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In 1995, more than 300 migrating snow geese perished after landing in the flooded Berkeley Pit, a toxic open pit copper mine in the northwestern United States. Many commentators subsequently saw the snow geese as symbols of a pure natural world destroyed by the impure artificiality of humans and their technologies. In this essay, however, I avoid such oppositions by drawing on new materialist theoretical approaches that reject anthropocentric thinking and instead emphasize the powerful materiality of cultural phenomena, both for humans and snow geese. This “neo-materialist flip” suggests that industrial artifacts like the Berkeley Pit defy modernist categories of natural and artificial, or pure and impure, because they are simultaneously both material and cultural. Hence the enduring material reality of the pit persists as a site of memory that will both create and embody the culture of snow geese, humans, and countless other living things for centuries to come.

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An Impure Nature: Memory and the Neo-Materialist Flip at America's Biggest Toxic Superfund Site¹

Timothy James LeCain

In an earlier age, ornithologists had called them *hyperborea*, Latin for “beyond the realm of the North Wind”, a haunting name that elegantly evoked the icy white mystery of their Arctic breeding grounds. Those of a more prosaic turn of mind simply called them snow geese, and indeed, when immense flocks of the birds took wing, the whirl of their brilliant white wings and bodies recalled a blizzard of swirling snowflakes.

Late one November night in 1995, a flock of more than 300 of the birds slipped west over the sharp peaks of the northern



Rocky Mountains and found themselves trapped by stormy weather in Montana's Summit Valley, a small high-mountain bowl that is home to the mining city of Butte and its immense flooded open-pit copper mine, the Berkeley Pit. The flock of snow geese circled the tight confines of the dark valley several times, no doubt searching for a marsh or pond where they could land and recover from the long miles already flown. At some point, the circling flock made the fateful decision that the Berkeley Pit "lake" offered an acceptable if somewhat unusual refuge. Of course, there was no way that the geese could have known that the acidic pit water carried deadly levels of arsenic, lead, cadmium, and other toxic heavy metals. Within days, the raucous calls of the geese faded into a cold November silence. When humans later discovered them, they found 342 of the dead birds floating in the lake, their brilliant white plumage stained the rust red of acid mine water.

Ever since the death of the Berkeley Pit snow geese, humans have struggled with how best to understand and remember the tragedy. Butte has several memorials that honor the miners who worked and often died in the copper mines. But there are no memorials to the geese or any of the countless other non-human actors whose historical orbits were bent by the powerful material pull of the pit. This is scarcely surprising, since humans tend to assume that their own stories are the most important and that they alone possess the capacity to have genuine memories of the past. Indeed, when humans have thought about the bizarre deaths of the Butte snow geese, they have been quick to see the tragedy as symbolic of their own concerns. For many, the beautiful white snow geese seemed an apt symbol

¹ Some sections of this essay first appeared in "The Ontology of Absence: Uniting Materialist and Ecological Interpretations at an Abandoned Open-Pit Copper Mine", in *Ruin Memories*, B.J. Olsen, Þ. Pétursdóttir (eds), Routledge, London 2013.

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of a pure and unsullied nature done in by the corrupting artifice of humankind. One writer suggested the story was symbolic of an “apocryphal struggle” between a malevolent corporate “snake” and the innocent wild geese that died in “its pool of poison”.² Yet while we humans find such stories emotionally satisfying, they keep our focus squarely on human memories and ideas rather than those of the snow geese themselves. When the pure, unsullied nature of the snow geese is opposed to the messy artificiality of humans, the geese are reduced to little more than empty signifiers for human concerns, stripped of any historical agency or memories of their own.

One of the goals of this essay is to suggest some ways we might begin to think about snow geese and other animals and things as participants in the creation of sites of memory. To do so, we must move beyond the pervasive modernist belief that culture, whether human or nonhuman, is distinctly separated from the material world. I argue that phenomena that we typically believe are solely a product of our brains – things like culture and memory – are better thought of as creations and embodiments of the material world. Close kin to the idea that humans and their cultures are separated from the material world is the belief that they are also detached from a material past. To be sure, historians routinely assert that the human past influences the human present. But because they believe that humans are largely or entirely distinct from their material environment, sociocultural phenomena are their preferred vehicles of temporal transmission. The idea that matter itself – or “nature”, as some prefer to call it – might carry the past into the future and drive the patterns of historical change and continuity as much as (or more than) social and cultural factors has received little attention. The idea that matter and the sociocultural are inextricably intertwined has received even less.

This human denial of the power of matter has deep cultural and historical roots that will not be easily overcome. However, in recent years scholars working in an array of different fields have begun to radically rethink the role of the material world in human and non-

² M. Levine, “As the Snake Did Away With the Geese”, in *Outside*, 21, 1996.

human history. Rather than being yet another one of the dizzying series of recent academic “turns”, this new materialist thinking seeks to flip the conventional view of the relationship between humans and matter on its head. This “neo-materialist flip”, as I call it, suggests that humans are best understood not as the master manipulators of a separate and passive material world, but rather as the products of matter: that the material world creates us and our diverse cultures every bit as much as we create it. Indeed, recent scientific and humanistic insights strongly suggest that it no longer makes sense to draw a clear conceptual line between humans and matter, but that we should instead focus more attention on the many ways that humans and their cultures are *made of and from* matter and cannot logically exist in isolation from it.

Another and closely related goal of this essay is to challenge the anthropocentrism that we typically bring to our encounters with sites of memory. If some humans experienced the ruins of the Berkeley Pit as a symbol of a fallen natural purity, the snow geese encountered the pit in their own ways. When the culture and practice of the geese intersected with the materiality of the pit, at first it seemed to create a place of rest and refuge rather than decay and death. Nonetheless, geese and humans were then, and still are now, joined in their shared bodily encounters with the material reality of the pit water and its power to dissolve and carry elements that are toxic to both. Whatever the sociocultural meanings geese and humans bring to the pit, these material realities persisted, irretrievably sully the pure categories by which we divide past and present, culture and matter, and human and non-human.

To understand the material power of a place like the Berkeley Pit, both for humans and for geese, we must begin by briefly discussing some key ideas that reside at the intersection of neo-materialist and ecological interpretations of matter. From these we can begin to perceive and understand the many ways in which the pure categories of the modernist worldview have begun to crumble, giving rise to an environment in which the “neo-materialist flip” can reveal how matter plays a dynamic role in creating culture and memories for both human and non-human actors alike.

History and Matter

As practitioners of a quintessentially humanistic discipline, historians have occasionally flirted with the role of matter in analyzing the past but have only rarely made it a focus of their predominantly anthropocentric narratives. During the last decades of the previous century, the emphasis on social constructivist theories and discursive analytical methodologies further marginalized the role of material factors. Recently, however, a small but growing number of historians have begun to join with other humanistic and scientific thinkers to reexamine materialism. Some have even proclaimed the arrival of a “new materialism”, although many of the varied ideas coalescing under the neo-materialist banner have been developing for at least several decades in an array of disciplines.

Of course, the arrival of a supposedly *new* materialism suggests the consignment of some earlier materialisms to the past. Most famously, Marx and Engels turned Hegel’s Geist-haunted idealism on its head to argue that social infrastructure was a product of material substructures. However, by the emerging standards of today’s materialist thinking, their conception of the material world was far too narrow, as was their insistence on keeping human beings squarely at the center of a narrative of dialectical progress and mastery of nature.³

If we are to survey the intellectual giants of the nineteenth century, we should focus not on Marx but on Darwin, a figure that many new materialists find inspiring. Darwin’s confident evolutionary materialism, along with the roughly contemporaneous geological discoveries of deep time, threatened to shake the European faith in human exceptionalism to its core. With Darwin, humans became just another animal. With deep time, all of human history became just a drop in a vast ocean of time.⁴ As I will argue, the neo-materialist challenge to anthropocentrism and chronocentrism are a logical culmination of both.

³ J.R. McNeill, J.A. Pádua, M. Rangarajan, *Environmental History: As if Nature Existed*, Oxford University Press, New Delhi 2010, p. 4.

⁴ E. Russell, *Evolutionary History: Uniting History and Biology to Understand Life on Earth*, Cambridge University Press, Cambridge and New York 2011.

Paradoxically, the threat posed by Darwin and geology to human exceptionalism led not to the rejection of anthropocentrism among historians but to its restoration in other more durable forms. As Andrew Shryock and Daniel Lord Smail argue in their perceptive introduction to the emerging new field of “deep history”, historians isolated themselves from these tectonic intellectual shifts by adopting the analysis of written documents as their defining method.⁵ Human “history” was thus seen as beginning roughly 5,000 years ago. The millennia of earlier human existence – not to mention the non-human – was conveniently relegated to the category of “prehistory” and left to the work of archaeologists, paleontologists, and others in disciplines comfortable with using increasingly scientific methods to analyze non-written evidence. More importantly for my argument here, the historians’ obsession with written evidence easily lent itself to a reactionary human exceptionalism and resurgent anthropocentrism. As the Darwinian revolution took hold, other disciplines embraced the idea that humans were a part of nature. Cultural systems could be equated with natural systems, and human history seemed poised to meld seamlessly with natural history. Historians, however, offered a convenient and powerful point of demarcation between what they saw as true human history and mere prehistory, between civilization and nature. Writing, and the emergence of the complex urban societies that made it possible, marked the moment when humans *left* nature and began its systematic exploitation. In this view, animals and earlier “brutish” humans were in harmony with nature; now, on the other hand, humans were engaged with nature in a never-ending war. Victory was the key to progress.⁶

In more recent years, many scholars in the history of technology and environmental history have begun to challenge such views, albeit haltingly. From their beginnings, both were distinct from most other historical fields because of their insistence on the importance of the material world, whether that matter was predominantly natu-

⁵ A. Shryock, D.L. Smail, T.K. Earle, *Deep History: The Architecture of Past and Present*, University of California Press, Berkeley 2011.

⁶ *Ibid.*

ral or technological. One of the most important early spurs to current neo-materialist thinking emerged from the sociology of science and technology with the influential Actor Network Theory (ANT) developed in the 1980s by John Law, Michael Callon, Bruno Latour, and others.⁷ Particularly as articulated in the ever-imaginative work of Latour, ANT includes all manner of potential non-human “actants” in its complex webs of networks. As these actants influence each other in complex networks they become “hybrids” – compound entities that challenge our conventional concepts of things or organisms as discrete, clearly bounded, and thus materially distinct from one another. Further, in its emphasis on the emergent nature of networks, ANT has many affinities with the ontological philosophies of Gilles Deleuze and Pierre-Félix Guattari, to which I will return shortly.

Despite (or perhaps because of) its potential to radically alter our understanding of the role of matter in history, the influence of ANT among historians has until recently been largely confined to scholars of science and technology. Even environmental historians, whose emphasis on the importance of the natural material world suggests obvious affinities, have been slow to explore the possibilities offered by ANT.⁸ In part, this reluctance may stem from the desire of many environmental historians to examine *individual* agency of non-human actors rather than an agency that emerges solely from a network. As geographers Owain Jones and Paul Cloke have recently pointed out, since agency emerges from the interactions of actors within a network, ANT stops short of an explicit recognition of the agency of isolated non-human actors or actants. Indeed, the theory tends to view attempts to discuss the agency of non-humans as a reassertion

⁷ J. Law, J. Hassard, *Actor Network Theory and After*, Blackwell/Sociological Review, Oxford and Malden, MA 1999; J. Law, *After Method: Mess in Social Science Research*, Routledge, London and New York 2004; B. Latour, *Science in Action: How to Follow Scientists and Engineers through Society*, Harvard University Press, Cambridge, MA 1987; id., *Reassembling the Social: An Introduction to Actor-Network-Theory*, Oxford University Press, Oxford and New York 2007.

⁸ For an important recent exception see Paul S. Sutter, “Nature’s Agents of Empire? Entomological Workers and Environmental Change During the Construction of the Panama Canal”, in *Isis*, 98, 2007, pp. 724-754.

of the very human-nature dualisms that the concept of hybridity was in part designed to avoid. Further, Jones and Cloak rightly complain that “much of the illustration and application of this hybridity seems to have been biased towards technological rather than organic non-human entities – a maneuver which somehow makes it easier to deny the specific non-human contribution to hybrid agency.”⁹

Jones and Cloke seek to go beyond the limits of ANT, arguing that scholars need to understand the precise nature of the contributions made by non-human agents like trees. Trees and other non-human actors, they argue, may have agency in four distinct ways. First, through “routine action”, in which a tree grows and pursues its organic processes. Second, through “transformative action”, when a tree acts autonomously, for example in self-seeding a farmer’s field. Third, through “purposive action”, a concept that generally demands intentionality and is thus typically limited to humans. However, the authors argue that trees have a kind of embedded purposive agency in their genetic blueprints that provide goals and some limited adaptive means of achieving them. Fourth, through “non-reflexive action” derived from socioecological interactions in which trees “have a capacity to engender affective and emotional responses from the humans who dwell amongst them”.¹⁰

The work of Jones and Cloke, as well as that of other scholars in a variety of other fields, suggests how ANT and other materialist approaches might find fertile common ground with environmental history. Some of the most interesting recent work in environmental history has revolved around new ways of thinking about bodies and environments that challenge modernist beliefs in a clear division between human and material nature. Linda Nash, for example, argues that the idea of a bounded human body distinct from the material world was a key illusion of modernism, with its dreams of human liberation from and mastery over nature.¹¹

⁹ O. Jones, P. Cloke, “Non-Human Agencies: Trees in Place and Time”, in *Material Agency: Towards a Non-Anthropocentric Approach*, Springer, New York 2008, pp. 79-96, 81.

¹⁰ Ibid., p. 87

¹¹ L. Nash, *Inescapable Ecologies: A History of Environment, Disease, and Knowl-*

Meanwhile, others working in the subfield of envirotechnical analysis have undermined the belief that human technology is categorically distinct from the natural world, challenging the idea that technology is the very archetype of the “un-natural”.¹² Recent work expanding the concept of technology to include animals and other organisms has potentially radical materialist implications as well. If, as several scholars have convincingly argued, a cow or silkworm is deliberately bred by humans to serve a specific technological purpose,¹³ where precisely is the line between the technological and the natural? The influential American historian Edmund Russell argues that humans are engaged in a process of evolutionary history in which the cultural and political literally become embedded in the DNA of other organisms, a type of early “genetic engineering”.¹⁴ Yet, if human culture and technology become part of nature, it no longer makes sense to argue that there is some sort of dialectical dance between distinct cultural and material spheres; rather, we must strive to understand both how culture is a material thing and how matter itself is culture.

Given these affinities and others, it is surprising that the neo-materialist movement has made so little use of the valuable insights offered by environmental historians. In part, this may be because much neo-materialist work remains highly abstract. Many of its self-identified advocates are political theorists, ethicists, and philosophers whose main goal is to develop new ways of thinking in the present. From a historian’s perspective, though, if the intriguing neo-materialist theo-

edge, University of California Press, Berkeley 2006; G. Mitman, “In Search of Health: Landscape and Disease in American Environmental History”, in *Environmental History*, 10, 2005, pp. 184-210; G. Mitman, *Breathing Space: How Allergies Shape Our Lives and Landscapes*, Yale University Press, New Haven 2007; C.B. Valencius, *The Health of the Country: How American Settlers Understood Themselves and Their Land*, Basic Books, New York 2002.

¹² T.J. LeCain, *Mass Destruction: The Men and Giant Mines that Wired America and Scarred the Planet*, Rutgers University Press, New Brunswick 2009; S.B. Pritchard, *Confluence the Nature of Technology and the Remaking of the Rhône*, Harvard University Press, Cambridge, Mass. 2011.

¹³ P. Scranton, S.R. Schrepfer, *Industrializing Organisms: Introducing Evolutionary History*, Routledge, New York 2004.

¹⁴ Russell, *Evolutionary History* cit.

retical insights are to have real value, they must be fused with the kind of detailed micro-level studies of the past that historians of science, technology, and the environment are skilled at producing.

But what then defines this neo-materialism (to the extent that it is a coherent body of thought)? Definitions will surely vary, but it seems safe to say that all new materialists, either explicitly or implicitly, are seeking new ways to better recognize and analyze the role of the non-human material world. One of the earliest uses of the phrase “new materialism” appears to have been in Manuel De Landa’s 1997 book, *A Thousand Years of Nonlinear History*, although he does not clearly define the term. Instead, he attempts to explain history in a way that decenters humans in favor of complex materialist explanations that challenge conventional social constructivist views.¹⁵ De Landa argues for both a realist and a materialist view of the past. Humans are best seen not as the architects of their destinies, he insists, but rather as one material expression of a natural world that spontaneously generates new forms and trajectories. What humans mistakenly and arrogantly view as their creations – economics, language, technology – are rather the product of complex non-linear assemblages of which humans are only one component, and perhaps not necessarily the most important one.

De Landa’s historicizing efforts notwithstanding, neo-materialism is still dominated by philosophical or ethical thinking. Many have found inspiration in the phenomenological philosophies of Husserl, Merleau-Ponty, and even a reconsidered Heidegger. The ideas of the French philosophers Gilles Deleuze and Félix Guattari have also been particularly influential among many recent materialist thinkers. In works like *A Thousand Plateaus*, Deleuze and Guattari develop a sophisticated realist ontology to explain how things in and of themselves exist independently of the human mind. Crucially, however, the pair insist that this separate material world does not exist fully formed and defined as a kind of pre-existing stage onto which humans emerge and play out their histories. Rather, their matter is a lively and dynamic

¹⁵ M. De Landa, *A Thousand Years of Nonlinear History*, Zone Books, New York 1997.

one, a materiality that emerges from the interactions of diverse actors or agents, humans only one among them. Thus Deleuze and Guattari offer a philosophical grounding for key neo-materialist concepts such as the creative power of matter, the distributive nature of agency, and the rejection of anthropocentrism.¹⁶

The works of Deleuze and Guattari, Husserl, and Merleau-Ponty all figure heavily in what is thus far the most coherent expression of a neo-materialist approach: the 2010 collection of essays entitled *The New Materialisms*. In their introduction, Diana Coole and Samantha Frost assert that human beings “inhabit an ineluctably material world” but that this essential materiality has been marginalized in recent decades by “the dominant constructivist orientation to social analysis”. While observing that this “new materialism” need not be antithetical to constructivist methods, Coole and Frost call for a more vibrant role for matter in its interaction with humans and their social systems. Theirs is a matter that is “active, self-creative, productive, unpredictable”, a matter that “becomes” rather than simply “is”.¹⁷

As promising as Coole’s and Frost’s introduction is, however, the actual essays in the volume often fail to live up to it. Few take on the challenge of explaining “just what it means to exist as a material individual with biological needs for survival yet inhabiting a world of natural and artificial objects” possessing varying levels of agentic efficacy.¹⁸ Given that many of the authors are political philosophers or ethicists, it is perhaps not surprising that many content themselves with mining the work of various earlier thinkers for promising veins of materialist thinking. Still, it is rather ironic that matter in and of itself makes far fewer appearances here than one might expect, and human ideas about matter far more.

While at times suffering from the same tendency to probe ideas rather than reality, Jane Bennett’s influential 2009 work *Vibrant Matter* does a better job of injecting at least some matter into her

¹⁶ G. Deleuze, F. Guattari, *A Thousand Plateaus: Capitalism and Schizophrenia*, University of Minnesota Press, Minneapolis 1987.

¹⁷ D.H. Coole, S. Frost, *New Materialisms: Ontology, Agency, and Politics*, Duke University Press, Durham, NC 2010.

¹⁸ *Ibid.*, p. 28

materialism. Under the banner of what she calls “vital materialism”, Bennett strives to strip away both anthropocentrism and biocentrism in order to conceptualize an environment that is much more than a merely passive or sometimes recalcitrant stage for human action. Bennett rightly argues that it is illogical to conceive of humans solely as acting within and influencing a separate environment. Humans affect nature, but the nonhuman also affects culture.

But the case for matter as active needs also to readjust the status of human actants: not by denying humanity’s awesome, awful powers, but by presenting these powers as evidence of our own constitutions as vital materiality. In other words, human power itself is a kind of thing-power.¹⁹

As with the Coole and Frost volume, though, Bennett is ultimately more successful at raising material questions than she is at answering them. In sum, neo-materialist approaches are already generating many interesting questions and insights. But shorn of their philosophical goals, it is not yet clear what value they may have for historical analysis. However, by bringing the ontological and ethical strengths of neo-materialism together with the analytical strengths of materialist-oriented environmental history, we can begin to develop a more broadly applicable and useful materialist approach for understanding both the past and present. Although it is too soon to offer any definitive list of the principles and methods that might constitute this ecologically grounded neo-materialism, I would hazard at least four that seem particularly important at this juncture.

First, we should recognize that the technological and natural are so closely linked that they are in fact best analyzed as one holistic unit: our material environment. Humans and their machines, houses, cars, and factories do not inhabit, destroy, or impinge upon a separate *natural* environment; rather, these human-associated artifacts fuse with non-human nature to constitute the unitary material environment in which we live.

Second, the ecological approach of environmental history helps

¹⁹ J. Bennett, *Vibrant Matter: A Political Ecology of Things*, Duke University Press, Durham, NC 2010.

us to better capture the dynamic, agentic, and emergent capacity of the material environment – properties that are well recognized in ecological science and theory. The neo-materialists, for example, rightly challenge our conventional biocentrism and ask us to think more seriously about the creative role of rocks and minerals. However, these material entities are best understood within the context of a broader local and global biogeochemical cycle. The same is even more obvious when we consider the independent ecological power of biotic organisms and systems.

Third, a combined ecological and neo-materialist approach should squarely challenge the traditional categorical separations between the sociocultural and the material, focusing instead on the ways in which the social is not only a product of the material but contiguous with the material. Here we might adopt a methodology of “materialist deconstruction”: the conscious effort to identify and historicize ways in which matter has influenced or constituted what many historians assume are exclusively sociocultural phenomena. The point is not to replace social or discursive explanations with materialist ones, but rather to ask how the historical process emerges from the interaction of all forms of matter, human and non-human.

Fourth, one of the most radical insights to emerge from fusing new materialist and environmental history approaches may be the end – or at least the decline – of anthropocentrism. If we are to take the new materialist ontological theories seriously, it is clear that we humans are not nearly so important or powerful as we like to think. Humans must be understood to a significant extent as products of matter, not its Olympian masters. On a practical level, reframing historical research in ways that avoid anthropocentrism opens up a vast new arena of research and brings the methods of history into the sciences. As the Polish historian and anthropologist Ewa Domanska rightly notes, we can begin to “de-centre human beings and focus on nonhumans as subjects of research (often quite apart from their relationships with humans)”.²⁰ More broadly, my concept of the “neo-

²⁰ E. Domanska, “Beyond Anthropocentrism in Historical Studies”, in *Historiein*, 10, 2012, pp. 118-130.

materialist flip” challenges anthropocentrism by arguing that even when focusing on human subjects, scholars must give far greater attention to the ways in which the sociocultural *emerges from and is embedded in* the material world.

Of course, regardless of their philosophical or ethical appeal, the utility of these approaches for historians must lie in their practical ability to reveal important new insights into past and present. In the second half of this essay, I attempt to suggest at least some of their rich possibilities with an analysis of the overwhelming material reality that is the Berkeley Pit.

The Berkeley Pit

Butte, Montana, has witnessed more than its share of outsized American dreams. Today a city of about 34,000, a century ago Butte was a raw-boned copper mining boomtown of at least twice that size, one of the biggest cities west of the Mississippi. The citizens of Butte hailed from nearly every corner of the planet, an ancestry that lives on in the neighborhoods named for their Irish, Cornish, Chinese, and other cosmopolitan inhabitants. With its diversity and extraordinary industrial wealth it seemed to belong not so much to the southwestern corner of an isolated agricultural state like Montana, but rather to a much grander geography, what some today might call a “world city” but that was captured then with the title of “Butte, America”. Most men came to Butte because there were well-paying jobs to be found in the underground mines and the smelters and mills above. Others (men and women) came to make their meals, clean their shirts, bind their wounds, and teach their children, but the copper mines remained the economic heart of the city for most of the twentieth century. Over it all presided the mighty Anaconda Copper Mining Company, one of the largest international corporations of its day. Over the course of a century of mining, humans would extract some \$25 billion in copper, gold, silver, and other minerals, in the process driving more than 10,000 miles of tunnels as deep as a mile beneath the earth.

By the 1950s, however, the copper ore was not as rich as before.

Remaining reserves were still vast, but the cost of extracting them with conventional underground methods exceeded their value. In 1955, Anaconda began excavation of the open-pit mine that would become the Berkeley Pit. Prior to this, skilful underground miners had carefully extracted only the desired copper ore and left the worthless waste rock behind, a technique that minimized waste but that was inherently slow and expensive. With the Berkeley Pit, Anaconda was able to replace highly paid underground miners with a much smaller number of workers who operated gigantic shovels and trucks. Instead of carefully excavating only the valuable ore, the company now used these imprecise but powerful machines to extract everything. The big dump trucks, with their eight-foot-tall tires, carried the shattered rock to a massive concentrating mill where it was pulverized. The tiny amount of copper was then separated from the vast bulk of waste.²¹

As I have argued elsewhere, the Berkeley Pit and other similar places where humans used large-scale technologies to extract desirable material resources like ore, timber, and fish are best understood as a form of “mass destruction”. The technology of mass destruction, which constitutes the material foundation of better-known systems of modern mass production and consumption, has greatly accelerated the pace at which matter is extracted and prepared for subsequent use in mass production processes. Further, precisely because the mass destruction techniques used at the Berkeley Pit and elsewhere were so efficient, they were essential to creating the modern throwaway culture in which things have become so cheap that they can be painlessly disposed of in favor of whatever is momentarily new and exciting. Indeed, the contemporary consumer-driven economy at the heart of the modernist world depends on this continual cycle of adoption, disposal, and replacement to survive. Infinite careless consumption rests on the illusion of infinite painless extraction.²²

During the first decades of the pit’s operation, Anaconda worked mightily to preserve the modernist illusion of painless economic growth and progress through painless infinite extraction. The inher-

²¹ LeCain, *Mass Destruction* cit.

²² *Ibid.*

ent destructiveness of the Berkeley Pit was portrayed as a virtue by shifting the emphasis away from the material place and things in and of themselves – Butte, the copper ore, the pit – and towards the new consumer items they made possible. In the summer of 1957, for example, the company published an advertisement in a popular mass-circulation magazine. Beneath a picture of the two-year-old Berkeley Pit, the ad suggested that this summer Americans should “plan also to see America the Bountiful”. In Butte they could witness how Anaconda extracts “the seemingly inexhaustible mineral wealth of a 32-square-mile area whose output increases year after year”.²³ In the modernist imagination, engineers, managers, and the other architects of industry are stereotyped as sober, hyper-rational positivists who see the world as it is and exploit it accordingly. However, as David Noble and others have demonstrated, western science and engineering have long been driven by an irrational spirit of human transcendence over nature that had its origins in medieval Christian attempts to recreate the lost Eden.²⁴ In its secularized form, this is precisely the spirit that informed the Anaconda’s promise to somehow extract a seemingly infinite amount of ore from a decidedly finite material space.

In other advertisements, Anaconda elided the actual material landscape of extraction all together and focused solely on evoking the many consumer uses of the copper. One 1950 ad, playing on the copper used in the famous American Liberty Bell, argued that copper’s role in carrying electricity and information in telephones, telegraphs, televisions, and radios was helping to make “freedom ring” around the Cold War world. During the Korean War, other ads reminded consumers how much copper could be found in the fixtures for three bathrooms (enough to make a jet plane engine) and in the motors for 210 home workshops (enough to make a 105-mm howitzer). Others simply reported how much copper could be found in a house, refrigerator, or television.²⁵ As several environmental histo-

²³ Ibid., p. 188.

²⁴ D.F. Noble, *The Religion of Technology: The Divinity of Man and the Spirit of Invention*, A.A. Knopf, New York 1997.

²⁵ LeCain, *Mass Destruction* cit., pp. 188-204.

rians have convincingly argued, mass production and distribution technologies had the effect of distancing humans from the material sources of their consumer items.²⁶ It became increasingly difficult for humans to imagine the original sources of the shrink-wrapped steaks, canned green beans, and copper-coiled refrigerators in their homes – even though the matter in question was still there (albeit in altered form) to be seen, touched, and tasted.

In this light, the Anaconda advertisements at least had the virtue of making *some* connections between consumer products and the copper within them, even if the origins of the copper in destructive open-pit mines was usually left unmentioned. Visitors to the pit today, however, face precisely the opposite problem. After passing through a short tunnel incongruously designed to evoke an Old West gold mine, visitors emerge onto a wooden platform perched on one side of the pit wall. Here the pit itself is an inescapable reality, a twisting oval hole in the ground almost one-and-a-half miles wide and 1,800 feet deep. In 1982, the corporate successor to Anaconda ceased all mining at Butte, thus bringing an abrupt end to the promise of infinite copper a mere 30 years after the pit had opened. When the giant underground pumps ceased their work, the ground water in Butte began to rise back to its pre-mining level, steadily flooding the pit. Visitors today see not just the towering walls of the pit but also a thousand-foot-deep lake. Roughly the pH of battery acid, the water of “Berkeley Lake” is a complex brew of arsenic, cadmium, and other heavy metals leached from thousands of miles of underground passages.

Yet while the visitor today is viscerally confronted with the topographical void of the pit and its growing body of water, much of the copper which sparked the pit’s construction is of course gone, spread around the nation and the globe in countless miles of wire, houses, cars, and refrigerators. Just as it is difficult to imagine back from a refrigerator to the pit, so too is it difficult to imagine forward from the

²⁶ W. Cronon, *Nature’s Metropolis: Chicago and the Great West*, W.W. Norton, New York 1991; A. Vileisis, *Kitchen Literacy: How We Lost Knowledge of Where Food Comes From and Why We Need to Get It Back*, Island Press/Shearwater Books, Washington 2008.

pit to a refrigerator. As a result, the visitor is predominantly left only with the experience of human and ecological ruin, which, if it at least challenges the modernist promise of painless infinite extraction, also tends to reinforce the supposed distance between the worlds of matter and of consumer culture. More could be done to educate visitors about the copper that was once in the Berkeley Pit, to tie them to the persistent materiality of the copper as it was distributed around the planet. However, any effort to merely *link* the material world of the pit with the human world of consumption inherently reifies the very dichotomies that drove the creation of the pit. By adopting an analytical stance that unites materialist and ecological interpretations, however, historians can turn the Berkeley Pit towards the deeper purpose of dissolving such modernist categories all together.

As Deleuze and Guattari argue, the present is best understood as but one of thousands of plateaus, a temporary and contingent arrangement of material actors whose existences emerge in ever shifting patterns of mutual encounters and interactions. History is thus a phenomenon of bumps and jogs, the illusion of a steady flow from a vanished past to a substantial present, a quirk of the human mind that we have mistaken for reality. Yet the material consequences of earlier moments, of earlier historical plateaus, persist into the present, carrying elements from the past into the now, where they may interact with new actors.

Humans tend to believe that memories of the past dwell somewhere in the tangle of neurons and synapses in their skulls, or perhaps simply in a ghostly spirit that resides there and yet is somehow distinct. But this too may be, in part, an illusion, an evolutionarily useful means of creating the sense of an “I” that wishes to endure, to survive, to reproduce. It is also a form of chronocentrism, the human belief that the present moment is entirely new and unhinged from the past. In reality, the past is persistent, not just in memory or culture, but also in the materiality of things literally *present*. “The stones, iron, and concrete used in the massive construction of some past and present empires”, the archaeologist Bjørnar Olsen reminds us, “are not only burdening the *brains* of their inhabitants; they left a thick and sticky heritage of materials that to some ex-

tent, at least, explains their continuous, effective history”.²⁷

Yet, as already noted, to visit the Berkeley Pit today is to be confronted not only with the material remains of the past but rather with their material absence. The millions of tons of waste rock and ore that had once been a part of the Butte hill are now gone – or so it seems. In reality, most of the rock that had once been in the pit is piled nearby or perched above in the massive Yankee Doodle Tailings Pond. Further, in the process of blasting and grinding up the once relatively solid rock, humans created a powerful, new, and stubbornly persistent material reality. As ground and surface water percolate through the ruins of the pit and its waste piles, it leaches out the heavy metals that had previously been safely locked away. To keep this contaminated water from flooding the basements of thousands of Butte homes and polluting the nearby Clark Fork River, the water must be continually pumped and processed in a treatment plant that removes some five hundred to a thousand tons of toxic sludge every day. In a startling example of the ecological persistence of the material past, this treatment process will have to continue for many centuries to come before enough of the heavy metals are washed out to make the water safe for most organic life.²⁸

In this sense, the material absence that is the pit is partially an illusion. Much of the rock that once filled the pit remains as a powerful ecological force that will endure on a geological time scale. And yet, the overwhelming material negativity of the pit itself – the topographical depression created by the absence of the rock that once was there – is a powerful force in its own right. As Bjørnar Olsen notes in his perceptive defense of the enduring power of matter, in the modernist age the pace at which material things are created, consumed, and abandoned has grown ever faster and the “processes of destruction have immensely intensified”.²⁹ However, as the Berkeley Pit makes clear, the processes of modern destruction occur not only

²⁷ B. Olsen, *In Defense of Things: Archaeology and the Ontology of Objects*, AltaMira Press, Lanham, MD 2010, p. 162.

²⁸ LeCain, *Mass Destruction* cit., pp. 202-204.

²⁹ Olsen, *In Defense of Things* cit., pp. 168-169.

at the end of product lifecycles, but also at their material beginnings. Ruination, in this sense, is more than just the consequence of the abandonment of previously useful and valued things. Rather, ruination is inherent as well in the *creation* of those things. In this broader ecological and materialist frame, the Berkeley Pit was a type of ruin from its beginnings, not just after it was shutdown and abandoned. That humans were the predominant agents of this form of ruination – rather than the rust or other forms of decay we typically think of – should not obscure the essential material nature of the process.

One of the human memories of the Berkeley Pit today, then, emerges from our encounter with the void, with the nothingness that remains after the transformative destruction of one form of matter into others. Finally, though, if we are to fully embrace the “flat ontology” of Deleuze, Guattari, De Landa, and others, in thinking about sites of memory we must also consider other non-human actors. In the dark mirror of the pit lake we may, as we always do, see reflections of ourselves most clearly. But look closer into the rusty red water and we begin to see other actors, other memories: creatures, elements, and even the water itself whose molecules render it a uniquely powerful carrier of material things past, present, and future.

Hyperborea

The night the snow geese arrived in Butte, the older birds may have searched in vain for familiar landmarks, while the youngest had little choice but to follow their more experienced flock mates. Centuries ago, the ancestors of perhaps some of these very geese might well have landed on the flat plain below, where the Summit Valley’s high groundwater once oozed out to create a wetland. The steel pistons of steam-powered pumps had long since sucked the water out and dried up these swamps, ultimately pushing the groundwater level more than a mile below the surface. When the pumps were stopped, the water found a new resting spot as it began to seep into the rocky bowl of the pit. For the disoriented snow geese that stumbled into the valley that November night, the “lake” formed by these earthy waters offered the only refuge in sight.

The previous spring, all of these geese (but for the newborns) had flown the opposite direction, north beyond the Arctic Circle, where they had nested along the tundra shoreline of far northern Alaska and Canada. Precisely which northern redoubt the Butte snow geese had summered at is impossible to know: perhaps the Yukon-Kuskokwim Delta or Baffin Island in northern Canada. They might have even come from as far away as Ostrov Vrangelya (Wrangel Island), a rocky outcrop in the Siberian Arctic set aside as a nature preserve by the Russian government. If possible, geese always return to their birthplaces to breed. There they sometimes form immense colonies of thousands of birds. Snow geese mate for life, and here among the multitudes the couples somehow find each other and begin the serious business of reproducing the next generation.

Regardless of where the Butte geese had summered, we know that with the approach of winter the elder geese and their young offspring had left the Arctic waters and ponds, formed their flock at a staging area, and headed south. Snow geese and other migratory waterfowl of North America follow four great aerial highways during their biannual journeys north and south. Both the Pacific and Central Flyways have thin tendrils that skirt over the sharp spine of the Continental Divide near Butte. The flock that landed at the pit could have been following either.³⁰

The geese came to southwestern Montana driven not by an irresistible instinctive urge to migrate, nor even by an innate dislike of cold weather. With their dense winter layers of down, snow geese can survive in surprisingly frigid conditions, and many would forgo the strenuous flight south were it not that the grasses, seeds, roots, and grains they fed upon begin to decline with the first hints of autumn frost. Hunger, or its specter, drove them south more than cold. The decision precisely when to head south was apparently intuitive, as was a very rough sense of the direction reckoned by the positions of sun and stars. But the precise path that they would follow is something they had learned only from older geese. As one wildlife

³⁰ R.M. Wilson, *Seeking Refuge: Birds and Landscapes of the Pacific Flyway*, University of Washington Press, Seattle 2010.

biologist observes of geese, ducks, and other migratory wildfowl, “A duck raised in isolation knows *how* to migrate, but not specifically *where*. Among these birds, and unlike almost all others, the details are bound up in tradition, passed on by older generations”.³¹

We also cannot say with certainty where the Berkeley Pit geese were headed, but there is a reasonably good chance that they were aiming for the Central Valley of California, where some 60 percent of migratory wildfowl winter. Regardless of their ultimate destination, the geese who had made the journey before would have led the way, each taking the point at the head of undulating V-shaped formations until they tired and dropped back for another to take their place. Ornithologists believe the geese find their way by following a chain of familiar landmarks – wetlands, mountains, and rivers, of course, but perhaps also towns, highways, wheat fields, and even open-pit mines.

In all this, geese clearly possess a striking level of sociocultural continuity. The oldest may live for ten years or more, with an average life span of eight years. As already mentioned, couples form mating bonds that persist throughout their lives. These cultural continuities both endure and evolve as the landscape around them changes. Over the past century and a half, many of the wetlands the geese once depended upon have been drained and replaced with millions of acres of industrial farms. But rather than being a disaster, this proved an opportunity: geese and other waterfowl quickly learned to eat what the farmers left behind after harvests. Fortified by such energy-rich rice and wheat, the snow geese also found protection in the refuges humans had either left behind or created. After collapsing in the early twentieth century, snow geese populations have since exploded.³² The birds have done far more than just unthinkingly “adapt” to this rapidly changing landscape; they have incorporated this environment into their culture and practice, becoming in some sense new animals as the material landscape that sustains them – and in part creates them – continually shifts.

³¹ Ibid., p. 31.

³² M. Johnson, “The Snow Goose Population Problem, Part I”, in *North Dakota Outdoors*, 59, 1997, pp. 14-18.

In this, geese and humans may well be united. As the influential philosopher of cognition Andy Clark provocatively argues, what we typically think of as the human mind resides not just in our brains, nor even in our bodies, but is rather to a significant degree extensive with the material world around it. For example, Clark argues that human cognitive abilities can be distributed in a network of external props and aids like computers, files, texts, and maps, aspects of our material surroundings without which some fundamental part of what we consider to be our intelligence would be removed. Humans thus have an “extended phenotype” of the mind, he writes, in which “the relation between the biological organism and the wideware is as important and intimate as that of the spider and the web”.³³

If Clark and other advocates of the “extended mind” theory of cognition are correct, then the consequences are profound. In keeping with the ontological theories of Deleuze, Guattari, Latour, and others, sociocultural phenomena must be understood as contiguous with, rather than distinct from, our material surroundings. “We must abandon the image of ourselves as essentially disembodied reasoning engines”, Clark argues. “And we must do so not simply by insisting that the mental is fully determined by the physical, but by accepting that we are beings whose neural profiles are profoundly geared so as to press maximal benefit from the opportunities afforded by bodily structure, action and environmental surroundings”.³⁴

Among all the animals on the earth, we humans have evolved brains that appear to be the most adept at incorporating various aspects of the material world into our cognitive processes, and thus our very identity. Humans are, Clark insists, “natural-born cyborgs”.³⁵ However, as his analogy to a spider and its web hints, Clark’s theory also suggests that other animals may also be entities that emerge out of the interactions between brain, body, and matter. He offers a telling example in the

³³ A. Clark, “Where Brain, Body and World Collide”, in *Material Agency*, L. Malafouris, C. Knappett (eds), Springer, New York 2008, p. 15.

³⁴ *Ibid.*, p. 14

³⁵ *Id.*, *Natural-born Cyborgs: Minds, Technologies, and the Future of Human Intelligence*, Oxford University Press, Oxford and New York 2003.

bluefish tuna, a fish whose body in isolation is far too weak (by a factor of seven) to swim, accelerate, and turn as fast as it actually does. Recent research by a pair of fluid dynamicists revealed that these tuna “exploit additional sources of propulsion and control in their watery environments” by creating and taking advantage of vortices and pressure gradients. “The real swimming machine”, Clark concludes, “is thus the fish *in its proper context*: the fish plus the surrounding structures and vortices tha[t] it actively creates and then maximally exploits”.³⁶

In this light, we can begin to see the meeting between the snow geese and the Berkeley Pit in a new way, as a creative ontological event during which the materiality of the pit melded with extensive socio-cultural materiality of the geese. We cannot know, of course, what passed through the minds of the tired birds as they circled the Summit Valley that night. Perhaps some of the more experienced geese tried to lead the flock back up to the sky, to head south where they remembered more familiar resting places from past journeys. Yet the geese had survived and thrived in a changing environment over the past century precisely because they could learn and adapt. Their understanding, intelligence, and perhaps even the neurons of their brains, had subtly shifted to encompass a new reality, a new plateau of existence. Like humans whose brains are different as they incorporate the aid of scribbled paper notes or printed books, so too did the extensive brains and bodies of the geese become different as their material environment shifted. Their ancestors had learned to compensate for vanished wetlands and take advantage of new foods from farmers’ fields. Why not then incorporate this new type of lake into their practice and culture? Perhaps it might eventually become an enduring part of the flock’s materially embedded culture, a memory and reality to be passed down each year to subsequent generations of young geese.

For the snow geese, the void that was the Berkeley Pit was thus an opportunity, a topographical thing that they seamlessly blended into their mental and cultural understanding of the world. Some humans might wish that the geese had been more rigid in the categories with

³⁶ Id., “Where Brain, Body and World Collide” cit. p. 13.

which they classified the world, less capable of accepting what we insist are patently unnatural or impure things. But as the Chinese Taoist philosopher Lao-Tzu observed centuries ago, “the *snow goose need not bathe* to make itself white”. The geese had never been pure or “natural” in the categorical sense that some modern humans understood them. They had always been animals whose existence emerged from the messy materiality of their environments. When their environment changed, they changed, becoming in some very real sense new creatures embarked on new plateaus of existence. In other words, they were very much like humans.

Unfortunately, snow geese are also like humans in that their biochemical metabolism is ill-prepared to handle high levels of heavy metals. The geese may have never been ontologically pure, but they still needed water that was chemically pure. Paradoxically, water cleans precisely because it is so easily dirtied. Thus as the water slowly scours the shattered rock of the Berkeley Pit, the arsenic, lead, and cadmium it dissolves are mobilized as powerful actors in their own right. So it is that the material memory of a few decades of open-pit copper mining will persist as humans, geese, and countless other organisms encounter its poisonous waters for many centuries to come.

Conclusion

As Bruno Latour observed nearly twenty years ago now, the evidence that the pure modernist categories of existence are false is everywhere. Humans have never lived in anything but an impure nature, Latour reminds us – one in which culture and matter are seamlessly melded.³⁷ Yet most historians and other humanists have only just begun to grapple with the tremendous methodological and analytical consequences and promises that might emerge from looking at the past and present freed from conventional modernist dichotomies. Humans are, at least in part, attracted to ruined places

³⁷ B. Latour, *We Have Never Been Modern*, Harvard University Press, Cambridge, MA 1993.

like Butte's Berkeley Pit precisely because they so powerfully violate these dichotomies, hopelessly entangling past and present, matter and culture, technology and nature. Thousands of tourists visit the Berkeley Pit every year where they can walk out onto a wooden viewing stand and look down into the dark pit waters and up at the towering rock walls. Perhaps they sense in such places the fragility of the modernist belief that humans are special animals, that we alone may *use* nature but are not *of* nature. If so, the prospect must be unsettling, as few tourists seem to linger long to ponder the pit. Most quickly hurry to their cars and head back out on the highway, perhaps more eager than ever to show that they are still in control of their own destinations, that they can leave the dangerous memories of the pit behind and escape to more pleasant places.

But the ruins of the Berkeley Pit are not so easily forgotten. In creating the pit, humans changed not just some separate place "out there" – what we like to call our environment. Rather, we changed ourselves, as well as the snow geese and many other material entities that have and will yet come into contact with it. In the decades and centuries to come, the memory of the 342 snow geese that died in the pit that stormy November night in 1995 may well fade from human memories. But the power of the pit itself will nonetheless endure, a type of material memory that will continue to help create humans and their cultures, just as it helped create the snow geese and theirs. Perhaps that is the most important insight that we can take today from this strange site of memory: that we can no more escape the powerful material pull of the pit than could those snow geese. That we too are creatures from afar, wheeling across a trackless night sky, uncertain of the way forward, unable to find a path back. Should we trust the strange dark waters below or move on in hopes of finding a more familiar refuge?