Ruskin’s Dust

ELLA MERSHON

A person turning to stone is usually bad, while a stone coming to life is desirable. But perhaps it is the confusion of the two realms that is really, and unavowedly, attractive.

—Barbara Johnson, Persons and Things (20)

Dust was on the Victorian mind in 1865. This year saw the publication of two notable texts centered on the intimacies of dust and human life: John Ruskin’s The Ethics of the Dust and Charles Dickens’s Our Mutual Friend. Exploring the circulation of dust according to principles of chemical and social economy, Ruskin and Dickens insert their human characters into complex systems of inorganic exchange. Presented as mineralogical lectures on “The Elements of Crystallization,” delivered in the form of a Socratic dialogue between an Old Lecturer and a group of schoolgirls, The Ethics of the Dust constructs an ethical system modeled upon the ceaseless movement of elements in a chemical economy. Meanwhile, Our Mutual Friend plots the relations that emerge through the perpetual

Abstract: This essay traces the connection between the aesthetics and ethics of self-formation in John Ruskin’s The Ethics of the Dust (1865) and mid-century debates about inorganic matter’s “vital” forms. Offering a reappraisal of dust’s role in Ruskin’s oeuvre and Victorian culture more broadly, this essay argues that “dust” signifies decay’s release of chemical potentiality, which thus encodes inorganic matter’s formative power as it ceaselessly morphs and moves through myriad forms. Introduced through Ruskin’s conversion of girls into particles of dust, the essay ends with a meditation on the gender of changefulness by turning to another great Victorian text on dust, Our Mutual Friend (1864-65), and to Lizzie Hexam’s unique relationship with that precious chemical agent: coal.

Ella Mershon (ellamershon@berkeley.edu) completed a PhD in English at the University of California, Berkeley in 2016. She is currently revising her dissertation, “Passing Forms: Decay and the Making of Victorian Culture,” into a monograph on decay’s temporality and its role in the period’s conception of development. This fall she begins an appointment as an A. W. Mellon Postdoctoral Fellow in the Humanities and Humanistic Sciences at the University of Wisconsin-Madison.
exchange of dead matter in a social economy, as epitomized by the protagonist's inheritance of giant mounds of dust. This essay brings these two texts together through a sustained study of the chemistry of decomposition that informs Ruskin's ethical system and, as we shall see, Dickens's social economy.

In his conception of dust as elemental particles, Ruskin asks us to imagine crystals not only as unyielding stones, but also as dynamic systems that move through states of dissolution and decay, solution and confluence. In “Form Things: Looking at Genre Through Victorian Diamonds,” Stefanie Markovits finds in the crystalline diamond a unique test case for an analysis of “form” and “thing,” as the diamond’s material structure encompasses both lyrical compression and narrative duration. Following the elements of crystallization through periods of disintegration and recombination, this essay explores the crystal's long geo-narrative in order to develop a conception of form that can account for the shaping power of subtraction, dissolution, and latent repose. Namely, this essay envisions diamonds as dust—as amorphous slurries of carbon molecules—so as to consider specific shapes and forms, patterns and structures, as the products of an environmental dynamism that draws the not-yet-formed and the recently un-formed into new combinations and arrangements.

Tracing the connection between dust and form in the Victorian era, I place Ruskin's scientific writings on decomposition's chemistry in dialogue with contemporary debates about inorganic matter's self-formation. In the 1860s, contentious debates erupted over the status of the Foraminifera, an animal confused with a mineral, and the Eozoon Canadense, a mineral mistaken for an animal. These two cases reveal that Ruskin was not alone in locating formative power in rocks; such scientific disputes were part of a larger cultural debate about the persistence of form in a world of molecular flux. I therefore turn to the mid-century revival of Lucretian atomism as an index to Victorian attitudes toward molecular science's ascent and, thus, toward the problem of form as it became increasingly pixelated, fluid, and unstable.

Ultimately, the turn to contemporary science reveals that, while surprisingly conversant with the science of his day, Ruskin outstrips his contemporaries in revealing the aesthetic and ethical implications of decay—a topos which many Victorians and Victorianists take to be the terrain of moral corruption or immoral fascination. Nevertheless, I argue that an examination of the scientific study of
decay produces a new framework for understanding the ethical value of dissolution—a reappraisal of forms of unwilled undoing that challenge the idea that ethics must be understood in terms of will or moral energy. Attending to decay’s ceaseless agitations, The Ethics of the Dust chronicles the “earth-agonies” of geomorphic decay (331), claiming that it is only through the earth’s “torture and grieving” (329) that the dust “finds in its weakness the first rudiments of a perfect strength” (358). In lieu of moral action, dust awaits the recombinant affinities that will transform grief into resplendent form.

In this way, dust not only serves a moral purpose but also takes on a socio-political dimension: the promise of mineralogical renewal assuages fears about resource depletion. Decay's recycling of elemental matter provides Ruskin with proof of nature's provision against exhaustion. Matter is not destroyed. It is recombined. Dust holds out the slim hope that the earth's scant supply of resources can be renewed. I say slim because Ruskin's belief in the regenerative power of dust was short-lived—a brief burst of enthusiasm in the 1860s, bracketed on either side by skepticism and despair. Nevertheless, Ruskin's dust flickers into form at a key moment in the history of science and literature, revealing the Victorians' desire to reassess their relationship to what is least—but, hopefully, not lost.

At the nexus of these debates about form and futurity is the figure of the young girl. Through its constant personification of crystals and petrification of girls, The Ethics of the Dust genders dust’s endless rearrangement of matter. Signifying inorganic matter's feminized capacity for “infinitude of change” (311), the young girl becomes the vehicle for Ruskin’s vision of geochemical renewal and sociopolitical regeneration. Taking carbon's ability to manifest as diamonds, graphite, and coal as a prime instance of dust’s “infinitude of change,” this essay moves from Ruskin to Dickens as it tracks the affinities between the figure of the young girl and Britain's “black diamonds” (“Black” 246). The essay closes with a meditation on the gender of changefulness as it examines mid-century debates about resource depletion by looking at Dickens's Our Mutual Friend and Lizzie Hexam's unique relationship to that precious chemical agent: coal.

I. Girl-Dust

At the beginning of the second lecture, the Old Lecturer establishes the central conceit of The Ethics of the Dust: girls are “dust,” and
dust represents inorganic matter's formative power. The lecture opens with a lesson drawn from life. The girls have just run in from the garden, jostling each other in the hallway, jockeying for position, and eventually settling into their proper places. According to the mineralogist, when they sat in their “orderly rows,” they became “crystalline” (221). Each schoolgirl, however, is an atom: the girls’ movement from “a state of solution” to “gradual confluence” is explained by molecular attraction. The girls are “arranged by atomic forces” (221). Musing on the atom’s power for self-organization, the Old Lecturer reconsiders his choice of diction: “I will not call you atoms any more. May I call you—let me see—‘primary molecules’? (General dissent indicated in subdued but decisive murmurs.) No! not even, in familiar Saxon, ‘dust’?” (222).

Dust was a freighted word for Ruskin and his Victorian audience. Kate Flint has shown that dust occupied an ambivalent place in Victorian culture, suggesting ideas about disease, hygiene, class, waste reclamation, and atmospheric effects (47). Intensifying its negative cultural associations, Ruskin’s Evangelical faith endowed dust with a gloomy significance: dust is proof of humanity’s corruption and God’s punishment as pronounced in Genesis 3:19. Even after his 1858 “unconversion,” the Biblical formulation of “dust to dust” continued to give Ruskin his essential coordinates: dust describes the fate of material existence (decay) and the form that fate takes (the molecular). Although the Old Lecturer calls the girls “dust” as a “familiar” substitute for “primary molecules,” dust is more than a mere synonym for other, equally serviceable terms. Dust taps into a wellspring of unstable cultural, social, and religious significations that complicates the text’s apparent investment in purity as an ethical objective. It is, after all, The Ethics of the Dust, not The Ethics of Crystalline Purity. Indeed, the text weds its “ethics” to the dust when the Old Lecturer commands the girls to “always behave at least as well as dust” (222).

Despite critical attempts to read the girls as occupying a state of absolute purity, the text makes a vivid and voyeuristic exhibition of the girls’ decay when the Old Lecturer asks the girls to imagine what it would be like to have transparent skin:

1. It would not at all be good for you, for instance, whenever you were washing your faces, and braiding your hair, to be thinking of the shapes of the jawbones, and of the cartilage of the nose, and of the jagged sutures of the scalp?

(Resolutely whispered “No’s.”)
L. Still less, to see through a clear glass the daily processes of nourishment and decay?

(No.)

L. Still less, if instead of merely inferior and preparatory conditions of structure, as in the skeleton,—or inferior offices of structure, as in operations of life and death,—there were actual disease in the body; ghastly and dreadful. (271-72)

Stripping the flesh from the girls’ pretty faces, the passage exposes “the shapes of the jawbones,” “the cartilage of the nose,” and “the jagged sutures of the scalp.” In exposing their skulls—the archetypal symbol of death and the consummate *memento mori*—the passage, at first, makes the usual connection between death and decay. But the passage also exhibits the girls’ internal organs—those “offices” of digestion, respiration, and circulation that aid in “the daily processes of nourishment and decay.” In other words, the passage disrupts the notion that decay is something that happens to the body only after it dies. Decay is with us every step of the way. It is a “daily” process, as much an “operation” of life as of death. In this way, the girls’ status as “dust” signifies the fact that molecular organization cannot be separated from processes that are simultaneously vital and moribund.

Because the girls embody the text’s project of self-formation, the biochemical flux of their bodies has immediate implications for the ethical assumption that triangulates the good, the beautiful, and the formed. Ostensibly, the text is committed to precisely this triangulation, in which crystallization exemplifies the beauty and virtue of formation. Here, this constellation breaks down. Beautiful form does not just hide ugly instabilities. Beautiful form derives its structure from processes that are subtractive and negative. As seen in the concurrent processes of absorption and excretion, formation entails contemporaneous making and unmaking. Hence, the command to “behave at least as well as dust” implies more than to “get into order.” It intimates the ethical value of the erosive unmaking that precedes and accompanies the act of making.

II. Elementary Ethics

While the principle of molecular attraction endows dust with a virtuous capacity for attachment and orderliness, the ethical import of dust’s “bonds of affection” actually lies in the dissevering of those bonds. Such dissevering not only generates the raw stuff from which
crystalline form emerges but also evinces the fortitude of that formation (222). By tracing the influence of Justus von Liebig's organic chemistry on Ruskin's conception of dust, I show that Ruskin's knowledge of decomposition's chemistry elucidates his attribution of ethical value to the process of dissolution. Several letters, along with an accompanying “Essay on the Fall,” written in 1843 and addressed to Reverend Edward Clayton, display Ruskin's early knowledge of decay's chemistry. As Mark Frost demonstrates, these little-known letters establish Ruskin's embrace of dynamic processes, challenging the critical history that views Ruskin's science as a descriptive taxonomy derived from a typological view of nature.8 While Frost reveals the influence of Charles Lyell's geology and Georges Cuvier's comparative anatomy on Ruskin's “dynamic materiality,” he virtually passes over Ruskin's use of Liebig's chemistry.9

Drawing upon Liebig's research on decay and agricultural productivity, Ruskin's “Essay on the Fall” argues for death's prelapsarian existence, claiming that decay releases dead matter's chemical potential into a system of complex exchanges that replenish food supplies. Figured as an economy, inorganic chemicals circulate and trade with other chemicals. Take, for example, the case of ammonia. When animal bodies decompose, ammonia is released into the atmosphere, where it combines with “carbonic acid,” which is then “dissolved into rain water and presented in this form to the root of the plant” (482). But the release of carbonic acid requires a previous chemical interaction: “we are machines for turning carbon and oxygen into carbonic acid; the plant is a machine for turning carbonic acid into carbon and oxygen.” In the economy of decomposition in which “the inorganic constituents of the earth are left in a state of perpetual circulation from death to life, and vice versa,” plant and animal life are held in balance by the ceaseless rearrangement of inorganic matter (483). Crucially for The Ethics of the Dust, in Ruskin's treatise on mountain geology in Modern Painters (1856) he locates the same chemical potential in rocks as he does in plants and animals. Crystalline rocks are “a kind of storehouse” (136). When these stones are “ground down into impalpable dust” (157), their cache of “sandstone and clay, together with potash, magnesia, and the metals of iron and manganese” is released and “the plants and animals which require them [are] sustained in health” (136). Like the “perpetual circulation” of inorganic matter in “Essay on the Fall,” the friable mountain enters into a system
of “perpetual renovation.” “Cast down in sheets of massy rock,” mountains undergo violent spasms of mass wasting. Aqueous erosion then pulverizes and distributes the crushed rocks: “each filtering thread of summer rain” carries with it an allotted portion of the substances “necessary for the nourishment of plants” (125). Modern Painters thus brings the geomorphic agencies of slope movement and erosion to bear on Ruskin’s earlier articulation of “perpetual circulation.”

The Ethics of the Dust brings decay’s agencies to fruition. When Mary asks, “what is [Tourmaline] made of” (325), the Old Lecturer responds: “there’s always flint, and clay, and magnesia in it; and the black is iron . . . and there’s boracic acid . . . potash, and soda” (325-26). Crystals are made of dust: crystallization begins when the rock’s raw materials are “slowly wrung, or ground to pieces,” releasing the chemical potential of decomposed matter (328). From the fragments of pulverized dust, crystals slowly emerge:

The soft white sediments of the sea draw themselves, in process of time, into smooth knots of sphered symmetry. . . . The dark drift of the inland river, or stagnant slime of inland pool and lake, divides, or resolves itself as it dries, into layers of its several elements; slowly purifying each by the patient withdrawal of it from the anarchy of the mass in which it was mingled. Contracted by increasing drought, till it must shatter into fragments, it infuses continually a finer ichor into the opening veins, and finds in its weakness the first rudiments of a perfect strength. Rent at last, rock from rock, nay, atom from atom, and tormented in lambent fire, it knits, through the fusion, the fibres of a perennial endurance. (358)

At first, the passage plots an uncomplicated movement from decay to formation. Pulverized oceanic remains coalesce into “knots of sphered symmetry.” “Stagnant slime” resolves into elemental purity. But this movement from decay to formation is overturned in the next sentence when these forms suddenly “shatter into fragments” and are “rent at last, rock from rock, nay, atom from atom.” In the perpetual circulation of matter, the broken dust “infuses continually” (my emphasis). As Anne-Julia Zwierlein argues, Ruskin presents crystalline formation as “alternately assimilating and repelling materials” (321). Like the girls’ decaying-growing bodies, crystals are simultaneously undergoing processes that are expulsive and incorporative. Indeed, the “ichor” which pours into the “opening veins” can either signify a “bloodlike fluid that flows through the veins of the gods” or a “watery, fetid discharge from a wound” (“Ichor”). Both meanings are operative. The Old Lecturer insists that the “crystalline power
principally exerts itself" in the earth's wounds: "wherever the earth is torn, it heals and binds; nay, the torture and grieving of the earth seem necessary to bring out its full energy" (329). While *The Ethics of the Dust* proffers crystallization as a model of virtuous self-formation, it exposes the "pure" self's enmeshment in processes that are fetid and suppurative and, therefore, curative and shaping.

Viewed through the lens of decay's chemistry, dust's ethics comes into focus. Ceaselessly undergoing geomorphic decay, dust withstands the "torture and grieving" of dissolution, and thereby models the patient endurance of rocks. But geological torture is only one half of the equation. Although decay shreds and grinds the earth, its dismembered atoms recombine to produce exquisite crystalline formations, and, thus, through chemical recombination, dust "finds in its weakness the first rudiments of a perfect strength." Ultimately, dust's ethical value inheres in matter's susceptibility—its vulnerability to the erosive effects of wind and water; to the sudden and unexpected violence of landslides; and to the subtle, insidious effects of contamination—since this "weakness" becomes the "rudiment," literally the unwrought element, that defines its strength. To behave as well as the dust is, thus, to emulate the patient suffering of the elements of the earth, which "must passively wait the appointed time of their repose, or their restoration" (360).

Although Ruskin tries to counterbalance dust's passivity with the vigor of human action, his call for human vitality is subverted by his blurred intermingling of personified stones and petrified girls. Besides the archetypal "wicked" and "good" crystals, the text moralizes on "indulged crystals" (334), "fat crystals" (335), "converted crystals" (334), "foolish crystals," "impatient crystals" (335), and, significantly, "little child crystals put to school like school-girls" (334). As Barbara Johnson suggests, it is a text that finds "the confusion" of girls turning to stones and stones coming to life "attractive" (20). Analyzing this attraction, Catherine Robson argues that the crystalline girl is not only "an object of desire" but also the figure for Ruskin's "lost self of childhood" (14). Indisputably, erotic desire inflects the depiction of the schoolgirls, who give the Old Lecturer kisses, crawl into his lap, and engage in coy coquetry. But Ruskin's identification with the crystalline girl shades into another erotic impulse: a desire to become stone, to experience the petrification that redeems dissolution. It is this desire for passive restoration that undermines the Old Lecturer's
attempt to define crystalline virtue through its vitality, and leads him
to the conclusion that ethical value inheres in the dust's "weakness."
Hence, when it comes to the gender politics of vulnerability, Ruskin's
sympathy for the rocks challenges our critical reception of his notori­
ous chivalry. I think we can approach Ruskin's idealization of female
self-sacrifice in "Of Queens' Gardens" (1865)—or, closer to our sed­
imentary terrain, his idolization of the dust of female perseverance
in *The Cestus of Aglaia* (1865-66) as "Patience . . . the submission to the
eternal laws of Pain and Time, and acceptance of them as inevitable,
smiling at the grief" (86)—as deflection or misdirection from his mas­
culine identification with passivity.12 Ruskin's respect for the grieving
earth intimates a desire to validate forms of passive expectancy and
silent suffering that did not easily square with Victorian notions of
manly vigor.13

So, while Ruskin tries to preserve humanity's "nobler," more
vigorous life, his identification with stoniness leaves us with a frail
sphere of action: Ruskin calls for "the activity of our hope [and] our
labour, for the time when the Dust of the generations of men shall be
confirmed for the foundations of the gates of the city of God" (360).
Modeled upon the ethics of dust's "repose," the text transfers ethical
action to the realm of affect, while it figures seemingly active labor
as a species of apocalyptic waiting. In the erotic confusion of animate
stones and inanimate girls, dust's passive suffering joins together the
"restoration" of geochemical recombination with that of divine res­
urrection. In this way, girl-dust merges the erotics of objectification
with the ethics of passive suffering through dust's unwrought ele­
mental potential.

**III. Animal or Mineral?**

The possibility that dead matter possesses life comes to a head
when Dora declares that the Old Lecturer "talks as if the crystals were
alive" (340). He responds that "things are not either wholly alive, or
wholly dead. They are more or less alive" (346). The Old Lecturer's
belief in a spectrum of liveliness echoes the tenets of vitalism, the idea
that "life" inheres in a superadded principle that cannot be reduced
to physical and chemical forces.14 While the object of vitalistic study
is, by definition, organic, Ruskin's extension of vitality to crystals
reflects the "flexible" location of life in the Victorian period, in which
life could be “latent in the whole of inorganic, or inanimate, matter” (Gallagher and Greenblatt 189). Although Denise Gigante argues that the rise of cell theory in the 1830s “killed off” living form, organicism survived cell theory’s compartmentalization of life into semi-autonomous citadels (35). Similarly, vitalism survived Friedrich Wöhler’s artificial synthesis of urea in 1828. Both notions persisted well into the latter half of the nineteenth century. This is especially true in Britain, where T. H. Huxley, the Victorian scientist most associated with scientific materialism, criticized German cell theory and promoted an epigenetic view of the organism derived from Caspar Friedrich Wolff’s vitalistic Theory of Generation (1759).

But, along vitalism’s newly broadened frontier, it became increasingly difficult to distinguish between organic and inorganic forms. While the watchword for organic life was “self-formation,” the presence or absence of form, as perceived under the microscope, could not always adjudicate between animate life and inanimate matter. While expanding the domain of the visible, microscopic science blurred the boundary between organic and inorganic since, as John Tyndall notes, it brought “into view a world of life formed of individuals so minute—so close as it seemed to the ultimate particles of matter—as to suggest an easy passage from atoms to organisms” (“Spontaneous” 23). Foraminifera are single-celled animals with jellylike bodies that “suggested an easy passage” to mud. Eozoön Canadense is a rock with reticulated tubular formations that was mistaken for an organism. If the “vital” power of self-formation is at stake in The Ethics of the Dust, these two cases reveal that self-formation was no longer the exclusive domain of the living. Dust and its inorganic fellows also possessed the power of form.

In 1863, a review of William Carpenter’s Introduction to the Study of the Foraminifera (1862) sparked a rapid-fire exchange of articles in the Athenæum between two prestigious Victorian scientists: Richard Owen and Charles Darwin. Carpenter, an expert in invertebrate zoology and physiology, describes the Foraminifera as “a little particle of apparently homogeneous jelly” capable of “laying hold of its food without members, swallowing it without a mouth, digesting it without a stomach, [and] moving from place to place without muscles” (vii–viii). In his review of 28 March 1863, Owen seizes upon these blobs of jelly to put forth his own belief that “the exuviations, ejections, and decay of organisms” provide the “raw materials” for “the ooze or mud” which manifests “the vital form of force” (417). In an angry
Ellermersh retort published on 25 April 1863, Darwin censures Owen for conflating living jelly with dead slime: “a mass of mud with matter decaying and undergoing complex chemical changes is a fine hiding place for obscurity of ideas” (“Doctrine” 554). But Owen was not the only Victorian scientist who speculated upon slime’s formative potential. In 1868, T. H. Huxley championed *Bathybius haeckelii* as providing the link between inorganic and organic matter. In samples of what proved to be nothing more than deep-sea mud, Huxley observed “granule-heaps” embedded in a “transparent gelatinous matter” (“On Some” 210). He proposed that this “colourless and structureless matrix” (205) represented “masses of protoplasm” which “very nearly” resembled the Urschleim proposed by Ernst Haeckel (210).

Both Owen and Huxley identified a formal potential in formless goo. For Owen, rotting slime provides the raw materials for the “manifestation” and “modification” of atomic form (417). Similarly, Huxley’s “matrix,” derived etymologically from “womb,” conveys the latency of formlessness to give birth to form. Even Darwin speculated upon the generative potential of inorganic matter. While in the article Darwin ridicules the idea that inorganic matter could produce a living creature, several years later in his private correspondence he imagines a “warm little pond” where “all sorts of ammonia and phosphoric salts, light, heat, electricity etc.” interact such that “a protein compound [is] chemically formed, ready to undergo still more complex changes” (“Letter” 202). In the 1860s, the study of microorganisms decoupled life from form and located a powerful formative drive in living jelly and dead ooze. In this light, the suppurative “ichor” of Ruskin’s crystals was yet another strangely vital substance that revealed the organic-inorganic borderland to be a murky shadowland populated by amorphous jelly, vital slime, womblike ooze, and incubating ponds.

While *Foraminifera* exposes the problematic formlessness of organic structure, the *Eozoon Canadense*’s intricate inorganic formation offers a convenient counterpoint. In 1864, John William Dawson and William Logan announced to the Bath meeting of the British Association for the Advancement of Science that they had discovered, in fossil beds of Laurentian limestone, the first signs of life on earth with the *Eozoon Canadense*, or the “dawn animal of Canada.” The London-based scientific establishment quickly embraced their discovery. Charles Lyell concluded his Presidential Address at Bath with glowing remarks about this discovery and confirmed Dawson’s view that the Laurentian limestone contained “organic remains” (lxxv).
the 1866 edition of the *Origin of Species*, Darwin describes the discovery of the *Eozoon* and concludes that “it is impossible to feel any doubt regarding its organic nature” (371). Called upon to verify Dawson and Logan's findings, Carpenter confirmed their assessment that the *Eozoon Canadense* was a “gigantic Foraminifera” (“Additional” 66). Meanwhile, William King and Thomas Rowney, professors of geology and chemistry at Queen's College, Galway, who attended the Bath meeting, disputed Dawson’s claim that the *Eozoon* was fossilized organic remains. They insisted that the specimens in question were “solely and purely of crystalline origin” (“On the So-Called” 215).

The debate over the status of the *Eozoon* hinged on the interpretation of microscopic tubules found in several limestone specimens. Describing the tubes, Dawson seized on organicism’s tropes of elegance and complexity: his prose highlights the branching intricacies of “numerous minute tubuli,” arranged “in bundles of great beauty and complexity, diverging in sheaf-like forms, and in their finer extension anastomosing so as to form a network” (“On the Structure” 51). Meanwhile, veins of carbonate of lime, “in their entire absence of structures other than crystalline, present a striking contrast to the fossil” (52). King and Rowney, however, claimed that, “every one of the structures diagnosed for *Eozoon Canadense* by Dawson and Carpenter is purely of inorganic origin” (“On Eozoon” 508). They argued that the “chamber casts” are “simply granules of serpentine”; that the “intermediate skeleton” is a “calcareous matrix”; that the canal system is “nothing more than forms of metaxite”; and that the “nummuline layer” is “a film of chrysotile” (508). Serpentine, metaxite, and chrysotile are minerals. According to King and Rowney, the *Eozoon* was a rock.

How could minerals create such complex organic structures? King and Rowney theorized that the *Eozoon*’s structure could be explained by two mineralogical phenomena: allomorphism and pseudomorphism. Allomorphism (*allo*- “other” + *morphe*- “form”) describes how the same chemical composition can manifest in different crystalline forms. Serpentine’s ability to morph into metaxite and chrysotile explained the *Eozoon*’s “organic” tubular formations. But allomorphism could not account for the presence of the “calcareous matrix.” King and Rowney proposed that “the replacing carbonate... is likewise nothing more than a pseudomorph after serpentine” (530-31). A pseudomorph is a mineral with a “false” form resulting from a substitution process in which one mineral replaces another. In this
case, calcium carbonate replaced the serpentine, producing a form that was doubly "false": the calcite mimics the form of the serpentine, and it also mimics the "organic" skeletal form of *Foraminifera*.

The *Eozoön* debate was not settled swiftly or politely. "The controversy outlived all of the original participants," writes Charles O'Brien, "and the decorum lasted only a few months" (209). Attacks from both sides became increasingly personal and nasty. Dawson accused King and Rowney of "defective observation—in failing to distinguish in the Canadian limestones themselves, between organic and crystalline forms" ("On New" 252). But if the protracted debate over the *Eozoön* proves anything, it is the difficulty of distinguishing "between organic and crystalline form." Scientists from Britain, Europe, and the United States bickered for over fifty years about the structure of branching tubes and canals that were deemed organic by some and crystalline by others. In the end, King and Rowney were right. The *Eozoön Canadense* was not "the dawn animal." It was a rock—a gorgeous, lifelike crystal-line formation.

As the cases of *Foraminifera* and *Eozoön* illustrate, the Old Lecturer has good reason for giving Dora an ambiguous answer to her query about crystals' vitality. In the 1860s, it was not always clear whether something was dead or alive. While living jelly was virtually bereft of the differentiation necessary to lay claim to the title of organ-ism, crystalline rocks branched into beautiful reticulations that vibrantly suggested the living powers of self-formation. With its mineralogical ability to mimic organic structures, the *Eozoön* provides a striking scientific precedent for Ruskin's girl-dust analogy, especially since dust makes this mimicry possible. Allomorphism and pseudomorphism owe their formal transformations to decay: continuous dissolution affords continuous recombination and, thus, constitutes the capacity for endless reformation. As I will discuss below, the Victorian public followed the developments of microscopic science with mingled awe and trepidation as form became increasingly mutable and unstable.

**IV. Lucretius's Falling Forms**

While advances in molecular science worked to establish the formative power of inorganic matter, this power increasingly appeared a little promiscuous. Inorganic matter could enter into endless
rearrangements—shifting, kaleidoscopically, into many forms. The title of Lindley Kemp’s 1855 treatise on modern chemistry, *The Phasis of Matter*, summarizes this idea. While crediting Liebig for the idea’s inception, Kemp declares that “what is now understood by chemistry” depends upon “the ascertained fact” that all bodies “consist of a variety of elements which, by continually changing their combination, constitute all the substances cognisable to our senses, living or dead” (10). Thus far, I have considered individual cases of inorganic self-formation. Ruskin’s dust, Owen’s slime, King and Rowney’s minerals: these substances reveal inorganic matter’s ability to move and morph into seemingly vital forms. But these individual cases were part of a larger cultural debate about the persistence of form in a world of molecular flux, and this debate came to a head with the mid-century revival of Lucretian atomism.22

Lucretius’s epic poem, *De Rerum Natura* (c. 55 BCE), describes Epicurus’s atomic theory, which posits that the world is composed of atoms that fall through a void; their falling occasions chance collisions that bring atoms together; and these atomic combinations explain the forms of the world. The world of *De Rerum Natura* is one of constant mutability. Atoms are continually coming together and drifting apart. Everything is perishable except the atoms, which are indestructible and eternal. This, I think, should sound familiar. With the advances of molecular science in the nineteenth century, *De Rerum Natura* gained credence as more than a poetic description of an ancient philosophy; it was also seen as an accurate description of scientific principles.23 One Victorian reviewer enthusiastically remarked that, “the first two books of the *De Rerum Natura* read almost like a modern treatise on the atomic and kinetic theories of matter!” (Adams 190). The poet and literary critic J. A. Symonds claimed that “modern theories of evolution and of molecular structure may be stated in language which . . . is singularly like that of Lucretius” (58).

More specifically, the Lucretian principle that “nothing is ever annihilated, but simply dissolved into its first bodies” speaks directly to the “perpetual circulation” of inorganic matter that this essay has been tracing (Jenkin 213). In his article for the *Gentleman’s Magazine* (1894), E. W. Adams refers to this principle as “a statement which modern chemistry has done so much to illustrate” (191), since it confirms Lucretius’s view “that the atoms can accomplish a vast deal by a mere change of arrangement” (192). Anticipating Liebig’s findings, Lucretian atomism
maintained that a body resolved “into its constituent elements” is reformed “into fresh compounds” such that “the death of the one combination is the birth of a new order of things, the case being one, not of annihilation, but of transformation” (191). While Adams takes a sanguine view of this incessant change, other Victorians were ruffled by this world of ceaseless turmoil. One Victorian reviewer summarizes Lucretian atomic theory as “one vast simultaneous shuffle” (Benn 321). Another reviewer emphasizes the “fearful shocks” and “the strain of eternal combinations from atoms to things, and dissolution from things back to atoms” (Masson, “The Atomic” 344). More prosaically, Fleeming Jenkin describes “the great wear and tear” of material existence (215). In Tyndall’s lyrical description, the Lucretian atom stands “amid the wreck of composite matter” (“Atoms” 30).

While Tyndall takes solace in the indestructability of the atom, other Victorians experienced the ascent of molecular science as a tumultuous upheaval. Writing about Lucretius in 1882, John Masson reflects upon the recent past as a time when people “felt old truths almost slipping from beneath their feet and, along with this, a unique sensation of universal unsteadiness and falling like that of men in an earthquake, when the solid earth which they have known all their lives, and which has ever been firm under their step, even the earth begins to be unsteady and shake under them” (“Lucretius” 333). While Masson’s “earthquake” symbolizes the psychological disturbance inflicted by scientific materialism, his depiction of the earth as a slippery, shifting substratum literalizes the atomism he critiques. Masson’s prose manifests the “falling” flux of Lucretian atomism. This contentious revival of Lucretian monism provides us with an index to Victorian attitudes toward the advancement of molecular science. While Tyndall and his scientific brethren marveled at the indefatigable might of the tiny atom, the Victorian public reeled as they tried to get their bearings amid the “shuffle,” “shock,” and “strain” of molecular instability. This, then, is the world of Victorian dust. Form atomized into quaking drifts. Humans scrambling without traction. Girls and dust, alike, falling in a void.
V. A Fragile Hope

While the ascent of molecular science revealed form's troubling instability, this same molecular flux held out the promise of regeneration. Before turning to the gendering of dust's formal mutability, I want to stress that the stakes for Ruskin's aesthetic and ethical reclamation of decay are nothing less than the expenditure of planetary resources and the annihilation of the human species—stakes that shape Dickens's representation of Lizzie Hexham and her coal-inspired narratives in *Our Mutual Friend*. In *Modern Painters*, Ruskin was convinced that the constant process of decomposition would lead to planetary ruin:

> For us the intelligible and substantial fact is that the earth has been brought, by forces we know not of, into a form fitted for our habitation: on that form a gradual, but destructive, change is continually taking place, and the course of that change points clearly to a period when it will no more be fitted for the dwelling-place of men. (179)

While Ruskin acknowledges that other geologists have attempted “to prove that destruction and renovation are continually proceeding simultaneously in mountains as well as in organic creatures” (177), he “cannot assent to such a conclusion” (178). Despite his belief in mountain erosion's “perpetual renovation” of the soil, Ruskin could not imagine the renovation of the mountains themselves.

However, in the 1860s Ruskin began to imagine the redemption of these losses. Specifically, he reversed his previous opinion that “no retrospection can raise [the mountains] out of their ruins” (*Modern* 210). In his article “On the Forms of the Stratified Alps of Savoy,” published in the *Geologist* in 1863, Ruskin concludes with an optimistic speculation: “immeasurable periods of time would be required to wear these [Alps] away; and to all appearances, during the process of their destruction, others were rising to take their place, and forms of perhaps far more nobly organized mountain would witness the collateral progress of humanity” (11). Published two years before *The Ethics of the Dust*, Ruskin's contribution to the *Geologist* foregrounds the revolution in his thinking about decay's temporality: formation occurs “during” the process of decay. In *The Ethics of the Dust*, Ruskin pursues this logic, locating the mechanism for the simultaneity of decay and formation in the geochemistry of dust:

SPRING 2016
The great laws which never fail, and to which all change is subordinate, appear such as to accomplish a gradual advance to lovelier order, and more calmly, yet more deeply, animated Rest. Nor has this conviction ever fastened itself upon me more distinctly, than during my endeavor to trace the laws which govern the lowly framework of the dust. (357)

By applying the chemical principles he learned from the economy of decomposition, Ruskin reconciles the losses of environmental degradation through the commensuration of “the lowly dust.” Decay’s recycling of elemental matter provides Ruskin with proof that decomposition leads to re-composition—that the loss of form is not absolute, and form will come again.

But Ruskin’s vision of planetary regeneration is short-lived. Ten years later, in Deucalion (1875-83), Ruskin jettisons principles foundational to his earlier geological writings and reverts to his view of an irremediably decaying earth. Confining himself to what is perceptible to the naked eye during the course of a human life, Deucalion refuses Lyell’s deep time and the geological principle of “denudation,” or aqueous erosion.25 Forgetting or suppressing his 1850s fieldwork in which he attempted to calculate the rate of Mont Blanc’ s denudation, Ruskin supplants his belief in erosion’s regenerative potential with a linear logic of decay.26 Ruskin argues: “there are, broadly, three great demonstrable periods of the Earth’s history. That in which it was crystallized; that in which it was sculptured; and that in which it is being unsculptured or deformed” (117). With illogical bravado, Ruskin rejects deep time and denudation’s gradual processes, because he has not, in his geologically long life, witnessed them.27

In Deucalion, Ruskin’s personal geological record collapses into a geological view of the self. In this way, the authority derived from his accretive collection of materials dovetails with his own senescence and with the earth’s equivalent decrepitude. It is precisely this unbounded identification of corrupted self, corrupted times, and corrupted earth that produces the staggeringly cataclysmic tone of The Storm Cloud of the Nineteenth Century (1884). However, Storm Cloud stands apart from Ruskin’s earlier work not because he apocalyptically blurs human industries and natural economies, but rather because he can no longer foresee the transformation of that admixture into a beautiful, synthetic whole (162).28 My point here is neither to call into doubt the reality of industrial pollution, nor to question Ruskin’s meticulous observation of that reality. Rather, by placing Storm Cloud in a
genealogy of Ruskin's writings on geochemical decomposition, we see that his dire pronouncements about industrial pollution coincide with his schismatic rejection of modern geological principles and his vision of the earth as naturally tending toward ruination. That is, without the assurances of dust's regenerative potential, Ruskin loses his aesthetic and ethical foothold on the putrid and the corrupting. Moreover, this genealogy reveals that Ruskin's writings about dust in the 1860s are fragilely poised between his youthful dismissal and his aged refusal of decay's formative potential. Their value lies in this fragility—a fleeting flicker of hope held against the wreckage of the world.

VI. Coal, Graphite, Diamonds

Whether the earth shall renew itself or fall into total ruination was a question as pressing to the Victorians as it is to us. While elsewhere in his oeuvre Ruskin squarely engages with Victorian Britain's economic reliance upon coal, *The Ethics of the Dust* explores neither the rapacious rate of coal consumption nor its potential exhaustion. Rather, coal appears in relation to the chemical properties underwriting its mineralogical existence. As I have argued, *The Ethics of the Dust* constructs a formal model based on dust's infinite recombination. Routed through the girl-crystal analogy, the text's formal ideal is expressed by the girls, “who are crystalline in brightness, as well as in caprice, charm infinitely, by infinitude of change” (311). Taking up coal's “infinitude of change,” *The Ethics of the Dust* represents coal in relation to the principle of allotropy (the “other” forms an element can take): carbon can manifest as coal, graphite, or diamonds. Accordingly, this final section surveys mid-century coal debates from the perspective of mineralogical otherness. As we shall see, Ruskin and Dickens gender coal's geochemical history, such that debates about the future of Britain's coal-dependent economy affix to the figure of the young girl and her allotropic possibilities.

For Samuel Taylor Coleridge, allotropy reveals matter's oneness: “so water and flame, the diamond, the charcoal, and the mantling champagne are convoked and fraternized by the theory of the chemist” (471). Even from the practical perspective of the *Library of Useful Knowledge*, allotropy instills wonder: “that the diamond should be made of the same material with coal . . . these surely are things to
excite the wonder of any reflecting mind" (Brougham 241). In *The Ethics of the Dust*, wonderment attends carbon's ability to "make itself" into pointedly dissimilar forms:

L. Some say it was once a vegetable gum; it may have been charred wood; but what one would like to know is, mainly, why charcoal should make itself into diamonds in India, and only into black lead in Borrowdale.

SIBYL. Are they wholly the same, then?

L. There is a little iron mixed with our black lead; but nothing to hinder its crystallization. Your pencils in fact are all pointed with formless diamonds, though they would be HHH pencils to purpose, if it crystallised. (219)

But wonder blends with disappointment: the Old Lecturer wants to know why carbon "only" makes itself into lead in his native land. Cheated of carbon's "other" form, the Old Lecturer sounds a melancholic note when he tells the girls that their pencils are "pointed with formless diamonds." Since graphite is a legitimate form of carbon, calling a pencil a "formless diamond" speaks to the felt loss of form that attends dust's kaleidoscopic rearrangement of elementary particles. Dust's morphic ability to take on "other" forms conjures a negative space, the empty outline of what is not—but might have been—present. Given Ruskin's investment in girls as symbols of dust's formative potential, I want to conclude this essay with a meditation on the gender of changefulness. To do so, I turn to another great Victorian text about dust, Dickens's *Our Mutual Friend*, in which the connection between gender and mineralogical change intersects more pointedly with the question of resource depletion.

The plot of *Our Mutual Friend* revolves around the inheritance of giant dust heaps. Like Ruskin's dialogue, *Our Mutual Friend* explores the transformative potential of dust, symbolically keyed to the novel's many resurrections, as characters die to be reborn into better lives. In large part, the metamorphic quality of Dickens's dust inheres in its status as inherited wealth, through which it represents the power of dead matter to circulate perpetually in an economy of scavengers, scam artists, social climbers, and leeches—that is, an economy that exploits the absolute fungibility of all matter and trades in dust as the true universal solvent. Dust thus comes to embody the abstract interchangeability of animate and inanimate matter so characteristic of Dickens's novels.
Critics have long noted Dickens's habit of turning people into things and things into people: John Bowen calls it a “key signature of Dickens' works” (207) and John Carey claims it is “the hallmark of his imagination” (101). While critics have interpreted these transformations in psychoanalytic, economic, and, most recently, energetic terms, inorganic matter's transformative potential has been under-theorized. Rather than describing the taxonomic collapse of “person” and “thing,” which often only reinscribes the taxonomic order it purports to overturn, chemistry can account for the amalgamations and expulsions that merge matter into conjoined person-things. While dust's sinuous flux describes *Our Mutual Friend's* world of abstract interchangeability, it is, as Catherine Gallagher argues, a man's world: “only the men are capable of holding ‘Life in abeyance’ . . . Bella and Lizzie have no such out-of-body possibilities, and hence they are debarred from the process of releasing value and being released as value, as pure vital potential” (116). Since Ruskin intimately connects girls to the “vital potential” of dust, I want to consider how a chemical reading of dust might change our view of the novel's gendered economy of transformation.

While the female characters in *Our Mutual Friend* may not undergo the rituals of drowning and rebirth endured by their male counterparts, Lizzie's kinship with coal links her to its transformative chemical potential. As Adelene Buckland argues, “Dickens often based plots of fictional transformation on the fantastic metamorphoses embodied in the lump of coal itself” (n.p.). *Household Words* and *All the Year Round* featured many articles on coal and its transformations. In “The True Story of a Coal Fire,” published in *Household Words* in April 1850, a dissolute young man named Flashley is propelled through a fireplace to an “antediluvian forest” to witness its transformation into coal (95); he is jammed into a modern mine to observe its cramped working conditions; he boards a collier and works as a cabin boy; he lands on a wharf and works as a coal-sifter; and, in this manner, he travels the full circuit of coal’s history. Like *The Ethics of the Dust*, “True Story” relies upon the perpetual circulation of inorganic matter to enact its tale of self-formation. Just as all living things “undergo a gradual transmutation into other bodies and things of the most opposite kind,” the indolent Flashley transforms...
into a toiling laborer (28). Specifically, Flashley learns to mimic coal's chemical potentiality:

Under the chemical process of ages... these huge ferns, these trunks, and stems, and towering fabrics of trees, shall all crash down—sink deep into the earth with all the rank enfolding mass of undergrowth—there to be jammed and mashed up between beds of fiery stone and grit and clay, and covered with oozy mud and sand... not rotting in vain, nor slumbering uselessly in darkness, but gradually, age after age, undergoing transmutation by the alchemy of Nature, till verdure becometh veriest blackness, and wood is changed to coal. (30)

Coal is given a similar, albeit briefer, chemical introduction in Our Mutual Friend when Charley reminds Lizzie that coal contains “gas” that is “coming out of a bit of a forest that's been under the mud that was under the water in the days of Noah's Ark” (37). In both “True Story” and Our Mutual Friend, coal represents decay's transformative potential. Thanks to “the chemical process of ages,” the superabundant foliage of the geological past does not “rot in vain”: wood becomes the coal that warms Lizzie's impoverished hearth and fires her imagination. Gazing into a transmuted forest, Lizzie's coal-narratives insert her into this erstwhile male history of chemical transformation.

But Lizzie's narratives also locate her at the center of debates about coal's depletion. In “True Story,” exhaustion will be forestalled by exhaust: when coal is burned, the same gases that fed antediluvian forests “are liberated” into the atmosphere, where they “form a portion of those elements which are again to assist in the growth of forests” (95). In Dickens's journal, the coal-forest cycle repeats itself and futurity is guaranteed a bright, warm existence. Not all Victorians shared this optimistic assessment. By the 1860s, the “inexhaustible” coal-fields had come up against the rapacious scale of human consumption (“True Story” 30). Published in 1865, dust's banner year, William Stanley Jevons's The Coal Question predicted that Britain had reached peak coal production. To write about coal in 1865 was to enter into a debate about abundance and scarcity, resource renewal and depletion. While Allen MacDuffie argues that Our Mutual Friend stages a conflict between cyclical renewal and an “entropy-centered economy” in which waste represents “the end of transformation itself” (126), I think Buckland is right in suggesting that Dickens refused to “countenance either coal exhaustion [or] its economic consequences” (24). Amid the panic, Dickens refused to relinquish coal's transformative power.
Accordingly, Lizzie’s coal reflects fears about resource scarcity even as it continues to materialize fantasies about renewal.

Like Ruskin’s pencils that shadow forth “formless diamonds,” Lizzie’s coal conjures lost forms—antediluvian forests, layers of sedimentation, the Deluge—in the negative. Reinforcing the connection between chemical potentiality and empty space, Lizzie narrates possible futures by gazing at “the hollow down by the flare” (38). This hollow is a world of narrative plenitude, or, as Charley styles it, “there seems to be the deuce-and-all in the hollow down by the flare” (38). The connection between the “hollow” and its infinitude would seem to confirm Gallagher’s reading: Lizzie imagines transformations for her brother, not herself. However, later in the novel Lizzie narrates another tale in the hollow, imagining a lady who will love Eugene Wrayburn and will announce her love with a curious phrase: “only put me in that empty place” (344). The “empty place” ostensibly refers to the vacuous Wrayburn. But as Lizzie narrates her tale, she ventriloquoizes her longing to put herself in the “empty place” carved out by the imaginary “lady rich and beautiful that [she] can never come near” (344). In the capacious fullness of the “empty place,” Lizzie taps into the pure potential of dust’s changefulness.

Even though the text does not convert Lizzie into coal (or diamonds), Lizzie’s affinity with coal gives her access to the “empty place” that allows her to imagine her allotropic other. She accesses Gallagher’s “out-of-body” possibility. But, like the Old Lecturer’s melancholic attachment to the pencil’s absent other, Lizzie’s narrative internalizes her attachment to that which she can “never come near.” That is, dust creates a formal model that can only ever be a melancholic fetishization. When form echoes all the forms it ever was and bespeaks all those it could still be, our attachment to form can only be partial, a fragment that substitutes for an overabundant whole. That the figure for the melancholic fetishization of form should be the young girl seems predictably to confirm the commodification of the female body. And yet the melancholia that attends Lizzie’s coal and Ruskin’s graphite is less a sexualized longing and more an environmental yearning for abundance in a world of finite scarcity. Indeed, both *Our Mutual Friend* and *The Ethics of the Dust* enact fantasies wherein scant resources are limitless recycled and reborn. Girl-dust represents Victorian dreams of resource plenitude, fueling sociopolitical desires.
for rebirth, or that the “Dust of generations of men” will lay the “foundation” for a redeemed “city” (Ruskin, *Ethics* 360).

In this light, Lizzie’s “hollow” would seem to activate the tradition that views the female body as a receptacle. But in the end, neither Ruskin nor Dickens simply recapitulates girl as organic fecundity. Lizzie is, after all, childless at the end of *Our Mutual Friend*, and Ruskin weds his nubile girls to inorganic matter. While Ruskin’s erotic interest in girls suggests an implicit embrace of procreative domesticity, girl-dust subverts heteronormative expectations by emphasizing the aesthetic and ethical value of asexual, inorganic recombination. In this way, dust disrupts biological reproduction and the political structures invested in reproducing the state as such, or what Lee Edelman has termed the politics of “reproductive futurism.” Although Edelman argues that heteronormativity structures any fantasy of reproduction, dust regenerates through ambient, inorganic affiliation, a mode of propagative futurity that challenges organic duplication’s hegemony. Girl, then, is the apt figure for dust less because she breeds from a hollow within, but more because her hollow prefigures the combination and containment of unruly materiality that holds dust’s restless transformations in a state of “animated Rest.” “There’s no music in a ‘rest,’” advises the Old Lecturer, “but there’s the making of music in it. And people are always missing that part of the life-melody; and scrambling on without counting” (247). It is easy to miss the “rest” in *The Ethics of the Dust* and to discount the streaming dust in a rush toward crystalline form. But by tracing dust’s formative power and its ceaseless circulation, we may bring the pause between making and unmaking into focus. Or rather, as I have argued, form is itself a pause, a transient coming together in the whirligig of molecular life. Both are true. Form is a pause (a compositional respite between decompositions); form emerges in the pause (decomposition nourishes composition). Hence, “the ethics of the dust” should not be summarized as “get into order”; rather, its motto is better stated as: “mind the Rest.” Mind that empty place—that melancholic girl—where dust’s infinite combinations lurk.

*University of California, Berkeley*
NOTES

1. While my thinking about form springs from nineteenth-century science, especially Johann Friedrich Blumenbach’s concept of *Bildungstrieb* (formative power), my work also engages with critics’ recent return to formalism. In my conception of form’s shifting contours, I draw upon Leighton’s insistence on “the dynamics of form itself” (16). In my conception of decay’s latent formal potential, I draw upon Caroline Levine’s use of design theory’s notion of “affordances,” which describes “the potential uses or actions latent in materials and design” (6).

2. Ruskin’s idiosyncratic science has been a topic of much critical debate. For a general overview, see Alexander. For Ruskin and Tyndall’s glacier debate, see Sawyer, “Poetry.” For Ruskin’s use of Biblical typology, see Spear 40–51. For Ruskin’s natural history textbooks of the 1880s, see Birch, “Ruskin and the Science” and Kirchhoff.

3. My reading of decay is indebted to a number of studies on dirt, filth, and the abject. These include Douglas, Kristeva, Hamlin, Nead, and McClintock. My work takes up this critical tradition—which has established the Victorian obsession with the taxonomic classification of waste and dirt, as well as the Victorians’ transgressive desire to revel in such foulness—and uncovers an alternative discourse about Victorian decay that embraced disintegration for its aesthetic, ethical, and environmental affordances.

4. George Levine argues that Ruskin “bows to Lamarckian evolution” because it allows for “will, intention, love, and hate” (243). Similarly, Zwierlein stresses the connection between Ruskin’s “moral concept of energy” and Victorian debates about willpower (322).

5. In addition to the connections among coal, dust, and gender performed by Lizzie’s fireside narratives, *Our Mutual Friend* also links the economies of coal and dust through the figure of the dustman, who, in Henry Mayhew’s *London Labour and the London Poor* (1851), collects waste “principally from the residuum of fires, the white ash and cinders, or small fragments of unconsumed coke” (345).

6. While scholarship on *The Ethics of the Dust* emphasizes the girl-crystal analogy, it pays little attention to dust’s role in facilitating this transformation. See Sawyer 246, Robson 115, and Weltman 46.

7. Even in Ruskin’s pagan exploration of Greek mythology in *The Queen of the Air* (1869), dust continues to derive its authority from Genesis 3:19: Demeter’s rule is over the earth “as the receiver of all things back at last into silence—’Dust thou art, and unto dust shalt thou return’” (394).

8. With the exception of Frost’s essay, the scientific content of these letters has received little critical attention. Other scholars have commented almost exclusively on Ruskin’s unorthodox interpretation of Genesis. See Conner 19 and Spear 372.

9. Ruskin refers to Liebig later in the essay: “Liebig says that the source of this ammonia is sufficiently evident by its peculiar odor” (486). While Cook and Wedderburn do not footnote this reference, it seems likely that Ruskin read Liebig’s *Organic Chemistry in its Application to Agriculture and Physiology* in its 1840 English translation by Lyon Playfair. See Brock 94–114.

10. Ruskin’s “girls” have received much scholarly attention. See Robson 94–129; Weltman, *Performing* 111–19; and Birch, “Ruskin’s Authorities.”
11. Chen defines "stone butch" as an erotic economy of affect "in which the butch's sexual pleasure can emerge from the touch instigated by her, whereas she prefers not to be touched by her lover" (216) and argues that it is "simply wrong" to see the stone butch as "affectless" (217). Similarly, it would be wrong to read Ruskin's desire to petrify little girls (or himself) as a deprivation of affect. Rather, this desire for objectification curiously probes the affective life of stones and their geomorphic traumas.

12. See Millet for a scathing critique of "Of Queens' Gardens" and Ruskin's "compulsive masculine fantasy" about "insipid goodies" (64). For a sympathetic reading that places "Of Queens' Gardens" in dialogue with the historical context of Queen Victoria's reign, see Weltman, *Ruskin's Mythic Queen* 103–23.

13. My reading of Ruskin's dust concurs with Birch's reading of Ruskin's "womanliness" and his feminized critical voice. See "Ruskin's Womanly Mind."

14. For the vitalist debate in the 1850s and '60s, see Geison.

15. Otis also reads the advent of cell theory as ushering in new concepts of self-enclosure. See 1-8 for an overview of her "membrane model" of identity.

16. Rocke emphasizes that there were artificial syntheses of "organic" materials before 1828 and that "total" syntheses were only performed long after that date: "Wöhler's accomplishment in no way refuted vitalism at a stroke" (239). Hilton argues that Wöhler's synthesis of urea "might even have given vitalism 'a new lease on life'" (182).

17. In "The Cell Theory," Huxley declares that he has "maintained the broad doctrine established by Wolff" (243). Richmond argues that Huxley's conception of the organism is "developmental and epigenetic rather than reductionist and morphological" (270).

18. While Gigante argues that the Romantic rejection of preformation meant "life now denoted power, rather than structure" (16), vital power was certainly not divorced from structure in most Romantic accounts of life, especially since Blumenbach's *Bildungstrieb* was a touchstone for Kantian aesthetics.

19. The review was anonymous, but Darwin and his circle immediately suspected the author's identity. J. D. Hooker made some inquires and concluded that it was Richard Owen. Hooker's sleuthing has since been confirmed by the editors of Darwin's correspondence (754). After Owen's review on 28 March, Carpenter responded swiftly on 30 March, distancing himself from Darwin. Darwin's angry retort appeared on 25 April, to which Owen responded on 2 May. Darwin responded again on 5 May. But in a letter to Darwin dated 7 May, Hooker begs him to acquiesce. For an overview of this debate, see *The Correspondence of Charles Darwin*, 745–55.

20. For a full account of the *Bathybius*, see Rehbock.

21. Even the public entered into the debate. In "Some Aspects of Mud," the anonymous reviewer ventures his opinion that "earth and water in combination, and acted on by the heat of the sun, seem in truth to contain the germinating principle of vitality" (199).

22. According to Priestman, "the first great Lucretian moment in Britain was the end of the seventeenth century," while a flurry of new editions between 1790 and 1820 marked "the second British Lucretian moment" (289). But, as Priestman acknowledges, scholars have traditionally placed the "epicenter" of Lucretius's nineteenth-century...
influence “firmly after *The Origin of Species* in 1859” (289). For Lucretius’s influence on British Romantic poetics, see Goldstein. For his influence on Victorian writers, see Turner.

23. Victorian interest in Lucretius began with H. A. J. Munro’s *new* translation of *De Rerum Natura* in 1860 and W. Y. Sellar’s *The Roman Poets of the Republic* in 1863. Turner argues that the publication of Alfred Tennyson’s “Lucretius” in 1868 marks “the beginning of a new appreciation for Lucretius” since that year also witnessed the publication of Fleeming Jenkin’s “The Atomic Theory of Lucretius,” the first article linking “the ancient writer to contemporary scientific thought” (335).

24. See also Jenkin 213.

25. For Ruskin’s refutation of the geological concept of denudation in *Deucalion*, see 121-22 and 247-55.

26. In *Modern Painters*, Ruskin collects the runoff water from an Alpine stream in order to measure Mont Blanc’s rate of decay. He calculates a staggering loss: “eighty thousand tons of mountain must be yearly transformed into drifted sand” (176).

27. In *Deucalion*, Ruskin makes multiple references to his agedness: he began his geological work “thirty years ago” (101); his dabbling-places “have not changed in fifty years” (122); he has returned to Switzerland and revisited the same scenes “forty years” later (126); the scenes he has revisited in Switzerland are “unchanged since I knew it first, when I was a boy of fifteen, quite forty years ago” (151); and he has gathered “fifty years’ experience of brooks” (250).

28. “The Work of Iron” (1858) is a paradigmatic example. In this lecture, he declares that rusted iron is “Living” and folds the chemical decomposition of this industrial product into a natural economy (376).

29. For an economic account of vitality, see Gallagher 86-117. For an energetic account of entropic loss, see MacDuffie 114-36.

30. I am indebted to Adelene Buckland for pointing me to these articles.

31. For the historical origins of the peak coal debate, see Jonsson 168-87.

32. The long literary-scientific tradition that views the female body as a receptacle takes on a new significance in the nineteenth century when Georges-Louis Leclerc Buffon theorizes “moules intérieures,” or “internal molds,” a hollow container that impresses each life with its characteristic form. See Gigante 14-15.

WORKS CITED


SPRING 2016


SPRING 2016


—. *The Storm-Cloud of the Nineteenth Century*. Works 34: 7-80.


