation. He ends his preface on a decidedly emphatic and celebratory note: "Why should science refuse to lend its aid to the support of moral truth!" (7). Geology, for Silliman, is intrinsically tied to a sense of Christian hope, as God both inspired scripture and created the landscape, mandating that the two forms of inscription shall accord with each other.

¹⁵ As Lundin describes Hitchcock's *Religious Lectures on Peculiar Phenomena in the Four Seasons*, "Its premise was that each season is laden with theological significance and that spring, with its reality of new life, is the supreme season. [...] The message is clear—death gives way to life, and in the divine order of things higher life always emerges from lower forms" (33).

¹⁶ This sense of geology as a means of hope in the face of death can be found in many Dickinson poems, such as "A science - so the Savans say," a poem about the geological sub-discipline of paleontology that Dickinson wrote in the spring of 1860:

A science - so the Savans say,
"Comparative Anatomy" -
By which a single bone -

Is made a secret to unfold
Of some rare tenant of the mold -
Else perished in the stone -

So to the eye prospective led,
This meekest flower of the mead
Opon [*sic*] a winter's day,
Stands representative in gold
Of Rose and Lily, manifold,
And countless Butterfly! (Dickinson 188, Franklin numbering 147)

This is a bifurcated poem arranged in two stanzas, with an *aabccb* rhyme scheme, and written in iambic tetrameter with the occasional trimeter line. The poem was perhaps inspired by Dickinson's reading of Hitchcock's 1850 text, *Religious Lectures on Peculiar Phenomena in the Four Seasons*, in which she found reassurance that wilted winter flowers would rejuvenate in the spring. In this poem, the science of geology—here rendered as “comparative anatomy”—allows the persona to reconstruct an entire organism from a single bone relic, remembering a creature whose every trace would have been wiped away if it were not for that bone fragment and the ability to read it. The geologist can use the power of analogy to imaginatively reanimate an ancient world. In the second stanza, we learn that this geological vision trains the eye to see hope not only in geological circumstances, but in other life moments: even in winter, when one only beholds *meekest* flowers, the wilted winter flower stands as a symbol of the beautiful and full flowers, thanks to this geological vision. Geology, in other words, facilitates a vision of the invisible, allowing the persona to imaginatively construct a vibrant future out of what seems like an atrophied present. As Uno Hiroko further elaborates in his essay, “Geology in Emily Dickinson's Poetry,” “she must have been happy to guess that even ‘this meekest flower’ could be fossilized and become a ‘rare tenant of the mold’ someday after being killed by frost in the near future, just as elegant flowers and butterflies could be” (5). The poem appears to be making a direct link between the kind of vision geology provides and the everyday vision of the world: geology becomes a technology of hope that expands beyond the confines of the science.

¹⁷Edward Hitchcock's 1832 map is located as a pullout in Orra White Hitchcock's *Plates Illustrating the Geology and Scenery of Massachusetts*. His 1841 map is a pullout located within his *Final Report on the Geology of Massachusetts*. As the 1841 map indicates: Amherst primarily consists of granite and a smaller portion of New Red Sandstone. South of Amherst, a thin strip of New Red Sandstone transitions into greenstone and then back to sandstone. West of Amherst, sandstone transitions to Diluvium and Alluvium along the Connecticut River. North of Amherst, granite continues in a narrow

strip northward, with greenstone and sandstone nearby. East of Amherst, there is gneiss and pockets of greenstone and serpentine. Amherst's sandstone has a mysterious origin in his *Final Report*: "As the sandstone of the Connecticut valley reposes directly upon primary rocks, and is covered only by diluvial and alluvial deposits, its exact place in the complete geological scale cannot be directly determined" (438). This New Red Sandstone yields fossil fish, plants, and tree trunks (450). And Dickinson would have seen the coarser varieties used in Massachusetts: the variety "forms excellent underpinning, door and window caps, and foundations and door steps" and is "sometimes wrought into sinks and other similar articles" (180).

¹⁸Hitchcock elaborates: "The quartz and feldspar are commonly white, yellowish and gray: the latter not unfrequently flesh colored: the mica is very often black, but sometimes of a silver color. When the quartz prevails, the rock is easily broken, but hornblende renders it tough. The predominance of feldspar generally gives the rock a more lively white color and renders it rather easier to work" (*Final Report* 146).

¹⁹By "cusp," I mean that as Hitchcock's *Final Report* was about to be printed in 1841, he discovered the logic of glacial theory, and so he added this knowledge as a postscript to the report. Silliman lent him Louis Agassiz's *Etudes sur les Glaciers* (a3). According to Hitchcock, "the whole subject of diluvium has been made to assume an aspect so new and interesting, that I am unwilling my Report should go out of my hands unaccompanied by a brief view of the facts and inferences concerning it" (a3). He continues: "I seemed to be acquiring a new *geological sense*; and I look upon our smoothed and striated rocks, our accumulations of gravel, and the "*tout ensemble*," of diluvial phenomena, with new eyes" (a3). He learned that as masses of ice carve the land, they create features that "correspond exactly in composition and shape to those accumulations of gravel and bowlders that have been ascribed to diluvial action" (3a-4a). And he concluded that "the theory of glacial action has imparted a fresh and lively interest to the diluvial phenomena of this country. It certainly explains most of those phenomena in a satisfactory manner" (11a). There is a vast difference between this view of the land and the view he provides when he was compiling the main body of the *Final Report*; looking at the large boulders (glacial erratics) along Cape Ann, Hitchcock writes that he "was amused by the exclamation of my assistant, who said,—'just so must the world have appeared to Noah, as he came out of the ark'" (377).

²⁰Perhaps it is just a coincidence, but it is remarkable that Hitchcock and Dickinson use the same phrase, he in his geology book and she in her poem: "I cannot doubt."

²¹ Indeed, Dickinson experienced floods in the nineteenth-century present. For more on this, consult Thomson et al., *Historical Floods in New England*.

²² Hitchcock adds an important caveat regarding Diluvium in his *Final Report*: "I shall probably be thought by some, either ignorant of the present state of geology, or unreasonably tenacious of former opinions, by retaining the term *Diluvium*, to designate that coating of gravel, sand, and clay, covering the surface almost everywhere, and resulting from aqueous agency between the deposition of the tertiary and alluvial strata. By doing this, I do not intend to advocate the opinion that all this deposit was the result of one transient universal deluge. But in New England, the greater part of it certainly appears as if the result of powerful currents of water, rushing over the surface in the manner of a deluge. So that in this country, diluvium can hardly be a misnomer" (350). Hitchcock vehemently believes that geological references to the deluge are justified: "Notwithstanding the efforts of some distinguished geologist to expunge the diluvial formation from the geological series, the decision of a large majority of geologists, as I apprehend, is, that for the present at least, it must be retained. To strike it from the list of North American rocks, would be to dispense with the most remarkable member of the series" (350). He acknowledges, nonetheless, that Diluvium is a slippery term: "Probably no part of geology is in a more unsettled state, or more imperfectly understood, than that of diluvium: and while it continues so, a designation for the formation is of little consequence, provided observers describe accurately what is included under it" (350).

²³ Specifically, Hitchcock was her geology's professor at Amherst Academy when she attended the school from 1840 to 1846 (Giles 5).

²⁴ Dickinson used Hitchcock's 1840 edition of *Elementary Geology* as her geology textbook at Amherst Academy.

²⁵ See especially Martha Nell Smith's *Rowing in Eden: Rereading Emily Dickinson*. For general feminist approaches to Dickinson, see Margaret Dickie's "Feminist Conceptions of Dickinson," William Pencak's "Emily Dickinson: Post-Colonial Feminist, Post-Modern Semiotician," and Sheila Shafer's "Feminism and ED."

²⁶ To his credit at least, Hitchcock considered drawing to be a form of geology: scenographical geology. As he writes in his 1841 *Final Report*, scenographical geology "embraces a description of the most remarkable natural scenery of the State, accompanied by drawings of the most interesting spots. These drawings I have succeeded in obtaining through the liberality of several artists, who have gratuitously accompanied me in my tours; and though they should be engraved in plain style, they

may aid in calling the attention of our citizens to striking features in our scenery, that are now generally passed unnoticed. This is the chief object of this part of my Report: and if I succeed in it, I shall feel as if an important point were gained" (iii).

²⁷ For more on Dickinson and the French feminists, see Erkkila 22.

²⁸ Plutonism was always associated with deep time because of the expansive time required for entire continents to be eroded into the sea and new ones to form.

²⁹ Recall Frank Adams's words quoted in my Hawthorne chapter: "The rise and fall of the Neptunian Theory of the Earth forms one of the most important, interesting and even romantic chapters in the history of geology" (209).

³⁰ It is important to note that, unlike the way Sewall and other Dickinson scholars package Silliman, he is not a poster child for Wernerian neptunism. Rather, Silliman explicitly identifies himself as neither Wernerian nor Huttonian, asserting the he will accept explanations of fire or water (i.e. igneous or aqueous) depending on the specificities of the given geologic context (4). When he *does* take sides within the igneous-aqueous debate, it is merely to recognize an overemphasis upon the igneous:

As it is the fashion of the day, to attribute almost every thing in the earth to igneous agency, I shall probably be thought to be behind the present state of opinion, while I maintain, that the chemical affinities, through the medium of aqueous solutions of the great chemical agents—as well as of water itself, have also produced important effects in the early arrangements of the planet. (3)

Here, Silliman is not siding with Werner, but rather merely asserting that water is still a significant agent within geology (as it most certainly is), and that one must not forget this concept in the tidal wave of Huttonian plutonism (akin to Maclure's image of the pendulum swing, from neptunism to plutonism in the 1820s). What is significant within Silliman's text is that his book brings out an important component hidden within the igneous-aqueous debate: the idea that there may be hidden agencies acting upon rock formations of which humans are still unaware. As Silliman writes, "There are probably many agents and agencies, of which we are still ignorant, and that the discovery of some new power, or of some new mode of operation in those already known, might [...] entirely subvert conclusions, in which we have been accustomed to repose unlimited confidence" (4). Here, Silliman wisely suggests that there may be new forces—unknown agents—in play within the formation of rocks, and that the future discovery of these agents will disrupt what may presently seem like a settled argument. This sense—that the aqueous-igneous debate is about the struggle of agencies and the potential of new

agencies—is, I would argue, a compelling concept for Dickinson, who often writes poems that contain agents that seem still on the outside, but that are active and raging on the inside. Indeed, the idea of hidden agencies dovetails well with the narrative of Dickinson’s struggle to add her voice to a masculine discourse: she is a formerly hidden agent that bursts into the known world, disrupting the old seemingly placid conceptions of nature. Silliman’s text foregrounds a strand within the igneous-aqueous debate that is present in any discussion of the debate, but that may be easy to overlook: that this debate is, fundamentally, a debate about competing agencies, and the faith that there may be agencies unknown—powers that have yet to be revealed. This sense of hidden agency must have been compelling to Dickinson, who latched onto this igneous-aqueous debate to reveal her own agency: the agency of a woman who was willing to add her voice to this masculinist scientific discourse. From Silliman to Hitchcock to Dickinson, there is a narrative strand that situates geology as a means of opening up the possibilities of alternative agencies, disruptive narratives of nature, and positing surrogate sciences.

³¹ Dickinson does not merely place her poem in an entirely different context, unconnected to its previous accretions of meaning. The fact that her poem can be read as a response to geological debates *and* that it was then emplaced into this epistolary context is significant: the previous associations do not simply disappear; they adhere.

³² Although Franklin, in his variorum edition, states that no two manuscript versions are “exactly the same,” this overlooks the fact that the manuscripts B and D, while different, present the stanzaic structures of the poems in virtually the same manner (1441).

³³ Note that Dickinson dies on May 15, 1886.

³⁴ Roxanne Harde asserts, “I suggest that because of the community she needed and gathered about her, Dickinson engendered the emotional life needed for her poetry; love is necessary for this art” (148). Building off of Harde’s work, I suggest that a female community also engendered the emotional life needed for her *geology*; love is necessary for this geology. And this point is illustrated in the gradual transformation of her geologic context, from discrete poem to an epistolary poem ensconced within a female community: her science could not remain walled off from her network of women, but rather situated her within that community. Speaking of a higher purpose, one of the critical debates within Dickinson studies has to do with Dickinson’s relation to Christianity: it is relatively clear that she rejected institutionalized Christianity, but scholars still debate how precisely she positions herself in relation to belief. The aqueous-igneous debate intersects this critical debate because the argument between

neptunism and plutonism traditionally has theological connotations. In short, neptunism is usually considered a more orthodox view in the nineteenth century, associated as it is (despite Werner) with the Noachian flood (Young 33). In this sense, as the different manuscript versions of “Though the great Waters sleep” register Dickinson’s changing relation to plutonism and neptunism, the poems thus also register her changing relation to orthodox Christianity. This poem poses a formal problem for Dickinson: how does one provide consolation in a poem, in response to a death, and yet stay true to one’s poetic and philosophical sensibilities, which tend to eschew eternal consolation? As Kirby writes, “many of her nature poems explore the idea of living in a world without certainty and without eternal consolation” (22). Dickinson negotiates this formal problem by rendering her poem ambiguous in itself, and yet, when ensconcing it within a consoling letter, the poem’s consoling possibilities suddenly become more operative, to use a Russian Formalist term. The poem’s consoling side relies on a logic that leans more toward the *igneous* side of the debate because it states that God did set fire to this world and will not let it be extinguished. This is an apt use of Dickinsonian irony because neptunism is traditionally the consoling side of the debate, but Dickinson uses the *plutonist* side to undertake this consolation.

³⁵ As Hallam writes: “Many vulcanists accepted the overall neptunist stratigraphic scheme and even the idea of a receding ocean; they merely differed on the origin of basalt. It is an oversimplification to distinguish the neptunists and plutonists respectively as supporters of the role of water and internal heat as the dominant geological agent. Water was as important as heat in the Huttonian system” (226).

³⁶ Warren captures the dynamism of plutonism in this description: “the surface of the earth was subjected to a cyclic building up and wearing down process—upheaval, erosion, and catastrophe (volcanic eruptions, earthquakes, and floods)—that could account for the irregularities and constant reshaping of the surface strata” (Warren 57).

Chapter 4: Reimagining the Human: George Perkins Marsh, Theology, and the Proto-Anthropocene

*Some - Work for Immortality -
The Chief part, for Time -
He - Compensates - immediately -
The former - Checks - on Fame -*

*Slow Gold - but Everlasting -
The Bullion of Today -
Contrasted with the Currency
Of Immortality -*

*A Beggar - Here and There -
Is gifted to discern
Beyond the Broker's insight -
One's - Money - One's - the Mine -
— Emily Dickinson, Poem 536 [1863]*

While Hawthorne, Maclure, and Dickinson underscored the smallness of the human, the amateur geographer George Perkins Marsh was intrigued by the collective power of the species. Like the others, he recognized the new temporal perspective of humans within earth history. Yet he also realized, toward the end of the nineteenth century, that the species had undergone radical change. In particular, when confronting the stratified earth, Marsh perceived a redefinition of human agency. No longer mere geographic forces, skimming telluric surfaces, humans— as a species— delved into depth. They claimed verticality by transforming themselves into a stratigraphic force. For their earthly actions impacted the layered earth well below humanity's veneer of time.

Questions of strata and agency lie at the heart of contemporary debates concerning the Anthropocene: whether to formally recognize a new epoch in the geological time scale. Geologists use the term “event stratigraphy” to denote the correlation of physical events with locations along the stratigraphic record (Allaby 207). Looking at a stratigraphic column, humans can observe how rocks bear the traces of earth events, such as climate change, geomagnetic polarity reversals, marine transgressions, volcanic eruptions, and extinction events. Such phenomena signal transitions in geologic time. For most of earth’s history, the major forces governing strata’s story have been erosion and deposition, but humanity’s collective impact challenges that narrative by giving voice to another force (Edgeworth et al. 48). The main question among geologists studying the Anthropocene is “whether humans have changed the earth system sufficiently to produce a stratigraphic signature in sediments and ice that is distinct from that of the Holocene epoch” (Waters et al. 137). The question, then is whether earth’s story—embedded in its layers, in the form of strata—allows humans to change the narrative, recognizing a new authorial force.

Picking up on the possibilities of connecting strata with story, this chapter investigates a textual event within the cultural strata of Anthropocene discourse. Anthropocene studies thus far has propagated C.P. Snow’s “Two Cultures” by allowing science—in particular, the International Commission on Stratigraphy—to be the sole arbiter in charge of defining and temporally delineating the origin and extent of the

Anthropocene epoch.¹ What we need is a cultural definition of the Anthropocene that encompasses and historically situates the scientific narrative and recovers its particularly human dimension. The cultural Anthropocene, I would like to suggest, began—as a textual *event* (albeit, one of many)—in 1874, when George Perkins Marsh initiated a transatlantic Anthropocene dialogue by responding to Italian geologist and Catholic priest Antonio Stoppani.² Analogous to a geologist studying event stratigraphy, I am trying to reconstruct the sequencing of this textual event in order to get a more precise and clearly delineated story of its unfolding. In this case, my “strata” are composed of Marsh’s text, as I use the relationship between his footnotes and the text proper to interpret the forces involved in this textual start to the cultural Anthropocene. Marsh’s engagement with Stoppani represents one origin story for the cultural Anthropocene, as both thinkers assess strata to determine if humans truly are a geological force. By the end of their discussion, both thinkers agree that humanity now wields a stratigraphic force. Humanity has changed—changed utterly—and strata are the means by which humans apprehend this new collective self.

Stoppani, in his 1873 text, *Corso di Geologia*, used the term “Anthropozoic era” to denote the very existence of humans as constituting a geologic force. Although the term was in circulation prior to Stoppani, according to his expansion of the term, God’s creation of humans introduced an *essentially* new telluric force into Earth’s geologic history. We can thus regard Stoppani’s use of the Anthropozoic as a precursor to the

“Anthropocene epoch,” a term popularized in 2000 by atmospheric chemist Paul Crutzen to designate the span of geologic time from the Industrial Revolution to the present, where humans have so transformed their environment that they are their own geologic force (Crutzen and Stoermer 17; Steffen et al. 843).³ Although we still technically live within the Holocene epoch, the Anthropocene is currently under consideration by the International Commission on Stratigraphy’s Anthropocene Working Group.⁴ Where the Anthropozoic is a hypothetical geologic *era* that refers to the very existence of humans as constituting a geologic force, the Anthropocene refers to a proposed geologic *epoch*.⁵ I believe the two terms nevertheless share a common intellectual lineage, insofar as they both challenge any clear distinction between human force and geologic force. We can consequently consider the concept of the Anthropozoic as an origin point of Anthropocene discourse.

As a term, the Anthropocene lacks official scientific consensus regarding its exact temporal and spatial limits.⁶ One group of earth scientists argues for an ‘early Anthropocene’ beginning 5,000-8,000 years ago, as deforestation and land cultivation of the Neolithic Revolution triggered a spike in atmospheric CO₂. Another group argues for a circa 1800 AD starting point that co-exists with the Industrial Revolution, while yet another group correlates the Anthropocene with the ‘Great Acceleration’ of industrialization during the mid-twentieth century. None of these arguments adequately acknowledges Stoppani’s work in extending the concept because all are

intent on producing what may be considered a scientific definition of the phenomenon in question. After noting how Crutzen's use of the Anthropocene epoch was influenced by Stoppani's use of the Anthropozoic concept, Will Steffen, for example, explains Stoppani's contribution by noting only that the Italian "was quoted by George Perkins Marsh in the second edition" of his 1864 *Man and Nature* (844).⁷ It is typical for such commentators to ignore the importance of the concept of the human impact on the earth's geology in favor of the phenomenon itself.⁸ As a result, even interdisciplinary analyses tend to position Stoppani as a solitary voice in the intellectual wilderness—a man whose use of the Anthropozoic idea had little to do with the concept Marsh used to launch an emergent discourse.

The "scientific" Anthropocene histories not only ignore the impact of human concepts on the history of the earth; they also expunge the Christian framework of Stoppani's stratigraphic interpretation. A steadfast adherent to the *concordismo* which insisted on a seamless correlation between Biblical exegesis and the geological record, Stoppani can be situated within the scriptural geology tradition known as "mosaic geology," which correlated strata, geological formations, and fossils with Old Testament events.⁹ He argues that just as Christ changed universal history via the incarnation, humans changed earth's physical history by their very creation.

By contrast, Marsh postulated a separation between science and religion in which spiritually-inflected scientific assertions were regarded with suspicion.¹⁰

Although his texts are intercalated throughout with religious anecdotes and rhetoric, these references seem more to be rhetorical flourishes of Marsh's Victorian writing style rather than metaphysical suppositions, motivating arguments. Marsh carefully observes a robust distinction between his empirical evidence and his religious anecdotal asides. In the second edition of *Man and Nature*, retitled as *The Earth as Modified by Human Action* (1874), however, Marsh implicitly confronts this strata-theology divide, when he interrogates Stoppani's use of the Anthropozoic.¹¹ His engagement with Stoppani's Anthropozoic takes the form of what might be called the loss-of-the-commons paradox: Marsh retains the commons Stoppani established between strata and the human, but he wants to detach the commons his predecessor maintained between Christianity and the nature-human dyad.¹² Much as Marsh is attracted to the exulted sense of human agency embedded in the concept of the Anthropozoic, he is also suspicious of the term's religious roots. Stoppani's theory, in other words, reminds Marsh of old theology's crustal infiltration—the traditional fundamentalist interpretations of the earth that placed the human at the center. Thus the challenge he faces in forging the intellectual lineage of the Anthropocene is whether there is a way to embrace the human-strata connection of the Anthropozoic while jettisoning the strata-religion connection.

To resolve this conundrum, Marsh first demotes Stoppani to the legitimizing footnoted space of the text, where he makes him the master of empirical observation.¹³ But then, when the Christian underpinnings of the Anthropozoic get the better of

Marsh's prose style, he carefully distances himself from the term's metaphysical assumptions. Stoppani, as Marsh packages him, is a geologist who recognizes relations between physical phenomena that other scientists overlook; he is a scientist who confirms the existence of an earth process via empirical observation and who recognizes the interrelated complexity of the earth by concretely observing the movement of fluids underground. In contrast to the "erroneous" scientists who merely skimmed along the surface of the earth, Stoppani sufficiently appreciates verticality, digging deeper into the water-cycle process to reveal the significance of subterranean fluids. Not merely a scientific observer, though, Stoppani aligns with the "emphatically modern science of geology" because he "investigated the rationale of the attendant phenomena" of groundwater flow (Marsh 473). Simply by granting this celebratory sentence of scientific progress with a footnote to Stoppani, Marsh transforms the Italian geologist—at least for his American readers—into a symbol of scientific advancement, an authority whose credentials are based upon concrete observation. But when, later in the text, Marsh directly enters into a dialogue with Stoppani's use of the Anthropozoic, his relation to his predecessor bursts out of the footnotes and disrupts the text proper.

As soon as Marsh uncovers the links between the Anthropozoic and the *creation* of man, he relies on the rhetorical mode of the quotation, making it abundantly clear that this linking of creationism and strata (regardless of Marsh's own view) is entirely of Stoppani's doing. The distancing of quotations punctuated by such attributions as "says

he” is Marsh’s way of acknowledging the Christian foundation of Stoppani’s Anthropozoic while conveying Marsh’s divergence from his colleague’s mosaic geology. Before the religious dimension of Stoppani’s concept surfaces, Marsh merely hinted that he, in contrast to Stoppani, was not confident that humans are ontologically different from other animals. Marsh slowly changes from a smaller view of the human to a belief in the power of humans as a collective. As will be seen, the culmination of Marsh’s precarious assent to the Anthropozoic occurs precisely when he directly confronts humanity’s intersection with strata.

But if we excavate the theoretical assumptions of Stoppani’s stratigraphic story, we have to realize Marsh began the present discourse of the Anthropocene by suppressing the link between religion and strata. This disavowal of the commons continues in the failure of twenty-first-century scientific publications to acknowledge the history of the term. What we lose by basing our own cultural definitions of the Anthropocene on “scientific” cleansing of theological connotations from its history is the unique thick description of the term made possible by a literary critical approach. What we lose is the human aspect of the Anthropocene, which is ironic insofar as the term is intended to encompass the geologic *and* the human. By proposing a cultural definition of the Anthropocene that locates one origin of the concept in Marsh’s appropriation of Stoppani, I hope to show that the loss of the commons is not a reductive, unified vector from unity to division, from concord to discord. All too often the loss of the commons is

narrated by imbuing an abstract conception of science with agential capabilities, as if this personified science is the main character in this nineteenth-century drama instead of the diverse and often self-contradictory and tension-laden drives of specific individuals. Rather than a clean trend from the commons to the non-commons, the Anthropozoic origins of the Anthropocene tell a story in which Marsh is willing to sacrifice one commons in the name of another commons—that is, he is willing to sacrifice the strata-theology commons in the name of the strata-human commons. Through this textual sacrifice, Marsh is able to co-opt a useful term—the Anthropozoic era—anesthetized of its messy theological taint, thus aligning himself with nationalistic trends. Let us not forget that *Man and Nature* is often cited as *the* text that began the modern American environmental movement.¹⁴

The full import of Stoppani's use of the Anthropozoic term does not fit Marsh's nationalist narrative because the Anthropozoic is infused with a specific theology Marsh considered anathema: Catholicism. Marsh was fiercely anti-Catholic, framing Catholicism—even within *Man and Nature*—as spiritually tyrannical, and thus participating in the dominant nineteenth-century Protestant discourse that saw Catholicism as a threat to American values.¹⁵ Ignoring the theological underpinnings of the Anthropozoic does much more than erase an entire dimension of the concept—it also reenacts a narratological violence by erasing the term's origins within the Catholic-Protestant tensions of late nineteenth-century America. The Anthropozoic is a story of

strata; it is the story of a Snowian “Two Cultures” *American* narrative versus a Levinian “One Culture” *Italian* narrative. It is the story of an American geographer suppressing the theologically-infused stratigraphic supposition of an Italian geologist. And it is the story of Protestant science erasing the syncretistic tendencies of Catholic science.

Together, Marsh and Stoppani show—in light of the previous chapters—how America’s stratigraphic vision transformed from temporal shallowness to spatial dominance. In reading the same layered earth that gave them a new perspective in relation to deep time, humans also realized their impact upon deep space in the form of strata.

Human Strata and the Anthropozoic Before Marsh

To fully appreciate how different the Anthropozoic stratigraphic story is from previous geologic stories within the nineteenth century, it is necessary to get a brief sense of how this term circulated prior to Stoppani’s use of the concept. Only then can we appreciate Marsh’s careful reckoning of strata’s ability to redefine human agency.

For Dipesh Chakrabarty, the Anthropocene allows humans to step out of traditional relations to nature—that of subject to object. In “Brute Force,” Chakrabarty writes, “to say that humans have become a ‘geophysical force’ on this planet is to get out of the subject/object dichotomy altogether. A force is neither a subject nor an object. It is simply the capacity to do things” (3). This distinction between force and alternative views of the human (either as subject or object) helps to clarify the kind of intellectual work Marsh and Stoppani undertake in the nineteenth century. Confronted with

anthropogenic strata, Marsh and Stoppani perceive a radical redefinition of human agency, in contrast to many other thinkers who also confronted the idea of humans being linked to the stratigraphic record. In the third volume of his 1835 *Principles of Geology*, Charles Lyell writes: “All formations, whether igneous or aqueous, which can be shown by any such proofs to be of a date posterior to the introduction of man, will be called *Recent*” (385). Lyell gives a nomenclature to the stratigraphic record, demarcating the introduction of humans as a significant event. But unlike the dynamic view of human force that Stoppani and Marsh tend to marshal, Lyell imbues humans with a sense of passivity. It is the mere “introduction of man” that denotes the Recent—that is, the mere appearance of human remains in the rock record. By hiding the agent of this introduction, and fixating on the occurrence of human remains, Lyell—in contrast to Marsh and Stoppani—deemphasizes the agency of humans. Indeed, this focus on human passivity is corroborated in Lyell’s chapter section entitled, “Influence of Man in modifying the Physical Geography of the Globe”: “We can never materially interfere with any of the great changes which either of the aqueous or igneous causes are bringing about on the earth. [...] The aggregate force exerted by man is truly insignificant” (191, 197). The temporal smallness of the human, for many geologists, was mirrored by smallness in impact as well.

Lyell, in other words, constructs a vision of human agency that is no match for geophysical forces.¹⁶ He cautions that scientists must always verify whether other

animals have similar powers before we even think of deeming humans anomalous (195). Humans, for example, can cut down trees and induce climate change, but—continues Lyell—an equal number of trees could also be felled by insects: “It would be rash [...] to pretend to decide how far the power of man to modify the surface may differ in kind or degree from that of other living beings” (195). It is, of course, expected that Lyell should deemphasize the agency of humans insofar as he believes in uniformitarianism, the geologic concept arguing that geologic agencies have been both continuous and uniform across geologic time; it would thus be counter to the uniformitarianist credo to suggest the sudden introduction of a yet-unheard-of force into the stratigraphic record.

Scholars who consider the Anthropocene a new term may be further surprised to learn how far back the “Anthropozoic” can be traced. Contrary to the repetitive histories of the Anthropocene—in both the sciences and the humanities—Antonio Stoppani did not originate the term “Anthropozoic.” This appears to be a fact that is either overlooked or deliberately left out of Anthropocene pre-history narratives. In the nineteenth century, various terms—including Pleistocene, Anthropozoic, and Quaternary—were used to refer to the introduction of humans into the rock record. In 1854, for example, Thomas W. Jenkyn contributed an article entitled “Lessons in Geology” in *The Popular Educator*: “All the recent rocks, called in our last lesson Post Pleistocene, might have been called Anthropozoic, that is, human-life rocks, but for the fact that their lower division contains fossils of all the existing species of shells, without

any remains or traces of the human race" (313). In Hugh Doherty's 1864 *Organic Philosophy; or, Man's True Place in Nature*, the Anthropozoic denotes the advent of man in the geologic record: "Two great epochs are recognized by Lyell before the advent of humanity upon the globe; and this gives us three natural distinctions, which may be called palaeozoic, mesozoic, and anthropozoic" (329). These earlier uses of the Anthropocene reveal the extent to which Stoppani re-conceptualizes the term. Whereas these earlier uses of the Anthropozoic use the term in all its Lyellian passivity, Stoppani gave the word a sense of vitality and human agency beyond mere presence in the rock record. His lyricism and imagination in expounding upon the term tore the Anthropozoic from its parochial usage within the discipline of geology, introducing a grander vision—one that anticipates the present usage of Anthropocene, and its vibrant life beyond the discipline of geology.

Contrast these passive stratigraphic stories with the radical agency permeating Stoppani's stratigraphic story. Invoking the term in 1873, Stoppani allowed his brand of mosaic geology to inform not only the rhetorical techniques he uses to couch the Anthropozoic within a Christian framework, but also his fundamental understanding of the very idea of the Anthropozoic era. Prior to proclaiming the turn in geologic time, Stoppani meditates upon the transition within "universal history," in which the universe as a whole entered a new era marked by Christ, whose birth "established the two eras" (Stoppani 36). As Valeria Federighi translates Stoppani, the new spiritual era

“happened when in the world resounded the great Word; when, in the bosom of the aged fabric of ancient pagan societies, the Christian ferment was introduced, the new element *par excellence*” (36). Co-opting Christ’s parable of the wineskin, Stoppani situates Christ as a fundamentally “new element” within the universe, then draws a parallel by asserting that humans represent a “new element” in the *physical* world—a “new being installed on the old planet” (36). As Stoppani continues: “It is in this sense, precisely, that I do not hesitate in proclaiming the Anthropozoic era. The creation of man constitutes the introduction into nature of a new element with a strength by no means known to ancient worlds” (36). Within the same sentence in which Stoppani declares the Anthropozoic, he simultaneously points—as if readers might somehow confuse his emphatic language—at the previous Christological paragraph, asserting that it is precisely in the same way (i.e. “it is in this sense” that) Christ changed universal history via the incarnation that humans changed earth’s physical history. Allowing his provocative concept to sink in, he then links the origin of humans once again to the “new element” of Christ, writing: “this creature, absolutely new in itself, is, to the physical world, a new element, a new telluric force that for its strength and universality does not pale in the face of the greatest forces of the globe” (36). Investing the term “Anthropozoic” with a sense of agency far exceeding his predecessors, Stoppani goes beyond discussions of subject and object to locate humans as a geophysical force. Searching for language to convey his exulted view of the human, he naturally makes

recourse to metaphors of divine revelation and the vocabulary of mosaic geology—precisely the rhetoric George Perkins Marsh so delicately subverts.

Demarcating the Divine in Geochronology

Infusing with theology the unofficial nomenclature of geologic time, Stoppani indelibly marks the Anthropozoic as a concept. That is, Stoppani mobilizes strata to tell a story, and this narrative necessarily aligns with his mosaic-geology interpretive lens. The Anthropozoic as a concept—and as Marsh receives it—is thus indelibly marked by the divine. And because Marsh is such a key figure in the environmental movement, and Stoppani is often seen as an originator of the Anthropocene as a concept, their discussion shapes the way people see the Anthropocene today. Whereas earlier mosaic geologists sought to correlate the Genesis flood narrative with physical strata, Stoppani retreats further into biblical time, using the creation of humans as a foundational stratigraphic signature. Marsh evidently encountered the expanded term soon after the 1873 publication of Stoppani's book, because he had time to incorporate the Italian geologist's thoughts into his 1874 revision of *Man and Nature*. Although Marsh engages Stoppani several times throughout the text, the story of that encounter—and the beginning of a transatlantic Anthropocene dialogue—can be examined through four references, ranging from footnotes to the text proper. Like a sedimentary rock, these references are the “trace fossils” of a particular moment in the cultural Anthropocene. This is a moment that challenges the indelibility of that geologic timespan's divine

inscription, forcing us, alongside Marsh, to ask: is it possible to erase the theological conceptual core of Stoppani's Anthropozoic? In other words, Marsh's conception of strata is challenged by Stoppani's divinely-marked stratigraphic narrative: Marsh is hesitant to fully agree with this radical assertion of human agency, and this hesitancy is expressed in the way he introduces Stoppani in his text. It is important to get a sense of Marsh's hesitation because it reveals how his stratigraphic story eventually changes, adapting itself to Stoppani's view of strata's intersection with human agency. Marsh's initial engagement with Stoppani can be traced through these four references in the 1874 revision of *Man and Nature*.

Marsh introduces the reader to the Italian geologist in a subdued fashion—via a footnote—and yet, despite this quiet commencement, clearly frames Stoppani from the start as the corrector of past scientific oversights and incomplete models of earth processes (473). Discussing groundwater, for example, Marsh describes how current researchers do not account for subterranean water when calculating how much precipitation derives from surface water evaporation. Estimating river basin evaporation, these scientists are stuck in a binary framework, believing precipitation is either discharged into rivers or evaporates back into the atmosphere, instead of recognizing that a portion also infiltrates the ground, replenishing groundwater reserves (472). As Marsh writes:

The progress of the emphatically modern science of geology has corrected these

erroneous views, because the observations on which it depends have demonstrated not only the existence, but the movement, of water in nearly all geological formations, have collected evidence of the presence of large reservoirs at greater or less depths beneath surfaces of almost every character, and have investigated the rationale of the attendant phenomena. (473)

Referencing the theoretical ground on which he makes this claim, Marsh adds a footnote: “See especially Stoppani, *Corso di Geologia*” (473). The relation between the passage and its footnote is significant on multiple levels. On one level, Marsh imbues Stoppani—in contrast to the reductive researchers—with an aura of respectable scientific status, aligning the Italian thinker with the “emphatically modern science of geology” (473). On another level, Marsh subtly expresses both the value and singularity of Stoppani’s research in the very construction of the footnote. Marsh privileges Stoppani with superlative status, not merely suggesting the reader should consult Stoppani, but rather recommending the reader “see especially Stoppani” (473). Keep in mind that Marsh is exacting in his diction and only occasionally directs readers to *especially* consult a specific scientist. Marsh excludes other scientists—for corroboration—from the footnote, presenting the geologist as the stand-alone signifier of modern empiricism, battling the forces of groundwater ignorance.

Continuing in this vein, Marsh reinforces his characterization of Stoppani through yet another footnote, remaining in the subterranean realm to explain the hydrologic source of artesian wells. As Marsh writes: “The waters of the earth are, in many cases, derived from superficial currents which are seen to pour into chasms

opened, as it were, expressly for their reception," but even when no crustal opening is perceivable, "their existence is proved by the fact that artesian wells sometimes bring up from great depths seeds, leaves, and even living fish, which must have been carried down through channels large enough to admit a considerable stream" (476-478).

Affixing a footnote to Stoppani, he characterizes the Italian geologist in a slightly different manner. Rather than explicitly celebrating progressive geology, Marsh now implicitly reveals the mental abstractions Stoppani uses to interpret earth processes: the very fact that artesian wells can yield above-ground objects like seeds and leaves reveals the existence of an opening into the earth, even though this opening might not be readily apparent. Associating Stoppani with this parsimonious scientific observation, Marsh carefully constructs an image of Stoppani as someone who intuits connections between circumstance and process, cause and effect, surface details and subsurface complexity. In its own subtle way, this association-by-footnote prepares readers for the increasingly abstract concept of the Anthropozoic by revealing how Stoppani's conclusions, however abstract, are founded on concrete, ocular proof. This reference also modifies the reader's view of Stoppani by placing the Italian geologist in a different relation to the scientific community, this time situating him as a member of the scientific consensus on a topic. Marsh constructs a community of likeminded individuals around Stoppani by nesting the reference within a list of three other scientific researchers. Marsh thus situates Stoppani as a legitimate source of authority who relies on the empirical method to

advance science: a scientist who both singularly reforms the errors of reductive researchers and agrees methodologically with his peers.

Thus far, Marsh neither acknowledges nor alludes to Stoppani's *concordismo* stratigraphic tendencies, even though his Christianity so thoroughly underlies his stratigraphic narrative.¹⁷ If the opening references to Stoppani represent Marsh's simultaneously legitimizing and secularizing the Italian geologist within the submerged textual space of footnotes, then this next major reference represents the eruption of Stoppani into the text proper, a rupture that coincides with Marsh's directly interrogating, for the first time, the Anthropozoic concept and its theological connotations:

In a former chapter I spoke of the influence of human action on the surface of the globe as immensely superior in degree to that exerted by brute animals, if not essentially different from it in kind. The eminent Italian geologist, Stoppani, goes further than I had ventured to do, and treats the action of man as a new physical element altogether *sui generis*. According to him, the existence of man constitutes a geological period which he designates as the *anthropozoic era*. (609)

Despite praising Stoppani as the "eminent Italian geologist," Marsh nevertheless distances himself from the less empirical, and implicitly religious, ontological assertion that the very existence of humans, irrespective of concrete environmental impact, constitutes a new geo-physical force. Marsh reveals that he takes Stoppani's concept seriously: though he does not give Stoppani a wholehearted endorsement, he nevertheless implies that, on some level, he agrees with Stoppani, despite distancing himself from the idea that humans are different in kind and not just degree from other

animals.¹⁸ These sentences convey an implied openness when Marsh acknowledges how Stoppani “goes further than I had ventured to do” (609). Using the past tense, he expresses his willingness to extend his viewpoint to Stoppani’s position, suggesting the possibility he may be willing—either now or in the future—to grant Stoppani’s point or, at the very least, is seriously considering Stoppani’s concept. Framing Stoppani as a scientist whose ideas venture further than his own, Marsh implicitly activates the reader’s memory of the first Stoppani reference, in which Marsh constructs Stoppani as the researcher who went farther—that is, into the ground—than other scientists. He places Stoppani into that narrative once again, this time giving implicit credence to the Anthropozoic.

As if aware of how close he is to directly endorsing the Anthropozoic, though, Marsh carefully qualifies his stance: “‘The creation of man,’ says he, ‘was the introduction of a new element into nature, of a force wholly unknown to earlier periods.’ ‘It is a new telluric force which in power and universality may be compared to the greater forces of the earth’” (609). As soon as the theological core of the Anthropocene is revealed, Marsh distances himself from Stoppani’s theologically-infused geology. This movement can be seen in the very act of quoting Stoppani, using the authorial clarifier—“says he”—to buffer the phrase, “the creation of man” (609). Marsh had previously only hinted at the marginally non-scientific status of the Anthropozoic by insisting that, unlike Stoppani, he is not as self-assured in proclaiming humans different in kind from

other animals. The concept of being different in kind—by one’s ontological being—is a source of tension in Marsh’s text because he apparently recognizes, as Stoppani does, that difference in kind can be associated with creationism and mosaic geology, and not with the concrete, empirical facts that Marsh so thoroughly relishes in his writings. Regardless of Marsh’s relation to the animal-human divide, though, it is evident that Stoppani’s expansive sense of agency is a radical view for Marsh, and one he does not yet fully agree with, despite his willingness to cite.

After this direct confrontation with the Anthropozoic, Marsh re-submerges the Italian geologist into the footnoted space of textual authority. Describing the effects of mining and how thoroughly some countries delve into the earth, Marsh adds a footnote: “Stoppani mentions an abandoned mine at Huttenberg, in Bohemia, of the depth of 3,775 feet” (631). Continuing to characterize Stoppani as a scientist who delves deeper—ventures further—than others, Marsh now associates the geologist with one of the greatest vertical depths referenced in the entire book, while simultaneously mitigating Stoppani’s association with mosaic geology by returning him to the realm of apparently concrete fact: the specific depth of a particular mine.

Through the textual apparatus of footnotes, Marsh disciplines Stoppani’s geologic imaginings, mediating the general reader’s first encounter with the Italian geologist. He could have introduced Stoppani solely as the scientist seeking to redefine the “now” of geologic time. But Stoppani’s porous boundary between divine and

human chronology, between spiritual and telluric forces, is too immediate—and too radical—to introduce unannounced. Instead, Marsh embarks upon an intricate process of demarcating the divine within Stoppani’s Anthropozoic stratigraphic concept. Any attempt, though, to separate the Anthropozoic view of strata from its theological core leaves a trace. Analogous to the way geologic events—like climate change and volcanic eruptions—can imprint themselves into sedimentary rocks, America’s first encounter with the expanded Anthropozoic concept is imprinted within the layers of text and subtext. Continuing to read the stratigraphic core sample of this cultural Anthropocene, it is evident, though, that 1874 is only the beginning of Marsh’s encounter with Stoppani’s expansive conception of the human.

The Question of Agency in Earth’s Stratigraphic Story

Marsh, Stoppani, and the Anthropozoic are part of a larger story about strata and the kinds of narratives the layers of the earth allow us to tell. The Italian geologist represents a union between science and religion that is fundamentally incompatible with Marsh’s conception of what religion is and what science should do, thus leading Marsh to strain out the biblical narrative within strata, replacing it with a more human myth. Mosaic geology, with its emphasis on a divine agent, gives way—like a microcosm of the nineteenth century’s loss of the commons—to a human agent. Witnessing how society has transformed the layers of the earth, Stoppani is willing to see humans as fundamental agents changing earth’s story, so much so that he embraces this new

terminology for geologic time. Though Marsh is attracted to the possibilities of the “Anthropozoic” concept, he avoids fully accepting the idea, at least in 1874. Both thinkers mobilize strata to tell a story, assessing the telluric layers and the degree of human impact, deciding whether that imprint warrants a redefinition of contemporary geologic time. Likewise, present-day geologists are assessing humanity’s stratigraphic signature and considering whether the forces of erosion and deposition have been sufficiently supplemented by human force to justify a new designation.

Marsh evidently continued to wrestle with the relationship between strata and agency, as is evident by the way he engages with Stoppani’s concept even more explicitly in the final 1884 edition of *The Earth as Modified by Human Action*. He not only cites Stoppani more frequently, but also finally adds the Italian geologist to the meticulous “Bibliographical List of Works Consulted in the Preparation of this Volume” (xxiii). Significantly, strata play a crucial role the first time Marsh explicitly affirms—while citing Stoppani—the idea of humans-as-a-geological force (in the 1884 edition). In the 1874 edition, Marsh’s alliance with Stoppani’s concept tended to be more implicit, with his divergences from Stoppani occupying the realm of the explicit. That all changes, however, in the 1884 edition. Writing about the vertical movement of landmasses, Marsh mentions how coastal uplift can create the appearance that the adjacent seas are falling, and how coastal subsidence can give the impression of sea-level rising, stating: “These movements depend upon geological causes wholly out of our

reach, and man can neither advance nor retard them" (388). Although Marsh seems to assert that humans have no influence upon these large-scale geological movements, his footnote to this sentence uses Stoppani to complicate that simplified assertion:

Now, almost all the operations of rural life, as I have abundantly shown, increase the liability of the soil to erosion by water. Hence, the clearing of the valley of the Ganges, for example, by man, must have much augmented the quantity of earth transported by that river to the sea, and of course have strengthened the effects, whatever they may be, of thickening the crust of the earth in the Bay of Bengal. In such cases, then, human action must rank among geological influences. See Stoppani, *Corso di Geologia*. (388-389)

Although Marsh is arguably aligned with the spirit of the Anthropozoic throughout his texts, as he traces how humans have influenced the earth, he *directly* aligns himself with both Stoppani *and* the idea that humans can act as a geological force on such a large scale. While this footnote is virtually identical with one presented in the 1874 edition, this revised note explicitly aligns Marsh with Stoppani's concept because it now includes the words, "See Stoppani, *Corso di Geologia*" (389). Marsh creates a narrative in which human modification of the Ganges River Valley triggers soil erosion, thus increasing the river's sediment load, which in turn thickens the crust in the Bay of Bengal. The implication, as he notes earlier in the footnote, is that this human-induced accumulation of sediment in bays can—depending on the nature of the river and shape of the bay—eventually get so heavy, compressing the underlying strata, that the layers of earth physically subside in relation to the surrounding landscape. Although Marsh is quick to qualify this observation, pointing out how subsidence, despite increased

sediment load, does not always occur, he nevertheless directly sides with Stoppani in this particular instance of the Ganges river, boldly stating, “in such cases [...] human action must rank among geological influences” (389). In this 1884 edition, before Marsh even explains the concept of the Anthropozoic, he already explicitly aligns himself with Stoppani’s radical conception of human agency.

Notice how it is precisely when dealing with strata that Marsh acknowledges humans as geological agents. As I argue, strata in general—particularly, sedimentary rocks—occasion a contemplation of impact. Earth layerings necessarily lead to questions of force because this is the geologic realm (i.e. sedimentary rocks) where humans can most impact the telluric story. “Strata” is the concept that flashes up in the moment of danger that *is* humans-as-geological force. Playfully revising Walter Benjamin’s words from “Theses on the Philosophy of History,” we might say: “To articulate strata does not mean to recognize a geologic moment ‘how it really was.’ It means to take control of a stratigraphic story, as it flashes in a moment of danger.” This moment flashes up as strata intersect with the human body, with the senses. The ensuing stratigraphic narrative is an interlayering of human and stratum—so much so that, oftentimes, they cannot be distinguished. But what, precisely, *is* this moment of danger regarding strata, at least in Marsh’s context?

Is this merely the danger of contemplating one’s own extinction when confronted with strata? In some sense, Marsh aligns with this Tennysonian shock of strata’s

seeming story of violence and extinction-on-a-whim, a sentiment Marsh expresses in his 1860 “The Study of Nature”: “[Man] reads in characters impressed upon the solid rock the historic record of myriads of ages when man was not, and every new field of view unfolds to him evidences of physical revolutions as mighty as the Noachian deluge” (91). The implication is that the movement from stratum to stratum is a condensed history of earth’s violent revolutions. But there is a more insidious danger—a shock to the status quo definition of the human that relies on a clear demarcation between human and environment—and it has to do with the way Marsh envisions human identity as entangled in strata through the intimate intersection of bodies (and, indeed, our minds as well) upon the imprintable earth. Marsh sees the earth as infinitely impressionable, eternally retaining the trace of every point of contact. In the same 1860 essay, he focuses on the agricultural realm, writing: “Not a sod has been turned, not a mattock struck into the ground, without leaving its enduring record of the human toils and aspirations that accompanied the act” (87). The turning of sod connotes not only the act itself, but also the will—or embodied agency—of that act. One can, according to Marsh “mentally follow back the links of this unending chain,” where “you will find them stamped with the impress of multitudes” (87). Recognizing strata as the site of agential change, Marsh also sees superficial strata—in the form of sod and turf—as the infinite record of human agency. Somehow, for Marsh, materiality bears the trace of both outward act and inward will.

Marsh extends this concept of the infinitely impressionable earth in his 1860 essay, and evidently it is a concept he continued to contemplate because he chooses to end both the 1874 and 1884 revisions of *Man and Nature* with the same thought. He paraphrases from memory or written record (because “I have not the volume at hand”) Charles Babbage’s *Ninth Bridgewater Treatise*, calling these words among the most sublime modern science has ever produced. He opens by writing: “No atom can be disturbed in place, or undergo any change of temperature, of electrical state, or other material condition, without affecting, by attraction or repulsion or other communication, the surrounding atoms. These, again, by the same law, transmit the influence to other atoms, and the impulse thus given extends through the whole material universe” (643). Reveling in the atomic implications of Newtonian physics, Marsh scales downward from sod and turf to the single atom, positing the universal impact of even atomic agents. Not content with staying in the merely inorganic material realm, though, he also notes how “Every human movement, every organic act, every volition, passion, or emotion, every intellectual process, is accompanied with atomic disturbance, and hence every such movement, every such act or process, affects all the atoms of universal matter” (643). Notice the gradation Marsh sets up in this sentence, expanding from human movement to every organic act, then swerving inward into the will before expanding this inward realm to include both affect (passion, emotion) and intellect.

Agency—human action plus volition—becomes the pivot by which Marsh invests emotion and intellect with the power to impact universal matter.

Even if reaction equals action, Marsh continues, atoms are never fully restored to their original location and condition, “no action can take place in physical, moral, or intellectual nature, without leaving all matter in a different state from what it would have been if such action had not occurred” (643). For Marsh, every action, whether it occurs in the exterior physical realm or inside the human brain, indelibly marks the world in some way. This record of agency is so totalizing that Marsh writes:

There exists, not alone in the human conscience or in the omniscience of the Creator, but in the external nature, an ineffaceable, imperishable record, possibly legible even to created intelligence, of every act done, every word uttered, nay, of every wish and purpose and thought conceived by mortal man, from the birth of our first parent to the final extinction of our race; so that the physical traces of our most secret sins shall last until time shall be merged in that eternity of which not science, but religion alone, assumes to take cognizance. (643-644)

Marsh conveys a world in which agency is layered upon agency from the first act to the last. Though he vaguely refers to the medium of this record as “external nature,” his language is reminiscent of the way he talks about strata, a medium that bears the traces of ancient forces. Yet Marsh goes further, claiming there is even a physical trace of our “most secret sins,” of “every act done, every word uttered, nay, of every wish and purpose and thought conceived by mortal man” (643-644). Nothing is irretrievable in this human-environmental context: the human mind, whether it accepts it or not, is unleashed—and laid bare—upon the physical world. In a totality reminiscent of the

deity, the material world records every mental phenomenon. The only other way Marsh conveys such a radical conception of agency's traceability is in his 1860 essay, when he envisions aliens—"beings with faculties analogous to ours," yet with "sharpened sight and indefinite power of motion"—in outer space observing the reflected light from humanity's past, able to "witness the rearing of pyramids, the founding of the walls of Rome, the battles of Alexander, the triumphs of Caesar, or the inauguration of Washington!" ("Study of Nature" 80). Whereas light bears an image of the act itself, the physical world—including strata—bear the elemental traces of agency.

The ability of strata to record the human, though, is predicated on the ability to distinguish the medium from the mediator, the supposed geologic *tabula rasa* from the human inscriber. What happens, then, when you imprint yourself so thoroughly upon the earth that your agency is indistinguishable from a geologic force? This is where we get closer to the danger that manifests itself in the stratigraphic concept.

To understand the way strata flashes up in this moment of agential uncertainty, it is necessary to understand how thoroughly humanity intersects with strata. For Marsh, humanity's innermost identity is defined by its ability to rebel against nature. In his 1860 "The Study of Nature," he asserts how humans are in "perpetual struggle with external Nature" (74). Humans, according to Marsh, cannot live off spontaneous nature, and, indeed, "all her influences, if untamed and unresisted, are hostile to his full development and perfect growth, to his physical enjoyments and his higher aspirations,

and even to his temporal existence" (74-75). The growth of humanity relies on resisting nature. For him, "it is by rebellion against her commands and the final subjugation of her forces alone that man can achieve the nobler ends of his creation" (75).

Mere resistance is not enough, as it must eventually lead, in Marsh's view, to the subjugation of the earth by the human. If nature is the entity against which humans rebel, nature is also—in the form of strata—a means by which humanity measures that subjugation. Writing in an 1855 Smithsonian Institute lecture about "The Camel," Marsh admits that humanity has not yet achieved the grand command by the Creator to subdue the earth, and thus exert human control over the "entire organic and inorganic world" (25). Yet, he lists the ways in which humanity has begun to heed that command, noting how humans have surveyed the horizontal reaches, outlined both the solid and fluid surface, measuring both areas and elevation. Humanity has "pierced its superficial strata, and detected the order of their historical succession; reduced to their primal elements its rocks, its soils, its waters, and its atmosphere, and even soared above its canopy of cloud" (26). In this sentence, much like a poetic line, he amplifies agency through the ordering of the list. The surficial, horizontal realm is the first to get colonized, and the marking of elevation is the stepping stone into the stratigraphic (albeit merely superficial strata).

The sentence then moves into the realm of chemistry by minimizing its scale to show humanity's agency over even the primal elements of rocks. Finally, Marsh ends

this story of lithologic (and downward) verticality by showing how humanity can itself become vertical, this time ascending to the heavens. Each step in the list is a fulfillment of the biblical command, as humans, according to Marsh, become ever more fully human by obeying the law of their own being, gradually growing in agency with each level (i.e. if humans are defined by their command to subdue nature, then any act that increases their agency to fulfill that original command aligns them ever closer to their inner identity—the destiny God gave them at creation). If the horizontal is the realm of surveying and measuring, the vertical is the realm of “historical succession.” Marsh not only understands strata as force, but also strata as story, as a sequence of events one can puzzle through and correlate. For Marsh, horizontal knowledge leads to vertical knowledge, just as, for Crèvecoeur, America gazed downwards at the same time it was gazing westward. Not content with this extreme amplification of human agency, from the surface to the stratigraphic subsurface, Marsh admits, “earth is not yet all his own; and millions of leagues of her surface still lie uninhabited, unenjoyed, and unsubdued” (26). Five years later, in “The Study of Nature,” Marsh goes further by predicating human emancipation—both physically and spiritually—on the conquest of nature. Collecting facts about natural knowledge, he says, is not an end in itself, and should not merely be “to extract a larger amount of physical good out of the resources of Nature” (92). Rather, the end goal is “to emancipate ourselves from her power, and make victories over the external world a vantage-ground to the conquest of the yet more

formidable and not less hostile world that lies within" (92). Just as Marsh traces the direct impact of internal thoughts on external materiality, he also figures external conquest as a model leading toward internal conquest: humans conquer nature on the way to conquering themselves.

Strata, for Marsh, is a thermometer of emancipation. The degree to which humans rebel against the external, material world can be read in the layers of the earth. Strata is both a record of agency and a means by which humans exert their agency over the earth. Human identity, for Marsh, is measured by its contrast with the external world, including strata. There is thus an inherent danger whenever Marsh, albeit infrequently, admits—as he does in the 1874 edition of *The Earth as Modified by Human Action*—that there are times when “the effects of human action on the forms of the earth’s surface could not always be distinguished from those resulting from geological causes” (50). The danger lies in the way a stratigraphic story, with its intimate intersections between geology and the human, can subvert more generalized, and fundamental, notions of the relation between nature and the human.

Marsh’s portrayal of human identity relies on the ability to demarcate the human from the natural, for humanity is measured, as he argues, by the degree to which it can rebel against nature. Thus humans-as-a-geological force reveals just how slippery any such demarcation is.

The entire first half of this chapter can be seen in this light: Marsh so thoroughly hesitates in assenting to Stoppani's radical redefinition of human agency (even more radical, as we have seen, than the merely geographical) precisely because this repositioning of the human undermines a fundamental belief regarding humanity's place in the world. Strata is the site of slippage. When the infinite impressibility of the earth magnifies to such an extent that geologic and human forces are indistinguishable, Marsh's foundational sense of self is threatened. Although he may avoid the radical transformation of human agency to some extent, shielding himself within the passive confines of a hermeneutics of suspicion, eventually he is forced to reckon with this newfound agency, and this reckoning, as the subsiding Bay of Bengal stratum reveals, occurs precisely when Marsh confronts the concept of strata. "Strata" is the concept that flashes up in the moment of danger that *is* humans-as-geological force.

Stoppani and Marsh represent two stratigraphic stories: one that fully embraces humanity's geological force, and one that is more comfortable with a merely geographical force; but Marsh's view changes through time, eventually assenting to a more radical conception of human force once humanity's intersection with strata is sufficiently articulated. As long as he can remain on the surface, Marsh can avoid the redefinition of human agency. But the surficial leads to the subterranean realm via the layered earth: humanity's agricultural practices—as Crèvecoeur predicted—lead one to dig deeper, understanding how one's agency does not stop at the surface. The layered

earth is the conceptual ladder one needs to connect surficial force with geologic force, as agricultural practices atop the flat horizontal realm lead one eventually to the idea of greater soil deposition in bays, strata thickening, and crustal subsidence. This is one major way strata—or verticality—occasion a contemplation of human force: by revealing that our actions do not stop at the surface, but have geological implications. Humans may be small temporally, but their actions are *deep* spatially.

As both Stoppani and Marsh gaze upon the earth, they at first see different stratigraphic stories, as they assess humanity's imprint upon the globe within different cultural, religious, and national contexts. Their articulations of strata, to echo Benjamin, do not manifest a geologic moment "how it really was." The human senses and story-making capacity necessarily intervene, just as they intervene as geologists feel a sedimentary rock in their hands and connect its materiality to an imagined depositional environment. Every articulation of strata means to take control of a stratigraphic story, as it flashes in a moment of danger. Strata is intimately connected with crisis—it is literally a turning point in an environment, a change from one force to another. As America contended with the meaning of strata, strata was not merely some inert piece of earth to be quietly described, categorized, and placed into the dark confines of a curiosity cabinet, to be promptly forgotten. Rather, strata occasion a crisis in conceptions of force not only in the strict geological sense that every change from one stratum to the next is a revolution in force, but also in the narrative sense insofar as

strata's connection to revolutionary force led America to redefine the limits of the human within its stratigraphic stories. Strata compel a crisis of transformed force upon its readers, and we work out this radical change through the narratives we write about strata: our stratigraphic stories. Strata's story is never manifest; it is *made* manifest as the layered earth intersects with the human body, and we body forth strata in order to transform it into narrative. Marsh's Ganges River example, though, is still rather indirect: agricultural practices lead to erosion, which leads to deposition, leading to crustal thickening, and then—if the conditions are right—possibly a vertically downward movement of strata. We can conceptualize more concretely the limits of the human in strata by realizing that manifesting verticality is not always about the *manifestus*, the hand striking the rock (and thus leaving a narrativizable and agentially positive impression upon the earth), but rather, the hand getting *incorporated* into the earth: the human becoming strata.

The human becoming strata suggests anthropogenic rock creation, or the idea that humans can create rocks. Humans do not merely impact strata's story: they also literally become strata's story, as their physical bodies and artifacts intersect with strata. The concept of anthropogenic rocks has been around for centuries, and in the 1870s, both Marsh and Stoppani describe this phenomenon. In his 1874 *The Earth as Modified by Human Action*, Marsh summons an earth scientist's research to describe how iron from wrecked ships get deposited in beach sands, conglomerating to form a "very solid mass

around the iron" (639). And in Elsinore, Denmark, Marsh explains, a scientist delineates a stratum over a foot thick resting on beach sand composed of pebbles, sand, pins, and coins from the mid-seventeenth century, concluding that this mélange originated from street sweepings from the nearby town (639). Likewise, in his 1873 *Corso di Geologia*, Antonio Stoppani refers to the strata of the Romans, lyrically imagining rivers transporting pottery fragments as if they were transporting granite pebbles (38). In all of these cases, anthropogenic rock formation is closely tied to decidedly unwanted materials, or materials that get accidentally taken out of human circulation. Human refuse becomes a means not only of impacting, but also of becoming, strata.

What is odd is that, unlike his hesitancy regarding humans as a geologic force, Marsh does not seem—at least on the surface—to be hesitant to describe human-created strata. One would think that, because Marsh tends to balk at the idea of humans being a geological force (especially in 1874, before his thinking evolved), he would also balk at the idea of human-strata. Yet he describes several scenes of anthropogenic inclusions in American strata, predominantly from either American Indian cultures or urban environments. Writing about the Ohio mound builders in his 1874 revision of *Man and Nature*, Marsh observes how the mounds “contain pearls, thought to be marine, which must have come from the Gulf of Mexico, or perhaps even from California, and the knives and pipes found in the same graves are often formed of far-fetched material, that was naturally paid for by some home product exported to the locality whence the

material was derived" (18). Despite emphasizing cultural exchange, thus implying the sheer effort it must have taken the mound builders to transport desired material objects, Marsh essentially describes these mounds as if they formed naturally, de-emphasizing the agency of the builders. The narrative of this stratum is focused more on the finder than the original founders. Marsh focuses on correlating materials to their original locations, much as a geologist corresponds a sedimentary rock to its depositional environment: the mounds "contain pearls" that probably derived from a marine environment such as the Gulf of Mexico or California, while the knives and pipes are also formed from "far-fetched material" (18). The entire exchange seems quite passive, and indeed, these materials were "naturally paid" for using local products. Perhaps Marsh is more comfortable, as many were in the nineteenth century, naturalizing Native Americans, and thus easily parries any sense of uncertain agency these kind of stratigraphic inclusions might conjure.

Although he does not seem to be anxious—on the surface—regarding anthropogenic rocks, an anxiety is still evident in his need to positively identify strata as either human or natural. That is, Marsh feels compelled to neatly identify the strata according to his human-versus-environment paradigm, and his eagerness to impose this distinction implies a certain anxiety—the fear that the human and nature could be indistinguishable. Thus he quickly emphasizes certainty in this situation, and even when there is room for doubt, he relegates that doubt to the past, creating a narrative of

scientific positivism. Later on in the same book, for example, Marsh describes an instance in which a stratum was once thought to be natural, but later out turned out to be cultural: “There are, on the southern coast of the United States, beds of shells so extensive that they were formerly supposed to have been naturally accumulated, and were appealed to as proofs of an elevation of the coast by geological causes” (96). For Marsh, horizontal extensiveness connotes natural accumulation, as if expansive beds of shells—because of their geographic excessiveness—could not be created by humans. Thus, finding shells on higher grounds than experts expected, geologists pointed to crustal elevation as the reason these shell beds are located where they are. These extensive beds of shells, however, “are now ascertained to have been derived chiefly from oysters and other shell-fish, consumed in the course of long ages by the inhabitants of Indian towns” (96). So Marsh quickly transitions from this sense of doubt to this sense of realizing the truth: from a stratum once considered natural to one identified as cultural. Perhaps he does not think these deposits have taken on a truly geological character because they have not impacted (by compressing) lower strata. He does seem to locate shell bed deposits squarely in the merely geographical realm: “The planting of a bed of oysters in a new locality might very probably lead, in time, to the formation of a bank, which, in connection with other deposits, might perceptibly affect the line of a coast, or, by changing the course of marine currents, or the outlet of a river, produce geographical changes of no small importance” (96). These shells seem to exert their

agency on the surface only, transforming currents, rivers, and coastlines, but not gathering enough force to make a vertical impact.

Transitioning from American Indian culture, the next major source of anthropogenic rock, for Marsh, is the urban environment. He mentions that, in American cities, “street sweepings and other town refuse are used as manure and spread over the neighboring fields, the surface of which is perceptibly raised by them, by vegetable deposit, and by other effects of human industry, and in spite of all efforts to remove the waste, the level of the ground on which large towns stand is constantly elevated” (642). Marsh firmly grounds this phenomenon in the “effects of human industry”: human agency. There is certainly a verticality to these deposits, as the urban ground—despite outsourcing its waste for agricultural purposes—is “constantly elevated.” Yet there is no sense of these layers of human refuse impacting and moving the lower strata, something that seems to be necessary to trigger the crisis of force within Marsh’s stratigraphic stories. It appears, as long as he emphasizes the human origin of these surficial strata, he is able to deflect any kind of agential uncertainty.

More than ever before, critics are beginning to appreciate the radical melding of human-geological force in the form of anthropogenic strata. Strata, I argue, reclaims the diachronous complexity of the Anthropocene—the idea that humans became a geological force not at a particular moment in time, but in multiple manners and temporalities. Anthropogenic earth layers connect present stories with past stories of

human force. It may be compelling to focus on contemporary industrial technofossils and rocks, such as the melding of plastics and traditional lithic fragments, or—in Marsh’s case—the strata of nineteenth-century urban refuse, but the earth has a long history of anthropogenic strata, of humans entering geologic time by imprinting themselves into the layers of soils and rock formations. Just as Marsh points out the street trash composing a new stratum, Stoppani describes the Roman pottery strata, and how rivers whisk away fragments alongside other lithological specimens. Indeed, pottery—as far as artificial ground is concerned—is virtually as profound as modern-day plastics, and has a much deeper history, with deposits in Syria dating back seven thousand years (Edgeworth et al. 42). As an interdisciplinary group of scientists points out:

Pottery was a novel material too, as innovative back then as plastic was in the 20th century. Associated with it was a technology of manufacture later to play a role in the development of metallurgy, instrumental in further technological innovations. As technofossils, pottery and 20th century plastics are not unconnected. Pottery achieved a near-global [...] distribution long before mass-produced plastics did. That wide distribution came about not in a precise or globally synchronous manner but rather through diachronous developments, via movements of peoples and networks of cultural exchange with sharing of information on techniques and skills of manufacture, in countless social and economic interactions, with some element of independent invention. (Edgeworth et al. 42)

Rather than a clean correlation with the Industrial Revolution, humanity’s entry into geologic time—as pottery attests—dates back centuries across disparate locations and temporalities. When arguing that humans have recently transformed into a geologic

force, Chakrabarty clarifies himself: “For it is no longer a question simply of man having an interactive relation with nature” (Chakrabarty “Climate” 207). Humanity’s stratigraphic signature challenges the “newness” of Chakrabarty’s Anthropocene claim because our impact on strata is not a mere “interactive relation,” but a significant and global transformation. Granted, the human is still small temporally in relation to earth history; but these same layers that speak of human smallness also record the force of humanity’s collective power.

This global transformation of strata is so important that scientists are now singling out the sum total of anthropogenically-transformed ground, arguing that these patches of humanly modified earth comprise a larger stratigraphic entity called the “archaeosphere” (Edgeworth et al. 33). The archaeosphere would presumably include both Marsh’s street-sweeping stratum and Stoppani’s Roman pottery stratum, alongside “artificial ground of industrial date, archaeological strata, buried infrastructure, quarries, landfill deposits, agricultural soils and surface layers of relevant material irrespective of depth” (Edgeworth et al. 40). Rather than having a discrete start date aligning with the Industrial Revolution, this stratigraphic analysis of the Anthropocene foregrounds diachronicity. As these researchers elaborate:

The substantial global change in this instance is to the Earth’s surface itself—its soils, landscapes, critical zones and ecologies—brought about not instantaneously but rather through the cumulative effects of many local events and processes taking place in different ways at different times. There is no single date for when these developments started to have global impact. As Periman (2006) succinctly puts it, “The Anthropocene begins to emerge when we consider

human-environmental activity at a local level, compounded by thousands of years, affecting vast areas of interlocking landscapes.” (Edgeworth et al. 34)

Through the course of time, patches of anthropogenic ground eventually coalesced to the point that researchers now realize this composite stratum of earth constitutes a single lithostratigraphic unit (Edgeworth et al. 54). Both the archaeosphere itself and the Anthropocene as a concept resist any attempt to fit them into a singular, clearly delineated start date.

This multiplicity of beginnings is the reason one major—and virtually never-ending—project for geologists is to demarcate the lower boundary, dubbed “Boundary A” by Edgeworth, of these anthropogenic deposits composing the archaeosphere (Edgeworth et al. 34). In a way, this chapter, aside from arguing for the newfound stratigraphic realization of humanity’s geologic force during the nineteenth century and humanity’s intimate relation between strata and crises of force, maps this Boundary A of the *cultural* Anthropocene’s archaeosphere. One stratigraphic surface for this cultural boundary dates to 1874 and lies in the transatlantic dialogue between George Perkins Marsh and Antonio Stoppani. The cultural Anthropocene had one of its beginnings in this textual connection between an amateur American geographer and an Italian geologist-priest, and is defined and forever marked by that imprint, in all its theological complexity. At first, they articulated different stratigraphic stories, though Marsh eventually aligned more with Stoppani when confronted with the way strata flashes up during a crisis of force—a turning point, for Marsh, from humans as geographical agents

to humans as geological agents. This is a transformation, in other words, from human smallness to human power, at least as physical impacts are concerned.

Today, we seem to play an ever-larger role in strata's story, as the artificial products of a consumerist culture find their way into the earth. Plastics, for example, get taken up by the earth's circulating systems and deposited like any other traditional lithologic grain. Increasingly, as we make manifest the stratigraphic story, it turns out we are telling a story in which the human and geological sides are infinitely enmeshed. In 2014, for example, on the coast of Hawaii, geologists discovered a new type of rock. Dubbed "plastiglomerate," this rock forms at the nexus of nature and the human, geology and consumerism, sediment and trash. Along the shores of Kamilo Beach on the island of Hawaii, synthetic organic polymers in the shape of bottle caps and fishing nets mingle—through the power of burning campfires—with coral pebbles, basaltic lava fragments, charcoal, nuts, and seeds, forming a dense rock with a high preservation potential within the geologic rock record. Given the ubiquity of plastic accumulation on the earth, especially along lake and ocean shorelines and bottoms, these scientists suggest that this new rock—this conglomeration of melted plastics, beach sediment, and organic debris—has a "great potential to form a marker horizon of human pollution, signaling the occurrence of the informal Anthropocene epoch" (Corcoran et al. 4).

Long signifying a multiplicity of forces in American literature, strata yet again signal a crisis of force in contemporary existence. Rather than uncertain forces, though,

it is a story of force out of control, and it is increasingly a story of violence. Indeed, anthropogenic rocks in the form of plastiglomerates signify the mixture of invisible and visible violence enacted upon the earth. So much of the current climate crisis—the Anthropocene epoch—unfolds to the rhythms of what Rob Nixon calls “slow violence”: an oftentimes invisible (at least to non-scientists) violence whose full timespan and reverberations cannot be captured within a single human lifespan. Plastics too have their slow violence side, as they slowly degrade over thousands of years, absorbing persistent organic pollutants (POPs) such as polychlorinated biphenyls (PCBs), bioaccumulating in the bodies of fish and humans (Corcoran et al. 4). But much like an earlier environmentalism’s more visible violence—such as deforestation, soil erosion, and desertification—these plastics and plastiglomerates also enact a more immediate performance, including ingestions, entanglements, and disrupted feeding patterns (Corcoran et al. 4).

There is also a temporal and spatial immediacy to the plastiglomerate itself, in both its formation (on a beach via campfire) and its tangibility within a finite space. This artifact of human geology is, in part, discernable and identifiable by the scientifically untrained eye, unlike the invisibility of parts per million CO₂. We can imagine, centuries from now, intelligent beings reading our contemporary stratigraphic column, and seeing the sudden introduction of plastiglomerates. How will our present-day moment in time get mobilized into a narrative? Will the story of human smallness within the

stratigraphic record parallel a story of ethical smallness—of the inability to act? Despite examining how strata invokes crises in American literature, there is also a sense in which, in the contemporary moment, strata simultaneously points to both crisis and the possibility of a positive, life-affirming sense of force. For if strata are stories, and the movement from one stratum to the next signifies a transformation in force, it is possible for us to take responsibility as the participant-writers of that story, and change the narrative. Collectively, humanity has transformed itself into a stratigraphic author. As it stands now, we will either write ourselves out of existence, or collectively struggle to change the contemporary stratigraphic story.

Notes

¹ Admittedly, “Anthropocene studies” is a large category, comprised of the “many Anthropocenes”: the stratigraphic Anthropocene; the natural and social-science Anthropocene; and the humanistic Anthropocene. This chapter tries to see Anthropocene studies as a whole, challenging strict boundaries between each discipline’s version of the Anthropocene.

² Regarding Marsh as an amateur geographer, as Lowenthal writes in his updated biography: “He considered himself a professional in no field, competent only in linguistics” (403).

³ Although some writers assert that the Anthropocene is a neologism introduced by Paul Crutzen, Crutzen is here referred to as having “reintroduced” the term because, as Will Steffen, Jacques Grinevald, Paul Crutzen, and John McNeill write in their multi-authored paper, “Biologist Eugene F. Stoermer wrote [...]: ‘I began using the term “anthropocene” in the 1980s, but never formalized it until Paul contacted me”’ (843).

⁴ For a recent scientific paper recommending formalization of the Anthropocene as a geological epoch, see Waters et al., “The Anthropocene is Functionally and Stratigraphically Distinct from the Holocene.”

⁵ Officially, the current geological epoch is still called the Holocene Epoch (Steffen et al. 843). In terms of the geological time scale, epochs and eras are different orders of time, with an epoch denoting a smaller unit of time than an era. It is not clear, though, if Stoppani is using “era” in its contemporary usage.

⁶ Some proposed start dates for the Anthropocene include: 13,800 BP; 11,700 BP; 8000-5000 BP; 2000 BP; the years 1750-1800; and also 1945-1950. For a brief description of these proposals, see Edgeworth et al., “Diachronous Beginnings of the Anthropocene: The Lower Bounding Surface of Anthropogenic Deposits” (34).

⁷ Steffen and his co-authors, it should be noted, indicate that the “anthropozoic era” was “proposed by a noted Italian geologist and Catholic priest” (844). Regardless of whether Stoppani came up with the term on his own, the “anthropozoic” was used by scholars before Stoppani’s proposal. He did not originate the term.

⁸ Certainly, some scholars cover both the concept and the phenomenon. Edgeworth et al., for example, recognize how language tends to simplistically divide the

“human” and the “non-human” (47). The reductive binaries of “artificial ground” and “man-made strata” lead them to propose the “archaeosphere.”

⁹ For more information about scriptural or mosaic geology, and a general history of geology in the nineteenth century, see Klaver’s *Geology and Religious Sentiment* and Rupke’s *The Great Chain of History*.

¹⁰ Unlike Stoppani, whose *concordismo* tendencies necessitated agreement between geological phenomena and religious beliefs, Marsh does not perceive a need to constantly correlate religion and geology. As Lowenthal writes in *George Perkins Marsh: Versatile Vermonter*, “To account for God through the evidence of the material world seemed to him both imprudent and impious, the one because such proof was questionable, the other because God should be felt, not understood, by man. Science and religion were neither antagonistic nor complementary” (271). Marsh, in other words, postulated a separation between science and religion, in which spiritually infused scientific assertions were looked at with suspicion. In writing *Man and Nature* and revising his text to create *The Earth as Modified by Human Action*, Marsh’s perspective on the division of science and religion finds expression in his consistent pattern of focusing on concrete observations by other scientists. Marsh “incessantly checked conjecture against facts,” as Lowenthal writes in his introduction to *Man and Nature*, and, “more than any of his erudite contemporaries, he was realistic, pragmatic, down-to-earth. Enforced intimacy with mundane enterprise patterned his tastes, tested his ideas against reality, and gave him a relish for hard facts, a zest for homely details” (xviii, xxx-xxx). Marsh, as a writer, focused on representing the physical world in the most forthright fashion, founded on a steadfast adherence to concrete observations. Thus Stoppani’s fundamental linkage between Christianity and the Anthropozoic is a source of tension within Marsh’s text because it is predicated upon an association between religion and science that Marsh consistently tries to dissociate. Marsh’s own relation to faith is complex, though he can be described as an evangelical Protestant (Lowenthal, *Versatile* 62). Marsh was raised a Calvinist, though as an adult living in Italy, he reluctantly went to church (Lowenthal, *Prophet* 7, 250). For more on Marsh and religion, see Lowenthal’s *George Perkins Marsh: Versatile Vermonter* 326-327. It should be noted that Marsh’s secularization of Stoppani is not a commentary on Marsh’s own religious beliefs, but rather stems from his views on science and the fact that he is not a mosaic geologist.

¹¹ For *Man and Nature*, Marsh had first proposed the title, “Man the Disturber of Nature’s Harmonies” (Lowenthal, *Prophet* 291).

¹² It is also important to not overemphasize Marsh's separation of Christianity and his scientific facts. As Lowenthal points out, "Marsh also aligned scientific with spiritual advance" (*Prophet* 402).

¹³ The idea that the footnotes within Marsh's text are used to legitimize Stoppani requires some clarification. Could not, for example, Marsh use the footnotes to legitimize himself by citing a scientist? In his day, Marsh was known primarily—as far as scholarly studies go—for being one of the foremost students in Scandinavian languages. And yet, as a member of Congress, as early as 1847, he gave addresses on environmental topics—addresses and reports that affected U.S. policies. Given the success of the 1864 publication of *Man and Nature* (which contains no mention of Stoppani and antedates his use of "Anthropozoic"), it is safe to say that Marsh was not trying to legitimize himself through the mere addition of Stoppani's name in the later edition. Marsh's main operative mode was as a thorough linguist and historian; by citing Stoppani, he is partly just operating in his normative mode, which is to be as detailed as possible. Of course there are in all likelihood several reasons why Marsh chose to cite Stoppani the way he does. For example, let us not forget that—as U.S. diplomat to Italy—one of Marsh's tasks was to keep the Italians "well disposed" toward the North during the Civil War (Orth 245). In Italy, Stoppani was famous for his pioneering work on Italian geology, and so it may be expected that Marsh would cite Stoppani—even after the Civil War ended—as a sign of diplomatic respect to Italy's geologist. Since this study focuses on the tension between Marsh and Stoppani's mosaic geology, following the footnotes as a narrative of secularization/legitimization is only one focus; other possible reasons for footnoting (including the flatfooted declaration that Marsh is merely substantiating his claim using the clearest source) are of course possible.

¹⁴ For a brief description of Marsh's impact on U.S. policies, see Cronon xi. Although many writers call Marsh an environmentalist, not everyone agrees; see Lowenthal, *Prophet* 392.

¹⁵ One could argue that Marsh's fiercely anti-Catholic perspective might also play into his relationship with the Catholic priest Antonio Stoppani, but I choose not to follow that narrative in this essay. To get an idea of Marsh's relationship with Catholicism, see Lowenthal's *George Perkins Marsh: Versatile Vermonter* 62-64 and 214-215; and *George Perkins Marsh: Prophet of Conservation* 58 and 225.

¹⁶ After reading *Man and Nature*, though, "Charles Lyell confessed that Marsh had disproved his own view that man's geological impact was no greater than that of animals" (Lowenthal, *Prophet* 302).

¹⁷ For more on the *concordismo* concept, see Vaccari 272.

¹⁸ There is a degree of slippage in delineating Marsh's relationship to the kind/degree concept. He sometimes, for example, modifies prior statements. The 1884 edition of Marsh's text reprints his bold proclamation from the Preface to the First Edition, stating that, in part, his objective is to "illustrate the doctrine that man is, in both kind and degree, a power of a higher order than any of the other forms of animated life" (vii). But this assertion that human power is different in both degree and kind from other creatures is modified as soon as Marsh directly engages with Stoppani's *Anthropozoic*, writing in the 1884 edition: "In a former chapter I spoke of the influence of human action on the surface of the globe as immensely superior in degree to that exerted by brute animals, if not essentially different from it in kind" (584). Even though Marsh does not directly refute the idea that humans are different in kind, he nevertheless distances himself from the idea, making it abundantly clear that Stoppani's idea that humans constitute "a new physical element altogether *sui generis*" exceeds his own view, even though he postulated that view earlier in the text. Directly confronted with the religious connotations of Stoppani's *Anthropozoic*, Marsh introduces an inconsistency in his text by qualifying the previously resolute declaration of humanity's uniqueness in both kind and degree from other animals. It should be noted that Marsh asserts several times—both explicitly and implicitly—that humans are different from animals in both kind and degree; see Lowenthal, *Prophet* 51 and 291.

Epilogue and Future Directions: Or, Stratigraphic Pasts and Futures

The earth is not a mere fragment of dead history, stratum upon stratum like the leaves of a book, to be studied by geologists and antiquaries chiefly, but living poetry [...].

—Henry David Thoreau, *Walden* [1854]

The earth has a rhetoric all its own. The verticality of stacked-up layers speaks of ceaseless change and human smallness. Humans learned to read the layered earth's rhetoric during the long nineteenth century, and what they read compelled them to find a new role within this transformed cosmos. Hawthorne sets up the human as rememberer in the face of aeolian erasure. In his story, the wind wipes away the human by triggering a landslide. But he reclaims the buried people by imagining their inner life. Maclure claims the human as world-maker. Humans, he shows, have constructed this world and they can topple it. Using the details of his stratigraphic pedagogy, he creates a new theology. This new theology is founded upon the intimate intersection of the human and the earth—a stratigraphic sacrament, if you will, that is meant to fundamentally change the human and challenge the theology that makes humans central. Dickinson finds a place for both Women and Poetry within this new cosmos. She turns stratigraphic forces into poetry, in the process asserting that Women's voice *is* poetry. Deep time becomes deep soul, as she claims poetry as a power to fight human erasure. Marsh asserts that humans have *become* stratigraphic forces. In conversation with Stoppani, he finds a new place for the human within the proto-Anthropocene. As self-aware forces, humans therefore have a responsibility to the planet.

What this dissertation is really about, then, is the human imagination. For both the artists and scientists, it is a large story about human achievement and possibility—consciousness and belief. Beyond saying that the scientists use imagination for reform and the artists use imagination for meaningful human survival, they are, in the end, part of the same project. Creating history so human achievements have meaning requires the ability to think anew, as does reform. Indeed, the human force of imagination leads, in the end, to the recognition of human force on the planet.

Just as strata compelled humans to reconsider the present and a hoped-for future, the strata of this dissertation—chapter piled upon chapter—lead me to wonder about the hoped-for future of these ideas. The story I have been telling opens up many possibilities. How, for example, does the abolition movement and Civil War intersect with the concept of strata? Considering the underground-ness of the Underground Railroad leads us to ask: how does aligning with strata—literally and metaphorically—create a new place in this cosmos for the escaped slave? How does the new layer of dead soldiers, strewn across a battlefield, allow thinkers to envision America's future, geologically interpolated?

These questions open up still more possibilities. The concept of strata circulated within abolition newspapers and slave narratives, rising up precisely as America was most stratified, during the Civil War. Why would strata—as metaphor—increase in use during this period? What about the layered earth allowed abolitionists to envision a

future? Strata was also an important term in antebellum politics for envisioning social structures. Some politicians, for example, referred to enslaved peoples as the “mud-sill” on which other social classes were built (Sundquist 252). Is it simply that a dynamic view of the earth—or even, an earthquake—would unsettle these social strata, or is this mud-sill metaphor part of a deeper story? How exactly did strata become a concept of resistance, providing intellectual leverage for conceiving the destabilization and reordering of antebellum social structures? And how does this narrative of stratigraphic emancipation reconfigure the story of human smallness flowing through Hawthorne, Maclure, Dickinson, and Marsh?

This project also opens up a space to think about the relation between material and spiritual verticality. Witnessing the decentering of the human within earth’s narrative compels any reflective individual to ask: what does my life mean? Geology was creating a language and concept for people to imagine deep time at the moment when traditional forms of religion were challenged. Earth science captured a sense of the sacred that did not necessarily represent itself as religion, but nevertheless adhered to deep time. Strata was both the concept challenging one’s place on earth and the means of discovering a new space. The layered earth provided a deep sense of humanity’s history on this planet at the same time it contributed this rhetoric of change. Specifically, humans saw themselves as agents of change at the same time they discovered a profoundly sacred sense of life connected to earthly depths. With the loss

of humanity's central place within earth's history, something had to give the notion of the sacred. The stratified earth and deep time itself gave life a sacred quality. Searching for meaning, humans claimed verticality.

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Biography

As a PhD Candidate in the Duke English department, Patrick Morgan has earned the graduate certificates in Feminist Studies, College Teaching, and Teaching Writing in the Disciplines. His peer-reviewed articles include “Biological Aesthetics: Thoreau, Gender, and Botany” (*Nineteenth-Century Prose*, 2018) and “Aesthetic Inflections: Thoreau, Gender, and Geology” (*The Concord Saunterer: A Journal of Thoreau Studies*, 2010). His dissertation project inspired a classroom lesson that involves pairing poems with sedimentary rocks, and is forthcoming in *The Pocket Instructor: Writing* (Princeton University Press). Additional book chapters have appeared in *The Pocket Instructor: Literature* (Princeton University Press, 2015) and *We Are Already One: Thomas Merton’s Message of Hope: Reflections to Honor his Centenary (1915-2015)* (Fons Vitae, 2015). As the editorial assistant for *American Literature*, he has written over two hundred book reviews for the Brief Mentions section. In addition, with a background in science writing, he has written hundreds of articles for *Discover* magazine, *Earth* magazine, *The American Gardener*, and the National Park Service. In 2018, Duke University awarded him the Dean’s Award for Excellence in Teaching. He completed his PhD in 2019. Prior to his doctoral work, he earned an MA from Duke University in 2015. He earned a BA in 2010 after completing a double major in English and Geological Sciences at SUNY Geneseo.