

The Victorian Anthropocene: George Marsh and the Tangled Bank of Darwinian Environmentalism

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In 2000, Eugene Stoermer and Paul Crutzen made the case that ‘the central role of mankind in geology and ecology’ justifies ‘using the term ‘anthropocene’ for the current geological epoch’ (2000: 17). The time had come, they argued, to register the role humans have come to play in shaping rather than merely responding to our environment. In the Anthropocene, we must grasp that in seemingly inhuman natural occurrences (tidal waves, storms, global warming, mass extinctions) we witness our own deeds outside ourselves.

Debate currently rages on when the Anthropocene began. Should we blame the great fossil-fuel upsurge of the 1950s, James Watt and the steam-powered Industrial Revolution, or even the agricultural land-clearing that began 8 000 years ago? (Robbin, Warde). Far less attention has been paid, however, to the question of when the idea of the Anthropocene began. Among those debating the nature and the politics of the current environmental crisis, the novelty of the word *Anthropocene* has sometimes been taken as proof of the concept’s novelty; alternatively, moral exhortations like White’s (1967,) are taken as origin points). With millennial wrath, some ask how our predecessors in the 19th and 20th century could have failed to grasp this inconvenient truth? How could it have taken scientists so long to realise that humans lived in an age where a whole range of seemingly extra-human forces were in fact very largely shaped by the direct and indirect results of human activity?

As Creutzen and Stoerner themselves note, however, the idea predates our own era. ‘During the Holocene mankind’s activities gradually grew into a significant geological, morphological force, as recognised early on by a number of scientists. Thus, GP Marsh already in 1864 published a book with the title *Man and Nature*: ‘*Man and Nature* is perhaps the first major work to focus on anthropogenic global change’ (17; cf. Zalasiewicz, 2011: 835). Creutzen and Stoerner do not pursue the point any further. Yet the subtitle of Marsh’s book, *Physical Geography as Modified by Human Action*, underscores one of Marsh’s key contributions to thinking about the Anthropocene: his interest in ‘the extent of the changes produced by human action in the physical conditions of the globe we inhabit’ (Marsh iii).

Equally significant is Marsh’s account of the role that humans *inadvertently* play in shaping, on a monumental scale, a seemingly extra-human terrestrial environment, which has a great deal to teach us not only about Victorian environmental consciousness, but about the environmental debates of our own day. By situating the emergence of Marsh’s idea of human-modified environment inside the ‘tangled bank’ of Darwinian natural materialist thinking in the mid-Victorian era, we can gain a valuable perspective on a wide range of conceptual tools that developed during the first few decades of Darwinian worldview, and that remain of great value today.

The most valuable lesson to be learned from Marsh's early effort to theorise the anthropocene may be the amount of emphasis Marsh places on the power of human beings—once they have realised the *unintended consequences* of their actions on their environment—to alter those actions. One striking historical parallel is that this sort of reflexivity, the feedback loop between previous environmental missteps and future course corrections, is linked in fascinating ways to Darwin's notion of the reflexive role that the expression of emotions plays in regulating animal activity. That linkage between early Anthropocene thinking and the ways that Darwin thought about emotional expression and the human place within the animal kingdom suggests that we can use our insights about the pre-history of the 'Anthropocene thinking' to gain some insights about present-day environmental thinking and environmental activism.

This article therefore aims: first, to establish the nature of Marsh's ideas about what we now label the Anthropocene; second, to link Marsh's hypotheses and mode of argumentation to the Darwinian naturalist materialism of his day; and third, to ask what lessons about present-day environmental debates can be drawn from Marsh's reliance on a Darwinian logic of recursion, which places stress on the role that various kinds of knowledge may play in altering the actions of those who possess that knowledge.

George Marsh: Theorist of the Anthropocene *avant la lettre*

Three initial observations about Marsh's *Man and Nature*. First, that Marsh's writing comes out of a rich environmental tradition that flourished from about 1830 in New England, a tradition that registered the painful effects of waves of human clear-cutting, reforestation, and even reclearing that reforestation. Second, as the book's subtitle suggests, one of Marsh's key innovation is to suggest that humans have been—for longer than they realise or acknowledge—altering fundamentally their world: Marsh's proposed title for his book was *Man The Disturber of Nature's Harmonies*. Marsh proposed (as Lowenthal paraphrases him) that as a 'uniquely potent creature' man 'was subverting the balance of nature to his own detriment' (Lowenthal, xix, xvii.). Marsh's crucial example was the deserts of North Africa, which he argued were unintended consequences of intensive Roman agricultural exploitation that had made North Africa Rome's breadbasket, its Nebraska. From there Marsh turns towards probable modern-day analogies, even hypothesising that the discharge of explosives in mining and warfare and erosion patterns caused by agriculture will change the rotation of the earth and thus alter the seasons.

Third, there is a deontology folded into Marsh's work, a surprisingly complex one, based on what it will mean for his readers to understand the nature and the consequences of their own actions. This claim is built on a subtle logical syllogism: Marsh insists that humankind has powers that entirely distinguish it from mere nature: in fact it is because humanity's own power to mar has been unrecognised (or conveniently overlooked) that we have managed to wreak such havoc. Elizabeth Kolbert's rich and vividly detailed wake-up call *The Sixth Extinction* is not the only recent book to have made the point that homo sapiens has had many of the same effects on the biome that asteroids and ice ages

did in the past. Will humans inflict the fate of the dinosaurs on amphibians, or coral reefs and their ecosystems? It seems increasingly likely.

Marsh's most radical suggestion is that grasping the potency of our actions to affect the distant future may jar humans into modifying those actions. Because that idea resonates more strongly today than it did in Marsh's own day, a fresh look at his views on human-induced ecocatastrophe seems worthwhile. Finding a way in to Marsh's mode of argument, though, is a challenge. It is unsurprising that brief name-checks by Creutzen and Stoerner or Zalasiewicz have done little to establish Marsh's relevance to current-day debates about the Anthropocene. Aligning Victorian environmental thinking with its modern descendants can be difficult, because the terminology and many of the axioms of such thinkers diverge so widely from the common parlance of our own day. *Man and Nature* begins, for example, with this curious credo:

The object of the present volume is: to indicate the character and, approximately, the extent of the changes produced by human action in the physical conditions of the globe we inhabit; to point out the dangers of imprudence and the necessity of caution in all operations which, on a large scale, interfere with the spontaneous arrangements of the organic or the inorganic world; to suggest the possibility and the importance of the restoration of disturbed harmonies and the material improvement of waste and exhausted regions; and, incidentally, 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, which, like him, are nourished at the table of bounteous nature. (iii)

And it ends by asserting that

The collection of phenomena must precede the analysis of them, and every new fact, illustrative of the action and reaction between humanity and the material world around it, is another step toward the determination of the great question, whether man is of nature or above her. (549)

Faced with passages like this, a modern-day reader is liable to focus on the notion of humanity's difference 'in kind and degree' from 'any other form of animated life'; and to suppose that this is a familiar theologically rooted claim about the distinct species-being of humans, above and apart from the rest of creation. And yet, the passage above holds the core of Marsh's seminal contribution. Not only have humans failed to recognise that our power, with all its unintended consequences, is changing a world that we perceive as distinct and apart from us, but faced with the evidence of such power, our actions can and should alter—once we grasp the magnitude of those actions' potential latter-day impact.

Marsh's notion is that humans can mar the world as no other species can—and also have an unprecedented capacity to comprehend and hence perhaps to remedy those actions. Here is where *reflexivity* (the way that awareness of the meaning of an action transforms that action) plays such a crucial role for Marsh. By Marsh's account, Vermont (rapidly deforesting in his day; 274) might be subject to some of the very same forces that

doomed North Africa. Yet North Africa's status as negative exemplar, evidence of what it would mean to make these same mistakes again, has the potential to change the equation for Vermont.

Though Marsh's language is not our own, his underlying concern is a familiar one: to hold up the deeds of the past and make them serve as a spur for future action. In the book's final footnote, for example, Marsh paraphrases Charles Babbage's 9th Bridgewater Treatise:

no action can take place in physical, moral, or intellectual nature, without leaving all matter in a different state so that the physical traces of our most secret sins shall last until ... eternity [Marsh 464-5 ft).

This point about secret sins is intimately bound up with Marsh's ideas about the unintended indirect consequences of human activity. Babbage's treatise may seem predestinarian, but Marsh is arguing here that like a perfect recording machine the universe will register our actions even when we are no longer there to be aware of them or to benefit from them. Accordingly—and it is this turn that makes *Man and Nature* a 'diatribe' rather than a 'jeremiad' [Lowenthal xi]—humankind can no longer call something like those North African deserts an 'unintended consequence', if the past serves as a visible reminder. To make the same mistake twice (to turn Vermont into a Sahara, say) would become an *intended consequence*, which is a different kettle of fish.

Marsh insisted that the audience for his book was not scientific but general. Although Marsh's editor wrote to him urging him to stick to 'the department of English languages and literature of which you are the acknowledged head', Marsh understood his own writing not as dry scholarship but as part of an effort to make 'the fortunes of the mass, their actions, their character, their leading impulses, their ruling hopes and fears' visible, because making the 'secret' consequences of those impulses and fears visible might move his readers to change them [Lowenthal x, xv]. He wanted farming, mining, even the discharge of weaponry to be accompanied by awareness of what it would mean for those actions to leave perdurable traces.

Marsh presumes that the human capacity to recognise, for the first time, the long-term rather than the merely direct consequences of their actions—that is, our rational ability to see action at a distance—will serve as one aspect of a signaling system that will alter our actions. Not just to see immediate consequences, but to grasp analogies (between North Africa ruin and Vermont agriculture) and feel impelled to act to prevent recurrence of the same cycle. The Romans had no environmentalists to predict future ruin. But we latter-day actors, thanks to the Romans, have a past example to make our own future visible to us. In order to understand the consequences of our actions, the unintended aftereffects of Roman actions prove vital.

This attention to long-term indirect causal chains crucially distinguishes Marsh from contemporaries who also registered the magnitude of humanity's impact. Although the Italian geologist Antonio Stepani (the other 19th century thinker cited in Creutzen and

Stoerner's article; 17) apparently coined the term *anthropozoic* in 1873, by it he merely meant to mark human capacity to create massive magnificent works that would permanently transform the earth: 'the day will come, when the earth will be but a seal of man's power' (Steppani, 40). Missing from Steppani's notion of human impact on the earth is any example like Marsh's that underscores the way that what may seem most trivial in the present about a human action may be its most enduring legacy.

Darwinian Feedback:

Victorian Natural Materialism's Contribution to Marsh's Environmentalism

Marsh opens up still-germane questions about how the awareness of the unintended consequences of one's own actions can alter those actions—since once such consequences are realised they effectively cease being *unintended*.¹ To appreciate that turn in Marsh's work, we should recognise how much of his thought comes out of his immersion in a scientific realm that (shaped by Lyell's 1830-3 *Principles of Geology*) explored the deep history of plant and animal life on the antediluvian earth. Perhaps the most fascinating mark of the influence of this generation of natural materialists is in Marsh's underlying presumption that charting humanity's impact on the environment will trigger changes in the human actions that have had such an impact.

In his presumptions about what difference a new thought can make, Marsh's mode of argumentation is profoundly linked to an underappreciated aspect of Darwin's thought: how central a role communication plays in Darwin's account of what motivates animal activity. This section will aim to make a succinct case that the sorts of arguments Darwin made about the feedback loops built into the display of emotions among animals (including humans) are fundamentally linked to Marsh's underlying assumptions about the differences caused by making palpable to his readers the distant consequences of their own actions.

One key thing connects Marsh's idea of what it means to recognise the 'unintended consequences' of our own actions to Darwin's account of emotional expression. That connection is the importance Darwin attaches to the ways in which emotions express—for the benefit of those who are around to receive signals from us—inward states that are validated and even in certain sense created by the existence of such intersubjective mechanisms. *Man and Nature's* attention to the *reflexive* nature of thought (what difference it makes to recognise the effects of one's own actions) has a significant echo in Darwin's work on the communicative function of emotional expression: *biosemiosis* (Emmeche; Winter). *The Origin of Species* inaugurated radically new ways of considering how humanity's essential attributes—our behavior, our emotions, even our use of language—mark us as one species among others species, formed and continuously modified by the same natural forces that shape the rest of the biotic world.

In the decades that followed, work by Darwin and others also explored humanity's similarity to other social animals—that is, animals whose ability both to signal and to interpret the signals of others is existentially vital (cf. Browne). In Darwin's account of how emotional expression works as a signaling mechanism (in *The Descent of Man and*

Selection in Relation to Sex and in *Expression of Emotion in Man and Animals*) presumes that humans, like other animals, go through life deciphering emotional evidence, and more importantly that evidence is itself produced by bodies that have developed with an implicit awareness that their actions are going to be read.² For example, consider Darwin's account of the human and lupine propensity to snarl *asymmetrically* when angry—revealing only the canine closest to the object of anger. If space allowed, it would be worth thinking about what links Darwin's accounts of the emotional expressions that connect humans with other animals to his commitment to a dispersed scientific network, correspondents in the project of 'collective empiricism' upon whom he relied not simply for ideas and facts, but also for a more complex kind of shared understanding.³

Darwin's work on how human beings and other animals signal their intentions through emotional expressions (and decipher those signals given off by other animals) is not completely explicable with reference to the 'epistemic virtue' of objectivity, which is Lorraine Daston and Peter Galison's phrase for a scientific ethos that they see rising to prominence (though not total dominance) in the latter half of the 19th century (Daston and Galison, 18). By Daston and Galison's reading, objectivity as a reigning epistemic virtue seeks 'willed willlessness' among its practitioners and requires conscious effort to suppress not just distortions in one's own sensoria but also is leery of the complex (and sometimes self-reflexive) cognitive process whereby such 'objective' observations are turned into reasoned judgments (38). Darwin's account of the roles that reflexive thinking plays in shaping animal activity is distinctly not 'objective' in this sense, because it relies on his observations about animal's capacity to modify activity in light of others' actions. Darwin on the one hand notices expressions of emotions as objective features to be explained; on the other, he crucially insists that any complete account of animal (and human) behavior must also explain how such expressions are comprehended and responded to by those around them: their uptake, which is what makes them into signals within a system rather than merely manifestations of inward states.

Darwin's interest in the role that emotional expression plays in communication turns out to be a crucial (though subtle) link between his work and Marsh's contemporaneous environmentalism. Darwin's nuanced account of the resemblance between animal and human cognition was accused of anthropomorphism from diametrically opposed positions: on the one side emotional intuitionists like Ruskin, for whom human response to beauty undergirded the absolute difference between human nature and the animal kingdom; on the other side mathematical biologists like D'Arcy Wentworth Thompson (pioneer of morphogenesis), who read Darwin as anthropomorphising animals by ignoring the chemistry and physics that offered simple explanations for even the most complex actions.

It is Thompson's unquestioning adherence to the epistemic virtue of objectivity that leads him to vitriolic attacks on Darwin for anthropocentrism and the pathetic fallacy, for inserting emotive and ethological explanations for what Thompson views as merely material properties. Like such other works as Theodore Cook's 1914 *Curves of Life* and the marvelous illustrations in the polygenist Ernst Haeckel's 1904 *Life Forms of Nature* (both heavily influenced by Thompson) the impact of Thompson's 1914 masterwork *On*

Growth and Form (which has been described as dwelling at the 'intersection of science and the imagination' [Jarron, 1] and hailed as a seminal text for the field of biomathematics) stemmed from Thompson's meticulous, careful efforts to explain plant and animal morphology with reference to basic laws of physics.

Thompson's work is distinctive for its unrelenting skepticism about Darwin's interest in complex interorganismic causality: that is, Darwin's tendency to find reasons for particular actions or structures in emotional impulses or in sexual selection, which he describes as 'that teleological argument which pervades his whole train of reasoning' (Thompson, 889). At times Thompson merely wants to explain natural phenomena without recourse to any behavioral impulses: e.g. he measures variations in honeycomb walls to disprove Darwin's claim that bees have a behavioral capacity to form hexagons in the most efficient possible manner. More often, Thompson's case against Darwin involves denying that any higher-order explanation is needed for a biological phenomenon beyond a simple (and objective) account of the properties of the materials involved. This is most evident in the account he offers of the incidence of those beautiful iridescent spots on peacock's tails: oculi. Thompson proposes a diffusionary chemical explanation for the advent of the oculi—and pooh-poohs the notion that Darwin would also need to explain the persistence and propagation of such tail decorations: 'Darwin's well known disquisition on the ocellar pattern . . . as a result of sexual selection, will occur to the reader's mind, in striking contrast to this or any other direct physical explanation' (431).

Thompson's ridicule aside, Darwin's explanation for oculi on a peacock's tail relies on an astute account of biosemiosis: males will grow unwieldy and highly decorated tails in order to *signal* their fitness to peahens, because the pressure of sexual selection outweighs other sorts of pressure that might be expected to keep tail size down. Unlike Thompson, Darwin takes into account what sorts of signals a peacock is sending and a peahen is deciphering. Thompson fails to grasp the importance of figuring the interaction between organisms into the explanation of a phenomenon's propagation. In other words, while sexual desire, especially a peahen's sexual desire, may not look exactly like affect, Darwin considers a broad range of signaling mechanisms (snarling, cringing, speaking, and tail display or tail evaluating) that can only be understood if one thinks about the ways in which one organism's appearance is taken up and responded to by another organism.

Thompson's anti-emotivism here can be usefully contrasted to the moral intuitionism of the redoubtable Victorian sage, art critic, and foe of Darwinian evolution, John Ruskin (cf. Day, Birch). The crux of the famous fight that erupted between Darwin and the art-critic and all-round sage was that question of *to whom* peacock's tails appeared attractive. That oculi were beautiful figured nowhere in Thompson's account, while to Ruskin their beauty is in humanity's (or God's) eye (Kirchoff; Ruskin). Three ways of looking at a peacock.

Darwin's comparative instinct about beauty stands in sharp contrast not only to Thompson's exclusion of it as a plausible explanation for the tail's continued existence, but also to Ruskin's deep unwillingness to hold human reactions up for rational

contemplation alongside other animal behavior (cf. Smith 167). As Darwin put it in his 1869 revision of the *Origin of Species*,

The sense of beauty obviously depends upon the nature of the mind, irrespective of any real quality in the admired object; and that the idea of what is beautiful, is not innate or unalterable. (1882: 160)

Ruskin proposes that the beauty of the peacock's tail demonstrates divinely ordained beauty: Darwin concludes not that animal responses to beauty are irrelevant (that is the 'objective' line taken by Thompson) but that beauty exists only 'the mind' of the observer, be she peahen or person ('Darwinism had breached the confines of physical expression and moved into the realm of the mind' (Prodger 56)). In other words, a sharp distinction exists between Darwin and Ruskin on one side (no moral intuitions, no transcendental impulses, feelings explicable by reference to biological systems); and between Darwin and Thompson on the other (explanation for biological processes being an 'emergent phenomenon' that has to take ethology into account not simply physics and chemistry, and that must leave a place for reflective actions). This triangulation opens up the road for thinking about what is a plausible case for environmentalism taking into account problems of emotional expression; or more broadly, *reflexive* problems where by humans become aware of the implications that their own actions have by seeing the impact of those actions on others.

Man and Nature Today

This compressed account of Darwinian ethology as occupying a middle ground between Ruskin's human-centered intuitionism (oculi simply *are* beautiful) and Thompson's reductive objectivity (oculi are diffusion effects, and their appeal to peahens is not germane) should suggest the crucial linkage between Darwin's and Marsh's emphasis on recognising the 'power' of human beings in shaping, or reshaping, their world. Marsh's notion that recognising human 'power' gives humans a way to alter their actions makes his thinking sharply distinct from *both* the passionate moral exhortation of Ruskin *and* the austere objectivity of Thompson. Like Darwin, Marsh is acutely aware both that humans are animals like others and that certain distinctive features of human culture and mental operations are distinct. Like Darwin, Marsh turns to the sense of time to single out human beings. Marsh's way of specifying the key difference between humans and other animals, however, turns on the human capacity to conceive of one's own actions as having *unintended consequences* at a distance.

Marsh's breakthrough lies in noticing the interdependence of human and the larger organic realm, how humans are modifying that which they had formerly understood as sempiternal and beyond human influence. He also speculates, somewhat inchoately, about what difference it makes for human ethics *and* epistemology for us to grasp the afterlife of our actions beyond the seeming limits of their initial effects. This is consequentialism in which intentionality is not so much obliterated as transmogrified, charged with the task of reckoning with our culpability for things we did not intend in the most direct sense, and yet must own up to. Thoreau and related Transcendentalist nature

writers are one important antecedent for Marsh. Certain aspects of his ‘anthropocene’ argument, however—most notably his notion that confronting humans with long-term consequences of their actions is the best way to change those actions in the future—place him within the same intellectual matrix as the Darwin who noticed and reflected upon the similarities in how humans and other animals signal their emotions and respond to the emotions of those around them.⁴ Darwin’s account of how peacock tails might operate as a signaling system—which Thompson (like Haeckel and other early bio-mathematicians) is quick to dub anthropocentrism—in fact points to Darwin’s commitment to deducing mental processes from revealing physical or ethological evidence. If this makes Darwin, like Marsh, sound like a detective, discerning motives and actions from the physical traces those actions leave on bodies and on environments, that analogy may be a helpful one.

The connections traced in this article between Marsh and Darwin suggest ways of connecting an ethos of environmental awareness directly to the account that Darwin offers of biological signaling expressions that are intimately bound up with the production, expression and reception of emotions. Marsh as a holistic environmental thinker is attempting to demonstrate the interconnectedness of human actions and large-scale environmental change. He is also, however, pursuing a line of argument that depends upon a sense of felt interconnectedness. The notion that ‘the physical traces of our most secret sins shall last until . . . eternity’ signals that he understands his writing too as a physical trace of his own society’s actions. Presented with such knowledge about the long-term effects of our actions (e.g. in his own Vermont, where old-growth forests were rapidly being clear-cut into pastures) our unintended consequences will become intended ones, and that realisation will have a reflexive effect upon our own future actions.

Can appreciating this aspect of Marsh’s thinking about the Anthropocene play any helpful role in present-day debates about the environment? Nobody is likely to repeat Thompson’s mistake of presuming that by explaining the diffusion reaction that produced the play of colors on a peacock’s tail, you have explained how enormous oculi-studded tails persist for generations. Still, comparable unwillingness to admit the complexity of actions and their motivations, the importance of the role played by *mind*, does exist. For the ‘speculative realist’ philosopher Graham Harman, ‘the real has an inner struggle of its own quite apart from the human encounter with it’ (193). And Jane Bennett’s *Vibrant Matter: a Political Ecology of Things* similarly explores the unparsable materiality of the universe, which persists in having a meaning while nonetheless resisting the paraphrase and sense-making that is the usual Kantian procedure for arriving at successful comprehension of the world (on the 19th century roots of ‘vital materialism’ see Lenoir 9, 127-132). Harman’s and Bennett’s line of thinking fails to account for the reflexive quality of human thought, and thus fails to account for our own implication in the world about whose meaning we can quarrel. If agency abides in the inanimate world rather than in our own overweening human mentation, then how can recalcitrant matter lend itself to a discussion that would, by definition, reduce, appropriate, or misdescribe such matter by bringing it within syntax?⁵

Impulses towards Ruskinian moral intuitionism also persist today. Dipesh Chakrabarty’s 2009 article ‘The Climate of History: Four Theses’, which is credited with bringing the

notion of the anthropocene into humanist studies, seems to me crucially to understate and undervalue the kind of reflexive rationality Darwin and Marsh rely upon. Like Marsh, Chakrabarty aims to achieve historical perspective on unintended consequences of human activity. His fourth thesis ('The Cross-Hatching of Species History and the History of Capital is a Process of Probing the Limits of Historical Understanding') proposes that 'Climate change is an unintended consequence of human actions and shows, only through scientific analysis, the affects of our actions as a species' (CI 221). But Chakrabarty's point about the difficulties that surround understanding our own role in altering the environment turns out to be that 'we can never *understand* this universal' (221-2). In Hegelian fashion, he subsumes the problem of the anthropocene into an insoluble aporia built into human understanding. Since 'one can never experience being a concept' it follows that 'we experience specific effects of the crisis but not the whole phenomenon' (220-221). For Harman and Bennett human experience diminishes in import in the face of the vibrant life of nonhuman matter. Conversely, Chakrabarty supposes that once we understand the limits of our direct experience, its inwoven blindness, we must give up on conceptualization altogether, taking solace only in the necessarily curtailed and partial experiences we happen to have.

The subtlety with which Marsh lays out the example of Roman North Africa is an effective refutation of such a limiting notion of what human experience is and can be. The Roman example is telling, in a way that Marsh's speculations about future impact of current actions cannot be, because it allows us to see that our own experience includes a conceptual purchase on experiences gone by. The form of knowledge that Marsh implicitly relies upon then—which Chakrabarty's notion of mere experientialism denies—is historical: we can reflexively grasp that our actions will have consequences that we cannot grasp. If so, then we are capable of grasping consequences to actions that we do not experience within our own life. To argue that such conceptual understanding is not truly 'experience' is at best nominalism and at worst a dangerous kind of intuitionism.

Marsh sheds light on what it means to consider not just the known impact of our actions on future generations, but also ineradicable marks that are only brought to light by comparing present actions to past ones, and asking what difference it makes for us to become aware of the potential for such long-term aftereffects. The reflexivity of thought means that our minds can not only comprehend our present circumstances but also compare them to circumstances past. The human power to mar is paired with an equal power *not* to mar—and perhaps even with a like power to mend.

NOTES

¹ While the concept of unintended consequences might well be implicit in the consequentialist philosophising of the Scottish Enlightenment (or even in Bernard of Clairvaux's 12th century adage, 'the road to hell is paved with good intentions') the phrase itself can only be traced back as far as a 1936 Robert Merton article, 'The Unanticipated Consequences of Purposive Social Action'. I am not aware of any environmental thinking prior to Marsh's work exploring the implications of unintended consequences as central to understanding humanity's ethical implication in the world's future state.

² Although Hartley (145-6) argues that Darwin 'failed to recognize [emotions] biological function in aiding the instinct to communicate in both humans and animals in the organic world', Winter proposes a biosemiotic reading of Darwin that aligns with my reading of the importance of expressive communication.

³ Cf. Ian Duncan's recent argument that 'For Whewell, as for Darwin, scientific language is not found in the world, a spontaneous emanation of data accurately observed. It has to be made: wrought from the "vagueness and fancy, imperfection and superfluity" of vernacular usage, language's natural state' (16). Duncan also mentions a revealing convergence between Darwin and George Eliot—that each comes in their writing of the 1870s to emphasise the tight relationship between language and the development of the virtue that each understands as the most direct outgrowth of man's 'social instincts': sympathy (Duncan 30).

⁴ In *Descent*, Darwin makes clear his belief that humans, like social insects, act for the good of the 'social community' because of their sociable nature, which derives from the existence of public opinion as a glue that joins human communities. In Darwin's view (Hale has recently argued) the presence of 'genuinely other-regarding human moral sentiments' are sufficiently explained by, and necessarily follow from sociability, intelligence, a level of language *sufficient to establish public opinion*, and habit' (Hale 341; emphasis added).

⁵ Among those who approach climate change quantitatively there may be approaches that are sober and authoritative, yet in another sense incapable of accommodating the political, and perhaps even the underlying philosophical realities of how human decision-making works. One response to such Thompsonian chilliness suggested by this reading of Marsh is that there is no approach to thinking and acting about environmental impact that does not carry with it implicit assumptions about how we ought to ask questions of the world and of one another, and what sort of response we expect from the world. Every viewpoint is from somewhere.

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