

Stem Cells and the Culture of Life

When, at the turn of the twentieth century, Hans Driesch and Henri Bergson defended their notions of vital force, they were participating in a debate that also engaged a larger public. In response to new discoveries in cellular biology and in embryology, the American public had become fascinated with the question of developmental growth: just how did change happen inside plants, animals, psyches, cultures, or other self-sustaining wholes? The ensuing debate was simultaneously moral and scientific: the vitalist-mechanist controversy combined discourses of freedom and life with studies of morphology and matter.

In the early twenty-first century, Americans were again participating in debates of this hybrid kind, debates also premised on a fundamental distinction between life and matter. One powerful voice in these debates—over abortion, artificial life support, and embryonic stem cell research—was the “culture of life” position advocated by evangelical Christians and Roman Catholics, including President George W. Bush. This position is, I will contend, a latter-day vitalism. The culture-of-life movement echoes a claim made by Immanuel Kant, Driesch, and

Bergson: there exists a vital force inside the biological organism that is irreducible to matter because it is a free and undetermined agency. Like the vitalists who preceded them, defenders of the culture of life believe there to be something profoundly inadequate about a mechanistic metaphysic.

But not all vitalisms are alike. For Bush and other evangelicals, the vital force is a divine spirit that animates the matter of the embryo; they affirm what Kant, Driesch, and Bergson each rejected as a vitalism of soul. Driesch especially took pains to distinguish his entelechy from religious notions of a disembodied spirit. Persuaded by Kant's critique of dogmatic philosophy, he gave methodological priority to naturalistic explanation: Driesch sought to make the laboratory the final court of appeal with regard to questions of embryonic development. And because Driesch sought to avoid scientific as well as religious dogmatism, he emphasized that the verdicts of the lab were subject to revision as new data emerged.

Driesch believed that empirical experimentation in the lab on non-human systems would shed light on truths that applied also to human systems. The "formative" power (entelechy) was present in sea urchin embryos, human embryos, the larger organic whole called history (that "suprapersonal process which [is] . . . unique and not yet finished in [its] uniqueness"), and even perhaps in inorganic systems: "There is the material world as the world of chance, but there is also a world of form or order that manifests itself in certain areas of the material world, namely, in the biological individual, and probably, in another way, in phylogeny and history also; there may even be formlike constellations in what we call the Inorganic."¹

Driesch was a secularist in that he tried to bracket his religious convictions when engaging in public reasoning. But this is not to say that he believed science to be irrelevant to public morality. Quite to the contrary, when the Nazis invoked entelechy to support their claim that some forms of life were more vital than others—by the mid-1930s entelechy had become a kind of "Führer de l'organisme"²—Driesch objected vehemently. The science of critical vitalism, he said, led to the conclusion that entelechial vitality is present in *all* human organisms. As the historian Anne Harrington notes, for Driesch, entelechy "recognized no state boundaries," and thus "the only biological 'whole' to

which one could rightfully belong was 'humanity.' He opposed . . . the militaristic actions of nation against nation . . . [as] 'the most terrible of all sins' against the vitalistic principles of life, holistic cooperation and higher development."³

Two different vitalisms (one soul-based, one not), two different politics (one hawkish, one pacifist). I do not think that there is any *direct* relationship between, on the one hand, a set of ontological assumptions about life or matter and, on the other hand, a politics; no particular ethics or politics follow inevitably from a metaphysics. But the hierarchical logic of God-Man-Nature implied in a vitalism of soul easily transitions into a political image of a hierarchy of social classes or even civilizations. I will suggest below that something like this seems to have happened with the culture of life. Unlike that evangelical vitalism, the "critical," "modern," or "scientific" vitalism of Driesch pairs an *affirmation* of non-material agencies (entelechies) at work in nature with an *agnosticism* about the existence of any supernatural agency. Driesch's first loyalty was to the method of experimental science, and what that method revealed to him was the vitalistic nature of all being: no one group has the natural right to rule or dispose of the others.

Driesch rejected the notion of a soul; he strove to replace faith-based claims with experimental hypotheses, and he associated the idea of vital force with a liberal pacifism. Culture-of-life vitalism does none of these things. In the next section I will contrast that latter-day vitalism to the critical vitalism of Driesch, with a focus on the political valence of each.

Stem Cells

In May of 2005, the president of the United States appeared on the steps of the White House with babies and toddlers born from test-tube embryos, embryos produced as extras for couples using fertility technologies. Inhabiting the role of baby-kissing politician, Bush cooed at the children who would have been preemptively killed had the embryos from which they sprang been used for embryonic stem cell research. The *New York Times* described stem cell research as an "important 'culture of life' issue" for conservative Christians and the president, and it

noted that the theatricality of the White House event "demonstrated just how far Mr. Bush is willing to assert himself on policy that goes to what he considers the moral heart of his presidency. . . . Tom DeLay of Texas managed the opposition to the bill, also casting it in stark moral terms. 'An embryo is a person, a distinct internally directed, self-integrating human organism.'"⁴

In April of 2007, at a National Catholic Prayer Breakfast concurrent with Supreme Court deliberations over the constitutionality of a law banning late-term abortions, Bush reiterated his commitment to life: "We must continue to work for a culture of life where the strong protect the weak, and where we recognize in every human life the image of our Creator."⁵ Three days later, and four years into a preemptive war that killed (as of August 2007) 3,689 American soldiers and estimated to have preempted the lives of between tens of thousands and hundreds of thousands of Iraqis,⁶ Bush opposed any timetable for the withdrawal of U.S. troops and described the invasion and occupation as a "vital war," ostensibly consistent with "the culture of life."⁷ I will return to this dual celebration of life and violence later in the chapter.

Stem cell is a neologism for a bit of matter believed to be pluripotent, that is, able to become any of the various kinds of cells or tissues of the mature, differentiated organism. The hope is that a better understanding of pluripotency will enable scientists to, for example, induce the production of new nerve cells in damaged spinal cords or new brain tissue in people with Alzheimer's disease. A stem cell, while pluripotent, is not, however, "totipotent," or able by itself to give rise to a fully differentiated organism.⁸ The procedure offensive to advocates of the culture of life consists in extracting cells from the blastula stage of the fertilized egg, when the egg is changing from a solid mass of cells into a hollow ball of cells. The blastocyst may then continue on to the "gastrula" stage, where it differentiates into three germ layers, whose cells, "channeled into their respective fate paths," are no longer pluripotent.⁹ Bush and others oppose embryonic stem cell research because the extraction halts the morphological process at the gastrula stage. DeLay described it as "the dismemberment of living, distinct human beings for the purposes of medical experimentation."¹⁰

When human stem cells are taken from embryos, the embryos are destroyed. Stem cells can also be taken or grown from umbilical-cord

blood, adult human bone marrow, fertilized embryos too old to be capable of developing further, and, as of the time of this writing, human skin cells.¹¹ The Bush administration did not object to these sources of stem cells, perhaps because if blood, marrow, skin, and decayed embryos are dead matter rather than life, their use poses no threat to the culture of life.

A Natural Order of Rank

The culture of life was the central theme of Pope John Paul II's 1995 "Evangelium Vitae" before it was adopted by non-Catholic evangelicals in the United States to refer to a cluster of theological beliefs linked to a set of public policies.¹² The policies are easy to name: the culture of life has been invoked to support legislation to keep a feeding tube inserted into a woman whose brain function had ceased, to restrict access by minors to abortion and to outlaw certain modes of abortion, as well as to oppose federal funding for embryonic stem cell research. The theological beliefs within the culture of life are less clearly articulated, but the following four claims seem central:

1. *Life is radically different from matter.* Life is organized, active, self-propelled, and, in diverse registers of the term, "free." Matter is intrinsically passive and predetermined in its operation. Life may be, and usually is encountered as, embodied; and when it is, it operates alongside physicochemical entities and processes. But life is irreducible to the sum of those entities and processes. Life is detachable from embodiment.

2. *Human life is qualitatively different from all other life.* Like other organisms, humans are endowed with a life force, but unlike all others, this force is "a unique life-principle or soul."¹³ According to the president of the Culture of Life Foundation, "If society loses the sense of the essential distinction of human life from animal life and material things, whether in theory or in the practice of attempting to clone a human embryo, it has lost its stature as a human society. It has lost the compass of humanness and is, instead, laying the foundation for the replacement of a human living with biological chaos."¹⁴ The ensouled human organism is a quantum leap above other organisms.

3. *Human uniqueness expresses a divine intention.* Human exceptionalism is not a contingent event, an accident of evolution, or a function of the distinctive material composition of the human body. It results, rather, from an omnipotent being ("the Almighty") who implants a divine spark or soul into each human individual.

4. *The world is a divinely created order and that order has the shape of a fixed hierarchy.* Humans are not only organic, unique, and ensouled but they also occupy the top of the ontological hierarchy, in a position superior to everything else on earth.

The first belief, that life is irreducible to matter, resonates with what Driesch said was the core belief of any vitalism, that is, that the developmental processes of the organism are not "the result of a special constellation of factors known already to the sciences of the inorganic," but are rather "the result of an *autonomy peculiar*" to life.¹⁵ Insofar as this autonomy is conceived as a soul whose existence is not dependent on being in relationship to matter, it also qualifies as what Driesch called "old vitalism." This vitalism, in contrast to "modern" or "critical" vitalism, fails to avail itself of the benefit of scientific insight into nature. For Driesch the lab and the reasoning scientist were the privileged point of access to the life principle, and it was always "essential to reflect once more with an open mind on the actual biological data."¹⁶ Critical vitalism offered falsifiable hypotheses rather than dogma that only immoralists would be moved to contest.

Advocates of the culture of life affirm science and its products, in particular weaponry, insofar as it advances the power of the United States. But no science could contravene the theological verities of ensoulment, human exceptionalism, and the qualitative hierarchy of Creation. To DeLay, for example, no revelation from molecular chemistry or complexity theory about the self-organizing capacity of inorganic systems could disprove his conviction that matter is inert and only life is free and open ended. And no data concerning the differential plasticity of cells at the blastula and gastrula stages could possibly alter the conclusion that the fertilized egg is a person ensouled by the Almighty.¹⁷ For DeLay and other soul vitalists, the vital force is a personal rather than, as for Driesch and Bergson, an impersonal agency. To use the terms developed in chapter 4, it is the life of a unique subject rather than a life.

Soul vitalism is, in short, more anthropocentric and hierarchical than

critical vitalism. Its cosmos is a morally ranked Creation at the top of which God has placed his most vital creature, Man. Man is the most vital in the sense of being the most animate or alive and thus powerful, and also in the sense of possessing the greatest degree of freedom or capacity to act in ways that cannot be reduced to their situational or environmental determinants. Organic life, it is asserted, is not only higher in rank than inorganic matter but radically or qualitatively different from it. Likewise, human life is not only higher in rank than non-human organisms but qualitatively different from it, that is, ensouled. Life is special, but we as humans are the most special. This same logic continues at the level of different peoples: for Bush and his associates, although all humans are imbued with soul, not all of these souls are equally activated, vital, or free. Soul vitalism calls on those peoples who are "strong" to "protect the weak," even if it also reminds them to "recognize in every human life the image of our Creator."¹⁸ This paternalistic care is conjoined to a doctrine of vital war and to other manifestations of a not-so-hidden attraction to violence, such as the ardent defense of torture, guns, and all things military (the civilian presidency became, at the insistence of Bush, defined primarily as the job of a commander in chief).

How can love of life coexist with love of violence? How was this strange link between care and conquest forged? It seems that the idea of a hierarchy of natural species was extended, or bled, into the idea that peoples are also ranked according to degrees of freedom. That, at least, would be one explanation for how, for those inside the culture of life, the invasion of Iraq constitutes an act of caring for the weak that offers them the gifts of vitality and freedom. That explanation, however, focuses rather exclusively on human actants, on the interplay of different human beliefs and practices. A richer account would treat the culture of life as an assemblage of human and nonhuman actants. In it, the human belief in a cosmic hierarchy presided over by an Almighty patriarch, the human feeling of pity for the weak, and the human pleasure taken in acts of aggression and violence would congregate and join forces with pluripotent stem cells, ultrasound images of unborn fetuses, the impersonal momentum of American empire, and the spectacular fires and explosions in Iraq.

Evangelical advocates of the sanctity of life celebrate preemptive war;

Nazis invoked entelechy to make their case that the German nation had to fulfill its vital destiny and wage a vital war. Is there something intrinsic to vitalism, to faith in the autonomy of life, that allies itself with violence? The counterexample of Driesch suggests otherwise. I am not sure just what it was about Driesch's brand of vitalism that fostered his generous politics, but a good candidate is his practical work in the laboratory: his hands-on, face-to-face, repeated encounters with sea urchins, seawater, sulfuric acid, and various pieces of glass and metal equipment. Such attentiveness to nonhuman matter and its powers is likely to erode any notion of a preformed or static hierarchy of nature.

Driesch fought to dissociate his theory of organic wholes from those for whom vitality was unevenly distributed across peoples. Driesch ultimately defended not only the entelechial equality of all people but also the possibility that this vitality is shared by *all* things. He suggests the latter at the end of his *The History and Theory of Vitalism*, where he surprises the reader by rejecting the very life-matter binary on which he had founded his argument. The universe, he ultimately concludes, is not dead matter sometimes supplemented with organic life, but one big organism, "a *something in evolution*. All natural becoming is like *one great embryology*." Every thing is entelechial, life-ly, vitalistic. Driesch ends his defense of vitalism by "destroying" "the [very] difference between 'mechanism' and 'Vitalism,' . . . which we have established so carefully."¹⁹ It is at this point, I would say, that Driesch begins to transition from vitalism to a vital materialism.

Vitality and Freedom

Mikhail Bakhtin, a mechanistic materialist, criticized Driesch's claim that the blastomere contained multiple intensities, only one of which, after being chosen by entelechy, became actual. For Bakhtin it was simply not true that there existed several possible paths: each act of morphogenesis only takes place under a singular set of conditions, and so there exists only *one* possible outcome, the one determined precisely by the physicochemical situation at hand. Driesch's "talk of several potentials and possibilities serves only one purpose: it allows for the presupposition that they are all equally possible . . . and that therefore

it is possible to choose one of them freely. Freedom of choice . . . is the ground of all of Driesch's constructions."²⁰

The link between vitalism and violence is, I think, contingent. But I agree with Bakhtin that what is essential to vitalism is an affirmation of free activity: a freedom imagined by evangelical Christians as free will and by the critical vitalists as the less personal force of *élan vital* or entelechy. Whether it is the freedom of a certain "indefiniteness of correspondence between specific cause and specific effect,"²¹ the freedom of a "ceaseless upspringing of something new,"²² or the freedom to invade the territory of those who hate freedom because they "love terror,"²³ vitalism recurs because it defends a world that is not predetermined but open, a land of opportunity for creativity, surprise, and choice. Freedom is an appealing idea: note that what generated all the excitement about stem cells is their pluripotentiality, or open-ended freedom to become any of the various kinds of cells or tissues of the mature, differentiated organism.

Analogous to *Bildungstrieb*, entelechy, *élan vital*, and soul is the notion of the out-side. This material vitality is resistant to calculation, hovering in what Georges Canguilhem called "des enclaves d'indetermination, des zones de dissidence, des foyers d'héresie."²⁴ The various figures of free vitality stand as reminders to secular modernists that while we can surely intervene in the material world, we are not in charge of it, for there are "foreign" powers about.

Though the controversy about embryonic stem cell research in the United States is often depicted as a struggle between religious people and scientific people (or, as the *Times* article cited earlier implies, as a clash between those for whom morality trumps medical progress and those for whom the reverse is true), I have presented it as the return of a vitalism-materialism debate. Vitalism has repeatedly risen from the ashes of scientific critiques of it. As Francis Sumner put it in a 1916 review of Driesch's *The History and Theory of Vitalism*, "Vitalism will not down. A consideration of recent literature drives us to this conclusion. One of the most widely read philosophical works of the past few decades (Bergson's *Creative Evolution*) is primarily a defense of this doctrine. The writings of Driesch, both in German and in English, have followed one another with marvelous rapidity and forced themselves upon the attention of even the most unswerving mechanist."²⁵

But vitalism is the reaction formation to mechanistic materialism. There is, of course, a rich tradition of another materialism, one in which atoms swerve, bodies are driven by conatus, and "unformed elements and materials dance."²⁶ From the perspective of this tradition, mechanical materialism underestimates the complex, emergent causality of materiality, a materiality figured by Louis Althusser as a "process that has no subject."²⁷ The machine model of nature, with its figure of inert matter, is no longer even scientific. It has been challenged by systems theory, complexity theory, chaos theory, fluid dynamics, as well as by the many earlier biophilosophies of flow that Michel Serres has chronicled in *The Birth of Physics*.²⁸ It is also challenged, as we shall see, by the National Institutes of Health's report on stem cells. Yet the popular image of materialism as mechanistic endures, perhaps because the scientific community tends to emphasize how human ingenuity can result in greater control over nature more than the element of freedom in matter. And perhaps that is because to highlight the limits of human power and the indeterminate vitality of matter would bring science into too close an alliance with theology, such as the latter-day vitalism of Bush.

Diving into Matter

The National Institutes of Health 2001 report on stem cells made two claims that surprised me. The first was that no one yet knows whether "embryonic stem cells" exist as such in human embryos in the womb, that is, whether they have a presence *before* they are extracted from blastocysts and placed in a new, laboratory-generated milieu. Though "most scientists now agree that *adult* stem cells exist in many tissues of the human body (*in vivo*). . . , it is less certain that embryonic stem cells exist as such in the embryo. Instead, embryonic stem cells . . . *develop in tissue culture* after they are *derived* from the inner cell mass of the early embryo."²⁹ The second startling claim was that it is also uncertain whether even the embryonic stem cells produced in the lab are in fact "homogeneous and undifferentiated," even though they appear to be and their promise of pluripotency is premised on that state of pure, quivering indeterminacy.

My response to these points was surprise, even alarm. What? Embry-

onic stem cells might not even exist in the body and their laboratory avatars might not even be an exemplar of undifferentiated pluripotency? My reaction revealed the extent to which I also had been thinking of my body as a physiological mechanism with fixed and determinate parts, including stem cells. I had absorbed the machine model of nature, and if I was not careful it would, as a default, limit my ability to perceive the vitality of things. In contrast, the National Institutes of Health affirmed Bergson's view that "materiality" is a flow, an indivisible continuum of becomings whose protean elements are not only exquisitely imbricated in a flowing environment but also are that very flow. Extensive and intensive forms swirl around and become an open and living whole, a "whole that is not given," as Bergson would say.³⁰ If it turns out that there are no "embryonic stem cells" in vivo, this may be because an embryo is not a collection of discrete parts, perhaps not even of protoparts or preformed possibilities, and that it is only in the closed system of the lab that what Bergson called the "indivisible continuity" of life allows itself to be sliced and diced into "embryonic stem cells." The human technological ability to create differentiation in cells is not an explanation of why they differentiate on their own. We can trigger this process, but we do not know what its own trigger is. (Driesch would name that internal trigger *entelechy*.)

My foray into Kant, Driesch, Bergson, and the culture of life was propelled by the desire to understand the appeal of the life-matter binary and its correlate, the machine model of nature, as well as to put forward another materialism, one that acknowledges an indeterminate vitality in the world without slipping back into a vitalism of nonmaterial agents. Ralph Waldo Emerson wrote in his journal in 1848: "I have no longer any taste for these refinements you call life, but shall dive again into brute matter."³¹ The vital materialist, too, goes diving there—and finds matter not so brute at all.

Jobann Gottfried von Herder, objecting to what he saw as Kant's theologically induced blindness to the pulsing vitality of matter, sought to put "an end to all the objectionable expressions of how God, according to this or that system, may work on and through dead matter. It is not dead but lives. For in it and conforming to its outer and inner organs, a thousand living, manifold forces are at work. The more we learn about matter, the more forces we discover in it, so that the empty concep-

tion of a dead extension completely disappears."³² The vital materialist affirms a figure of matter as an active principle, and a universe of this lively materiality that is always in various states of congealment and diffusion, materialities that are active and creative without needing to be experienced or conceived as partaking in divinity or purposiveness. Driesch and Bergson share with me a picture of the universe in which becoming continually vies with being, but for them becomings include a moment of transcendence in the form of *élan vital* or *entelechy*. Despite their respect for the complexity of physicochemical processes, they could not quite imagine a materialism adequate to the flowering of life. But the critical vitalists came very close, and I locate my vital materialism in their wake.

Political Ecologies

In this chapter I have two goals. The first is easier than the second: I retell a couple of worm stories, first heard from Charles Darwin and Bruno Latour, to show how worms are “like” us. Here, as elsewhere in the book, I find in a non- or not-quite-human body evidence of the vitality of matter. Worms, or electricity, or various gadgets, or fats, or metals, or stem cells are actants, or what Darwin calls “small agencies,” that, when in the right confederation with other physical and physiological bodies, can make big things happen. The second goal is to confront the hard question of the *political* capacity of actants. Even if a convincing case is made for worms as active members of, say, the ecosystem of a rainforest, can worms be considered members of a *public*? What is the difference between an ecosystem and a political system? Are they analogs? Two names for the same system at different scales? What is the difference between an actant and a political actor? Is there a clear difference? Does an action count as *political* by virtue of its having taken place “in” a public? Are there nonhuman members of a public? What, in sum, are the implications of a (meta)physics of vibrant materiality for political theory?

After the worm stories, I try to explore these very difficult questions by engaging two theories of democracy. I will focus on their different understandings of what a public is, how a public is formed and deformed, and what counts as a political act. I choose the first theory, by John Dewey, because in it the analogy between an ecosystem and a political system is fairly strong and the gap between action and political action relatively small. Key here is Dewey's notion of the generative field that he calls "conjoint action." Conjoint action is the agency behind the emergence of a public; a public's agency or capacity to produce effects is also a function of conjoint action. Dewey's theory leaves open the possibility that some of the acts of conjoint action originate in non-human (natural and technological) bodies. I choose the second theory, that of Jacques Rancière, because it emphasizes the extent to which the political constitutes a distinctive realm of action and thus outlines why a polity ought not to be considered an ecology. On Rancière's account, the public is constituted by bodies with uniquely human capabilities, talents, and skills, and political action is something that only they can do. Both models are instructive, and together they help us begin to discern the politics of vital materialism.

The "Small Agency" of Worms

Darwin watched English worms: many, many of them for many, many hours. He watched how they moved, where they went, and what they did, and, most of all, he watched how they made topsoil or "vegetable mould": after digesting "earthly matter," they would deposit the castings at the mouth of their burrows, thus continually bringing to the surface a refined layer of vegetable mold. It is, writes Darwin, "a marvellous reflection that the whole of the . . . mould over any . . . expanse has passed, and will again pass, every few years through the bodies of worms."¹ But the claim with which Darwin ends his *Formation of Vegetable Mould through the Actions of Worms with Observations on Their Habits* (1881) is not about biology or agronomy but about history: "Worms have played a more important part in the history of the world than most persons would at first assume" (*Mould*, 305). How do worms make history? They make it by making vegetable mold, which makes possible "seedlings of all kinds," which makes possible an earth hospitable to humans, which

makes possible the cultural artifacts, rituals, plans, and endeavors of human history (Mould, 309). Worms also "make history" by preserving the artifacts that humans make: worms protect "for an indefinitely long period every object, not liable to decay, which is dropped on the surface of the land, by burying it beneath their castings," a service for which "archaeologists ought to be grateful to worms" (Mould, 308).

Darwin claims that worms inaugurate human culture and then, working alongside people and their endeavors, help preserve what people and worms together have made. Darwin does not claim that worms intend to have this effect so beneficial to humankind, or that any divine intention is at work through them. Rather, that the exertions of worms contribute to human history and culture is the unplanned result of worms acting in conjunction and competition with other (biological, bacterial, chemical, human) agents. Darwin describes the activities of worms as one of many "small agencies" whose "accumulated effects" turn out to be quite big.² It would be consistent with Darwin to say that worms participate in heterogeneous assemblages in which agency has no single locus, no mastermind, but is distributed across a swarm of various and variegated vibrant materialities.³

Worms do not intend to enable human culture, but worms do, according to Darwin, pursue what appear to be prospective endeavors. His close observations of worms led him to conclude that worm actions are not the result of "an unvarying inherited impulse" (Mould, 64–65), but are intelligent improvisations. For example, in "plugging up the mouths of their burrows" with leaves, worms "act in nearly the same manner as would a man" — that is, they make apparently free, or at least unpredictable, decisions based on the available materials. Though they usually seize leaves (to be dragged to their burrows) by their pointed ends, "they do not act in the same unvarying manner in all cases," but adjust their technique to the particular situation and its set of possibilities: Which leaves are available? Is the ground wet or dry? What other creatures are around? (Mould, 312). Further evidence of a certain freedom to their acts is the phenomenon of a worm *overriding* a normal physiological response, as when a worm fails to recoil and retreat to its burrow when exposed to a bright light. Darwin notes that this overruling occurs when a worm is focused closely on a task, such as eating, dragging leaves, or mating:

When a worm is suddenly illuminated and dashes like a rabbit into its burrow . . . we are at first led to look at the action as a reflex one. The irritation of the cerebral ganglia appears to cause certain muscles to contract in an inevitable manner, independently of the will or consciousness . . . , as if it were an automaton. But [this is contested by] . . . the fact that a worm when in any way employed and in the intervals of such employment, whatever set of muscles and ganglia may then have been brought into play, is often regardless of light. . . . With the higher animals, when close attention to some object leads to the disregard of the impressions which other objects must be producing on them, we attribute this to their attention being then absorbed; and attention implies the presence of a mind. (*Mould*, 23–24)

Darwin's worms pay attention, and they respond appropriately to unprecedented situations, displaying what Hans Driesch called the power of "individual correspondence." Their actions are neither an expression of divine purpose nor reducible to an unvarying mechanical instinct. Let us call the assemblage in which these wiggling actants participate not (as in Baruch Spinoza) God or Nature, but History or Nature, or, to be more precise, British History or England's Nature. This assemblage is an ecology in the sense that it is an interconnected series of parts, but it is not a fixed order of parts, for the order is always being reworked in accordance with a certain "freedom of choice" exercised by its actants.

In *Pandora's Hope*, Latour tells a story about Amazonian rather than English worms, and again we see that worms play a more important part in the history of (that part of) the world than most persons would at first suppose. The story begins with the puzzling presence, about ten meters into the rainforest, of trees typical only of the savanna. The soil under these trees is "more clayey than the savanna but less so than the forest." How was the border between savanna and forest breached? Did "the forest cast its own soil before it to create conditions favorable to its expansion," or is the savanna "degrading the woodland humus as it prepares to invade the forest"?⁴ This question presumes a kind of vegetal agency in a natural system understood not as a mechanical order of fixed laws but as the scene of not-fully-predictable encounters between multiple kinds of actants. Savanna vegetation, forest trees, soil, soil microorganisms, and humans native and exotic to the rainforest are all responding, in real time and without predetermined outcome, to each other and to the collective force of the shifting configurations that form.

The task at hand for humans is to find a more horizontal representation of the relation between human and nonhuman actants in order to be more faithful to the style of action pursued by each.

Latour and the scientists he is observing eventually conclude that, for reasons unknown to the humans, worms had gathered at the border and produced a lot of aluminum, which transformed the silica of the sandy soil into the clay more amenable to forest trees, and so it was the forest that was advancing into the savanna.⁵ It is difficult to pinpoint just who or what was the key operator or “assemblage converter” here:⁶ The worms? Their diet? The aluminum excrement? Had the human inhabitants of the rainforest done something to make the worms migrate? These various materialities do not exercise exactly the same kind of agency, but neither is it easy to arrange them into a hierarchy, for in some times and places, the “small agency” of the lowly worm makes more of a difference than the grand agency of humans.

We consider it a political act, for example, when people distribute themselves into racially and economically segregated neighborhoods, even if, in doing so, they are following a cultural trend and do not explicitly intend, endorse, or even consider the impact of their movements on, say, municipal finances, crime rates, or transportation policy. There are many affinities between the act of persons dragging their belongings to their new homes in the suburbs and the acts of worms dragging leaves to their burrows or migrating to a savanna-forest border.

A Note on Anthropomorphism

Darwin and Latour help make a case for worms as vibrant material actants whose difference from us may be smaller than we thought. And without worms or aluminum (or edibles or stem cells) and their conative endeavors, it would be difficult if not impossible for humans to exercise our exquisite wills or intentions. It seems both that worms are “like” us and that (to use a Kantian formulation) we must posit a certain nonhuman agency as the condition of possibility of human agency. Or are these claims fatally dependent on anthropomorphization?

Anthropomorphizing, the interpretation of what is not human or personal in terms of human or personal characteristics, is clearly a part of

the story, but it is less clear how fatal it is. According to George Levine, "Darwin's extraordinary curiosity about the talents of worms has to do with his inveterate anthropomorphism," which was "absolutely central to his larger theoretical project."⁷ Darwin anthropomorphized his worms: he saw in them an intelligence and a willfulness that he recognized as related to his own. But the narcissism of this gaze backfired, for it also prompted Darwin to pay close attention to the mundane activities of worms, and what came to the fore through paying attention was their own, distinctive, material complexity. He was able to detect what natural historians call the "jizz" of a worm, which the geographer Jamie Lorimer describes as "the unique combination of properties . . . that allows its ready identification and differentiation from others."⁸ In a vital materialism, an anthropomorphic element in perception can uncover a whole world of resonances and resemblances—sounds and sights that echo and bounce far more than would be possible were the universe to have a hierarchical structure. We at first may see only a world in our own image, but what appears next is a swarm of "talented" and vibrant materialities (including the seeing self).

A touch of anthropomorphism, then, can catalyze a sensibility that finds a world filled not with ontologically distinct categories of beings (subjects and objects) but with variously composed materialities that form confederations. In revealing similarities across categorical divides and lighting up structural parallels between material forms in "nature" and those in "culture," anthropomorphism can reveal isomorphisms. A good example of this is the sensibility expressed in the *Great Treatise on Supreme Sound*, a fourteenth-century handbook for musicians. It describes the various sounds of the lute in terms of a movement style expressed by an animal and instructs the lute player to mimic that movement style: to make a staccato sound, the player should try to reproduce with his finger the motion of "an emaciated crow perched on a bare tree or pecking at the snow in hope of finding something to eat"; to make the characteristic sound that comes when the index, middle, and third fingers grip two strings at once, the lutist is to render his hand in the image of "the nonchalant flick of a carp's tail"; to produce a "floating sound," fingers should imitate the series of movements made by a "white butterfly fluttering at flower level" who "lingers but does not stay."⁹ In the twentieth century, complexity theory also focused on iso-

morphic resonances. Clusters of neurons in a human brain, groupings of buildings in a city, and colonies of slime molds all have been shown to follow similar organizational rules; each is an instance of what Steven Johnson has called "organized complexity."¹⁰

The Public and Its Problems

What, if anything, does the claim that worms and trees and aluminum are participants in an ecosystem say about political participation? The answer depends in part on whether a political system itself constitutes a kind of ecosystem. Dewey's notion of a public suggests that it does. I turn now to him and to the advantages and limits of modeling politics as an ecology. If Darwin highlights the power of choice in worms to contest the idea that worms are moved only by animal instinct or bodily affect, Dewey closes the gap between human and nonhuman from the other direction: he highlights the affective, bodily nature of human responses.

In *The Public and Its Problems*, Dewey presents a public as a confederation of bodies, bodies pulled together not so much by choice (a public is not exactly a voluntary association) as by a shared experience of harm that, over time, coalesces into a "problem." Dewey makes it clear that a public does not preexist its particular problem but emerges in response to it.¹¹ A public is a contingent and temporary formation existing alongside many other publics, protopublics, and residual or postpublics. Problems come and go, and so, too, do publics: at any given moment, many different publics are in the process of crystallizing and dissolving.¹²

When diverse bodies suddenly draw near and form a public, they have been provoked to do so by a problem, that is, by the "indirect, serious and enduring" consequences of "conjoint action."¹³ Problems are effects of the phenomenon of conjoint action. Like the conjoint action of Darwin's worms, the conjoint action of Dewey's citizens is not under the control of any rational plan or deliberate intention. No efficient cause of the problems it generates can really be pinpointed. What is more, there is no action that is not conjoint, that does not, in other words, immediately become enmeshed in a web of connections. For Dewey, any action is always a trans-action, and any act is really but an initiative

that gives birth to a cascade of legitimate and bastard progeny. This is because an act can only take place in a field already crowded with other endeavors and their consequences, a crowd with which the new entrant immediately interacts, overlaps, interferes. The field of *political* action is thus for Dewey a kind of ecology. No one body owns its supposedly own initiatives, for initiatives instantly conjoin with an impersonal swarm of contemporaneous endeavors, each with its own duration and intensity, with endeavors that are losing or gaining momentum, rippling into and recombining with others. In Dewey's own terms, conjoint actions generate "multitudinous consequences," and each of these consequences "crosses the others" to generate its own problems, and thus its own publics or "group of persons especially affected."¹⁴

Dewey imagines a public as a set of bodies affected by a common problem generated by a pulsing swarm of activities. Let us bracket for the moment Dewey's claim that a public is a group of "persons especially affected" and leave aside the question of what *kinds* of bodies can do the "acts" that are conjoining, and focus instead on the way Dewey defines the members of a public in terms of their "affective" capacity. We would then get this (Spinozist) version of Dewey's theory of the public and of conjoint action: problems give rise to publics, publics are groups of bodies with the capacity to affect and be affected; problems are signals that the would-be or protomembers of a public had already encountered the indirect effects of other endeavoring bodies, effects that have decreased the capacity for action of the protomembers. A public is a cluster of bodies harmed by the actions of others or even by actions born from their own actions as these trans-act; harmed bodies draw near each other and seek to engage in new acts that will restore their power, protect against future harm, or compensate for damage done—in that consists their political action, which, fortunately or unfortunately, will also become conjoint action with a chain of indirect, unpredictable consequences.

Dewey presents the members of a public as having been *inducted* into rather than *volunteering* for it: each body finds itself thrown together with other harmed and squirming bodies. Dewey's political pragmatism, like the one expressed at the end of my discussion of the black-out in chapter 2, emphasizes consequences more than intentions and makes "responsibility" more a matter of responding to harms than of

identifying objects of blame. Dewey's concept of conjoint action distributes responsibility to many different (human) actors. What is more, in naming a *problem* (rather than an act of will) as the driving force behind the formation of a public, Dewey (almost) acknowledges that a *political* action need not originate in human bodies at all. For is it not the case that some of the initiatives that conjoin and cause harm started from (or later became conjoined with) the vibrant bodies of animals, plants, metals, or machines?

In *Art as Experience*, Dewey comes close to saying that even human initiatives are not exclusively human; he flirts with a posthuman conception of action when he notes the porosity of the border between a human body and its out-side: "The epidermis is only in the most superficial way an indication of where an organism ends and its environment begins. There are things inside the body that are foreign to it, and there are things outside of it that belong to it *de jure* if not *de facto*; that must be taken possession of if life is to continue. The need that is manifest in the urgent impulses that demand completion through what the environment—and it alone—can supply, is a dynamic acknowledgment of this dependence of the self for wholeness upon its surroundings."¹⁵

Of course, Dewey is not quite a vital materialist. His language quoted above ultimately relegates the nonhuman and the nonorganic to the role of "environment" rather than actor and affirms a profound "dependence" of humans on "surroundings," but not a true reciprocity between participants of various material compositions. And Dewey generally assumes that the acts in conjoint action are *human* endeavors. Such anthropocentrism is impossible to avoid completely: as Theodor Adorno said, we are (almost) blind to the gap between concept and thing, and we have a tendency, as did even Spinoza, to privilege *human* efforts even when acknowledging the presence of other kinds of conative bodies. A pragmatic approach to politics, which emphasizes problem solving, may call forth with particular vigor what Henri Bergson described as action-oriented perception. For are not human bodies the ones best equipped to analyze a problem and devise strategies for its solution? All kinds of bodies may be able to join forces, but a pragmatist would be quick to note that only *some* bodies can make this association into a *task* force. And yet there also persists a self-interested motivation for the presumption that all material bodies are potential members of the public into

which one has been inducted. Such a presumption will enable me to discern more fully the extent of their power over me: How is this food or worm or aluminum contributing to a problem affecting me? How might these nonhumans contribute to its solution?

Latour pushes Dewey's theory of the public and its problems further in a vital materialist direction. He does so, first, by inventing the concept of an actant, which is an attempt, as is conjoint action, to pry some space between the idea of action and the idea of human intentionality. Second, Latour explicitly rejects the categories of "nature" and "culture" in favor of the "collective," which refers to an ecology of human and nonhuman elements.¹⁶ A polity is one of these collectives. Third, Latour frames political action not as the enactment of choices but as the call-and-response between "propositions."¹⁷ A proposition has no decisionistic power but is a lending of weight, an incentive toward, a pressure in the direction of one trajectory of action rather than another.¹⁸ Any given response to a problem is less the result of "deliberation" than of the "fermentation" of the various propositions and energies of the affected bodies.¹⁹ Finally, Latour distributes agentic capacity also to the "event." Policy directions and political moods are irreducible to the sum of the propositions of even an ontologically plural public, for there is always a slight surprise of action: "There are events. I never act; I am always slightly surprised by what I do. That which acts through me is also surprised by what I do, by the chance to mutate, to change, and to bifurcate."²⁰

Dewey's account of a public as the product of conjoint action paints a picture of a political system that has much in common with a dynamic natural ecosystem. This, along with his claim that a member of a public is one "affected by the indirect consequences of transactions to such an extent that it is deemed necessary to have those consequences systematically cared for,"²¹ paves the way for a theory of action that more explicitly accepts nonhuman bodies as members of a public, more explicitly attends to how they, too, participate in conjoint action, and more clearly discerns instances of harm to the (affective) bodies of animals, vegetables, minerals, and their ecocultures. These harms will surely provoke some "events" in response, but it is an open question whether they will provoke people to throw their weight toward a solution to them. Humans may notice the harm too late to intervene effectively, or their

strategies of intervention may be ineffective, or they simply may deem it unnecessary “to systematically care for” a harm, as we regularly sacrifice some actants for the sake of ourselves. For while every public may very well be an ecosystem, not every ecosystem is democratic. And I cannot envision any polity so egalitarian that important human needs, such as health or survival, would not take priority.

Why not? Since I have challenged the uniqueness of humanity in several ways, why not conclude that we and they are equally entitled? Because I have not eliminated all differences between us but examined instead the affinities across these differences, affinities that enable the very assemblages explored in the present book. To put it bluntly, my conatus will not let me “horizontalize” the world completely. I also identify with members of my species, insofar as they are bodies most similar to mine. I so identify even as I seek to extend awareness of our interinvolvements and interdependencies. The political goal of a vital materialism is not the perfect equality of actants, but a polity with more channels of communication between members. (Latour calls this a more “vascularized” collective.²³)

There are many practical and conceptual obstacles here: How can communication proceed when many members are nonlinguistic? Can we theorize more closely the various forms of such communicative energies? How can humans learn to hear or enhance our receptivity for “propositions” not expressed in words? How to translate between them? What kinds of institutions and rituals of democracy would be appropriate? Latour suggests that we convene a “parliament of things,” an idea that is as provocative as it is elusive.²³ Perhaps we can make better progress on this front by looking at a theory designed to open democracy to the voices of excluded humans. I turn to Rancière’s theory of democracy as disruption.

Disruptions and the Demos

Compared to Dewey and Latour, Rancière is less concerned with how a public emerges than with the means by which its (apparent) coherence can be interrupted. In his influential *Disagreement*, he focuses on a potentially disruptive human force that exists within (though is not

recognized by) the public. He calls this the force of the people or of the "demos." The democratic act par excellence occurs when the demos does something that exposes the arbitrariness of the dominant "partition of the sensible."²⁴ This is the partition that had been rendering some people visible as political actors while pushing others below the threshold of note. Politics, as Rancière frames it, consists not in acts that preserve a political order or respond to already articulated problems, but is "the name of a singular disruption of this order of distribution of bodies."²⁵

These singular disruptions are neither intentional acts nor aleatory eruptions; Rancière locates them in the between-space of the staged event. The demos more or less spontaneously constructs "a polemical scene" within which what was formerly heard as noise by powerful persons begins to sound to them like "argumentative utterances."²⁶ Such scenes, however different in their cast of characters, always tell the same story: the story of "the equality of speaking beings."²⁷ The "mise-en-scènes that reconfigure the relations of the visible and the sayable" expose "the ultimate secret of any social order,"²⁸ that is, that "there is no natural principle of domination by one person over another."²⁹

For Rancière, then, the political act consists in the exclamatory interjection of affective bodies as they enter a preexisting public, or, rather, as they reveal that they have been there all along as an unaccounted-for part. (Rancière would be helped here, I think, were he to adopt Dewey's insight about multiple, coexisting publics, rather than speak of a single demos with an overt and a latent set of members.) What difference does this interjection by formerly ignored bodies make, according to Rancière? It modifies the "partition of the perceptible" or the "regime of the visible,"³⁰ and this changes everything. As an example Rancière cites the interruption staged by the plebeians of the Roman (patrician) Republic:

The plebs gathered on the Aventine . . . do not set up a fortified camp in the manner of the Scythian slaves. They do what would have been unthinkable for the latter: they establish another order, another partition of the perceptible, by constituting themselves not as warriors equal to other warriors but as speaking beings sharing the same properties as those who deny them these. They thereby execute a series of speech acts that mimic those of the patricians: they pronounce imprecations and apotheoses; they delegate one

of their number to go and consult *their* oracles; they give themselves representatives by rebaptizing them. In a word, they conduct themselves like beings with names. Through transgression, they find that they too . . . are endowed with speech that does not simply express want, suffering, or rage, but intelligence.³¹

The plebs managed to repartition the regime of the sensible. Is this an exclusively human power? Though the metaphors of eruption or disruption that Rancière employs may suggest that the political act is “like” a force of nature, his description of the act increasingly takes on a linguistic cast (“disruption” becomes “interruption” and then “disagreement”). It is an “objection to a wrong,” where a wrong is defined as the unequal treatment of beings who are equally endowed with a capacity for *human* speech. When asked in public whether he thought that an animal or a plant or a drug or a (nonlinguistic) sound could disrupt the police order, Rancière said no: he did not want to extend the concept of the political that far; nonhumans do not qualify as participants in a demos; the disruption effect must be accompanied by the desire to engage in reasoned discourse.³²

Despite this reply, I think that even against his will, so to speak, Rancière’s model contains inklings of and opportunities for a more (vital) materialist theory of democracy. Consider, for example, the way it imagines the being of the demos: not as a formed thing or fixed entity, but as an unruly activity or indeterminate wave of energy. The demos is, we read, “neither the sum of the population nor the disfavored element within,” but an “excess” irreducible to the particular *bodies* involved.³³ This idea of a force that traverses bodies without itself being one resonates with Spinoza’s *conatus* and Deleuze’s notion of (the motility of) intensities, discussed in chapters 2 and 4, respectively. Does not the protean “excess” that Rancière invokes flow through nonhuman bodies? Might not this be what the *New York Times* was pointing to by saying that the grid “lives and dies by its own rules”? (Or what is intuited in phrases like “the war has a momentum of its own”?) Rancière implicitly raises this question: Is the power to disrupt really limited to human speakers?

A second opportunity for a more materialist theory of democracy arises when Rancière chooses to define what counts as political by what effect is generated: a political act not only disrupts, it disrupts in such

a way as to change radically what people can "see": it repartitions the sensible; it overthrows the regime of the perceptible. Here again the political gate is opened enough for nonhumans (dead rats, bottle caps, gadgets, fire, electricity, berries, metal) to slip through, for they also have the power to startle and provoke a gestalt shift in perception: what was trash becomes things, what was an instrument becomes a participant, what was foodstuff becomes agent, what was adamantine becomes intensity. We see how an animal, plant, mineral, or artifact can sometimes catalyze a public, and we might then see how to devise more effective (experimental) tactics for enhancing or weakening that public. It feels dangerous to leave the gate open, for it renders many conceptual, moral, and psychological possessions exposed and vulnerable. It seems safer to figure eruptive events as "argumentative utterances."

It is, of course, quite normal for democratic theory to be anthropocentric and quite reasonable to tie political participation to some degree of linguistic or deliberative competence.³⁴ These tendencies have directed democratic theorists toward important problems: the uninformed voter and a scarcity of deliberative forums, the unequal access of different human groups to political power, the harm caused when we fail to discern not just established constituencies but also what William Connolly has described as those protean identities emerging from inarticulate "currents of experience."³⁵

But what if we loosened the tie between participation and human language use, encountering the world as a swarm of vibrant materials entering and leaving agentic assemblages? We might then entertain a set of crazy and not-so-crazy questions: Did the typical American diet play any role in engendering the widespread susceptibility to the propaganda leading up to the invasion of Iraq? Do sand storms make a difference to the spread of so-called sectarian violence? Does mercury help enact autism? In what ways does the effect on sensibility of a video game exceed the intentions of its designers and users? Can a hurricane bring down a president? Can HIV mobilize homophobia or an evangelical revival? Can an avian virus jump from birds to humans and create havoc for systems of health care and international trade and travel?

Though Rancière objects to the "Platonic" prejudice against the demos, which positions commoners as defective versions of men in possession of logos, to imagine politics as a realm of human activity

alone may also be a kind of prejudice: a prejudice against a (nonhuman) multitude misrecognized as context, constraint, or tool. A vital materialist theory of democracy seeks to transform the divide between speaking subjects and mute objects into a set of differential tendencies and variable capacities. I think this is also what Darwin and Latour were trying to do when they told their worm stories.

A Diet of Worms

As our ability to detect and translate the more subtle forms of animal behavior and communication has grown, so, too, has our willingness to attribute intelligence to it and to recast it from behavior to action. But to truly take worms seriously, we would not only have to revise our assessment of their activities but also need to question our larger faith in the uniqueness of humans and to reinvent concepts now attached to that faith.³⁶ Theories of democracy that assume a world of active subjects and passive objects begin to appear as thin descriptions at a time when the interactions between human, viral, animal, and technological bodies are becoming more and more intense. If human culture is inextricably enmeshed with vibrant, nonhuman agencies,³⁷ and if human intentionality can be agentic only if accompanied by a vast entourage of nonhumans,³⁸ then it seems that the appropriate unit of analysis for democratic theory is neither the individual human nor an exclusively human collective but the (ontologically heterogeneous) “public” coalescing around a problem.³⁹ We need not only to invent or reinvoke concepts like *conatus*, *actant*, *assemblage*, *small agency*, *operator*, *disruption*, and the like but also to devise new procedures, technologies, and regimes of perception that enable us to consult nonhumans more closely, or to listen and respond more carefully to their outbreaks, objections, testimonies, and propositions. For these offerings are profoundly important to the health of the political ecologies to which we belong.

Of course, to acknowledge nonhuman materialities as participants in a political ecology is not to claim that everything is always a participant, or that all participants are alike. Persons, worms, leaves, bacteria, metals, and hurricanes have different types and degrees of power, just as different persons have different types and degrees of power, different

worms have different types and degrees of power, and so on, depending on the time, place, composition, and density of the formation. But surely the scope of democratization can be broadened to acknowledge more nonhumans in more ways, in something like the ways in which we have come to hear the political voices of other humans formerly on the outs: "Are you ready, and at the price of what sacrifice, to live the good life together? That this highest of moral and political questions could have been raised, for so many centuries, by so many bright minds, *for human only* without the nonhumans that make them up, will soon appear, I have no doubt, as extravagant as when the Founding Fathers denied slaves and women the vote."⁴⁰

8

Vitality and Self-interest

In response to a series of practical problems, including Hurricane Katrina (August 2005), expensive gasoline, tornadoes in months and places where they had not normally occurred, the dead and tortured bodies from the invasions of Iraq and Afghanistan, and pathogens in spinach, hot peppers, chicken, and beef produced by long-distance factory farming, an American public seemed to be coalescing. Stirred from their "fatalistic passivity" by a series of harms, some members of this public began to note aloud—in the news, in schools, on the street—the self-destructive quality of the American way of life.¹ Environmentalism, invented in the 1970s, was making a comeback. This comeback was motivated in large part by self-interest, by a fear of the environmental "blowback" of human actions.²

Following John Dewey, I do not object to the self-interested character of this emergent public. But I do wonder whether environmentalism remains the best way to frame the problems, whether it is the most persuasive rubric for challenging the American equation of prosperity with wanton consumption, or for inducing, more generally, the political will to create more sustainable political economies in or adjacent to global

capitalism. Would a discursive shift from environmentalism to vital materialism enhance the prospects for a more sustainability-oriented public? That is an open, empirical question. In advance it is possible only to say that the two concepts call to the fore different sets of affects and invoke different histories of use, and thus are likely to catalyze different publics. It is difficult, for example, for a public convened by environmentalism to include animals, vegetables, or minerals as bona fide members, for nonhumans are already named as a passive environment or perhaps a recalcitrant context for human action. A more materialist public would need to include more earthlings in the swarm of actants. If environmentalists are selves who live on earth, vital materialists are selves who live as earth, who are more alert to the capacities and limitations—the “jizz”—of the various materials that they are. If environmentalism leads to the call for the protection and wise management of an ecosystem that surrounds us, a vital materialism suggests that the task is to engage more strategically with a trenchant materiality that is us as it vies with us in agentic assemblages.³

The discourse of environmentalism has certainly raised good political questions. To name just a few: What is the relationship between environmental protection and capitalist markets? What are the strengths and limitations of the Kyoto approach to global warming? How do hierarchies of race, class, gender, and civilization complicate the project of environmental protection? Might animals and plants be assigned legal rights? Yet other questions have been occluded: How can humans become more attentive to the public activities, affects, and effects of nonhumans? What dangers do we risk if we continue to overlook the force of things? What other affinities between us and them become apparent if we construe both us and them as vibrant matter?

Freya Mathews, Bruno Latour, Donna Haraway, Gay Hawkins, Tim Ingold, N. Katherine Hayles, Karen Barad, Sarah Whatmore, Nick Bingham, Félix Guattari, Don Ihde, and W. J. T. Mitchell have been making the call for more sustainable, less noxious modes of production and consumption in the name of a vigorous materiality rather than in the name of the environment.⁴ In the next section I will examine the contributions made by Guattari in this regard. But let me first name three advantages, or possible advantages, of the discourse of encountering a vital materiality over that of caring for an environment.

First, if the environment is defined as the substrate of human cul-

ture, *materiality* is a term that applies more evenly to humans and non-humans. I am a material configuration, the pigeons in the park are material compositions, the viruses, parasites, and heavy metals in my flesh and in pigeon flesh are materialities, as are neurochemicals, hurricane winds, *E. coli*, and the dust on the floor. Materiality is a rubric that tends to horizontalize the relations between humans, biota, and abiota. It draws human attention sideways, away from an ontologically ranked Great Chain of Being and toward a greater appreciation of the complex entanglements of humans and nonhumans. Here, the implicit moral imperative of Western thought—“Thou shall identify and defend what is special about Man”—loses some of its salience.

A second advantage hinges on the inflection of matter as vibrant, vital, energetic, lively, quivering, vibratory, evanescent, and effluent (to recall some modifiers I have used throughout the book). In a world of lively matter, we see that biochemical and biochemical-social systems can sometimes unexpectedly bifurcate or choose developmental paths that could not have been foreseen, for they are governed by an emergent rather than a linear or deterministic causality. And once we see this, we will need an alternative both to the idea of nature as a purposive, harmonious process and to the idea of nature as a blind mechanism. A vital materialism interrupts both the teleological organicism of some ecologists and the machine image of nature governing many of their opponents.

A third advantage of the notion of “vital materiality” compared to “environment” is the one I will focus on in this chapter. Vital materiality better captures an “alien” quality of our own flesh, and in so doing reminds humans of the very radical character of the (fractious) kinship between the human and the nonhuman. My “own” body is material, and yet this vital materiality is not fully or exclusively human. My flesh is populated and constituted by different swarms of foreigners. The crook of my elbow, for example, is “a special ecosystem, a bountiful home to no fewer than six tribes of bacteria. . . . They are helping to moisturize the skin by processing the raw fats it produces. . . . The bacteria in the human microbiome collectively possess at least 100 times as many genes as the mere 20,000 or so in the human genome.”⁵ The its outnumber the *mes*. In a world of vibrant matter, it is thus not enough to say that we are “embodied.” We are, rather, *an array of bodies*, many

different kinds of them in a nested set of microbiomes. If more people marked this fact more of the time, if we were more attentive to the indispensable foreignness that we are, would we continue to produce and consume in the same violently reckless ways?

It is very hard to keep focused on the oxymoronic truism that the human is not exclusively human, that we are made up of its. But I think this truism, and the cultivated talent for remembering it, forms a key part of the newish self that needs to emerge, the self of a new self-interest. For what counts as self-interest shifts in a world of vital materialities. I turn next Guattari's *The Three Ecologies* and to the various rhetorical tactics and conceptual inventions he uses to express this truism and to remain present to it.

I as It: The Outside That's Within

Guattari's *The Three Ecologies*, written in 1986, begins with an appeal to self-interest. The problem we are facing, he says, is not simply "environmental" decay but a disease afflicting all three "ecological registers": the environmental, the social, and the mental.⁶ The modern "period of intense techno-scientific transformations" has degraded both the impersonal environment and our own sociopsychic networks: air, water, and soil are contaminated as "kinship networks tend to be reduced to a bare minimum; domestic life is being poisoned by the gangrene of mass-media consumption; family and married life are frequently 'ossified' by a sort of standardization of behavior; and neighborhood relations are generally reduced to their meanest expression."⁷ And so, warns Guattari, if we have a humanistic interest in a richer kinship, marital, or civic life, we had better pursue a more ecological sustainable relationship with nonhuman nature.

Guattari insists that the relationship between the three ecologies is extremely close; they are not really even "discrete domains" but only "interchangeable lenses or points of view." In fact, the three ecologies form a single whole, which Guattari calls Integrated World Capitalism (IWC). This complex assemblage works to manufacture the particular psychosocial self in the interest of which environmentalism is initially pursued. It does so by means of various "modules of subjectification,"⁸

which include ideological as well as (Foucaultian) disciplinary components, all designed to organize bodily energies (including the "intensive" forces of the unconscious) into the form of the consumer-self. This consumer-self has an "interest" in environmentalism. But if the greening is to develop beyond the superficial level allowed by the consumeristic selves of iwc (beyond what Timothy W. Luke has persistently criticized as "green consumerism"⁹), then new modules of subjectification must be created and deployed. It is precisely because iwc works by appropriating bodily affect and channeling unconscious intensities that a greener self-culture-nature will require not only new "laws, decrees and bureaucratic programmes" but "new micropolitical and microsocial practices, new solidarities, a new gentleness, together with new aesthetic and new analytic practices regarding the formation of the unconscious."¹⁰

Guattari's claim that the ecological problem is as much a matter of culture- and psyche-formation as it is of watershed management and air quality protection has since been echoed by others.¹¹ What is especially intriguing, however, is his particular articulation of the impossible fact that humans are both "in" and "of" nature, both are and are not the outside. Guattari's rhetorical strategy here echoes that pursued by Roman Catholicism to express the mysterious unity of the three persons of God. There are three ecologies, says Guattari, or, as the Baltimore Catechism says, the Father, Son, and Holy Spirit are three persons "really distinct from one another." And yet, says Guattari, the three ecologies form a single whole, iwc, or, in the worlds of the catechism, "The Trinity is One."¹² We must, says Guattari, learn to think the three-in-one: to think "transversally" or fix our mind's eye on the interlacing of the mechosphere, the social sphere, and the inwardness of subjectivity.¹³

Guattari first categorically distinguishes the human (or social and mental ecologies) from the nonhuman (mechosphere or environmental ecology), but then he immediately calls this division into question and calls for a "transversal" mode of perception. In his contribution to a collection of "postenvironmentalist" essays, Latour describes this double move as a characteristically "modern" one. The modern, urban self on the one hand feels more and more *removed* from nature, as family farming becomes agribusiness, hands-on food preparation becomes the consumption of fast food, bloody wars are waged from high altitudes,

fuel is consumed with little recognition of the violence of its extraction and distribution, and so on. These distances are encoded into the figure of nature as an abstract environment, or expressed as three separate ecologies. But on the other hand, continues Latour, the modern self feels increasingly *entangled*—cosmically, biotechnologically, medically, virally, pharmacologically—with nonhuman nature. Nature has always mixed it up with self and society, but Latour notes that lately this comingling has intensified and become harder to ignore. “Whereas at the time of ploughs we could only scratch the surface of the soil, we can now begin to fold ourselves into the molecular machinery of soil bacteria.”¹⁴ There is a cognitive dissonance between the everyday experience of this comingling and the rubric of an environment that we direct from above and outside.

Some people respond to the proliferation of entanglements between human and nonhuman materialities with a desire to reenforce the boundary between culture and nature, as Jürgen Habermas seems to do in *The Future of Human Nature*, or as American evangelicals do in their “culture of life” opposition to cloning or embryonic stem cell research. Another response is to accept the mingling and to seek to bring the conceptual vocabulary more in line with this condition: ecological thinking should become more dialectical, or dialogical, or phenomenological, or we should no longer speak of “nature” but only of “second nature.” The idea of “second nature” emphasizes that what we used to call natural is actually the cultural determination of nature. But here the vital materialist points out that culture is *not* of our own making, infused as it is by biological, geological, and climatic forces. (There is, as I suggest in chapter 4, a life of metal as well as a life of men.) These impinge on us as much as we impinge on them. In other words, the fugitive disadvantage of the figure of “second nature” is the same as its apparent advantage: it highlights the agency of humans.¹⁵

Latour makes this same point when he notes that we are much better at admitting that humans infect nature than we are at admitting that nonhumanity infects culture, for the latter entails the blasphemous idea that nonhumans—trash, bacteria, stem cells, food, metal, technologies, weather—are actants more than objects. Latour argues for a pragma-based politics that explicitly acknowledges this comingling, and for (liberal democratic) public policies designed to “*follow through*” or at-

tend to the problems for human flourishing caused by the intimacy of the human and the nonhuman.¹⁶ Admit that humans have crawled or secreted themselves into every corner of the environment; admit that the environment is actually inside human bodies and minds, and then proceed politically, technologically, scientifically, in everyday life, with careful forbearance, as you might with unruly relatives to whom you are inextricably bound and with whom you will engage over a lifetime, like it or not. Give up the futile attempt to disentangle the human from the nonhuman. Seek instead to engage more civilly, strategically, and subtly with the nonhumans in the assemblages in which you, too, participate.

Like Latour, Guattari also calls for a politics that openly acknowledges the porosity of the borders between (what he categorizes as) subjectivity, society, and machines.¹⁷ He, too, rejects any attempt to unstir the cream from the coffee—to disentangle the cultural from the natural. It makes no political sense, writes Guattari in 1986, to try to withdraw from nature, for the health of the planet is “increasingly reliant upon human intervention, and a time will come when vast programmes will need to be set up in order to regulate the relationship between oxygen, ozone and carbon dioxide in the Earth’s atmosphere. . . . In the future, much more than the simple defense of nature will be required; we will have to launch an initiative if we are to repair the Amazonian ‘lung,’ for example.”¹⁸

It is futile to seek a pure nature unpolluted by humanity, and it is foolish to define the self as something purely human. But how can I start to feel myself as not only human? Guattari’s call for us to cultivate a “transversal” style of thinking gestures toward one of the ways we might develop this newish self. A vital materialism also recasts the self in the light of its intrinsically polluted nature and in so doing recasts what counts as self-interest. Let me turn next to an additional tactic in the struggle to remain present to the paradox of a self that is its own outside, is vibrant matter. It takes the form of an onto-story.

Natura Naturans

In lieu of an environment that surrounds human culture, or even a cosmos that cleaves into three ecologies, picture an ontological field without any unequivocal demarcations between human, animal, vegetable,

or mineral. All forces and flows (materialities) are or can become lively, affective, and signaling. And so an affective, speaking human body is not radically different from the affective, signaling nonhumans with which it coexists, hosts, enjoys, serves, consumes, produces, and competes.

This field lacks primordial divisions, but it is not a uniform or flat topography. It is just that its differentiations are too protean and diverse to coincide exclusively with the philosophical categories of life, matter, mental, environmental. The consistency of the field is more uneven than that: portions congeal into bodies, but not in a way that makes any one type the privileged site of agency. The source of effects is, rather, always an ontologically diverse assemblage of energies and bodies, of simple and complex bodies, of the physical and the physiological.

In this onto-tale, everything is, in a sense, alive. This liveliness is not capped by an ultimate purpose or grasped and managed through a few simple and timeless (Kantian) categories. What I am calling vital materiality or vibrant matter is akin to what is expressed in one of the many historical senses of the word *nature*.¹⁹ Though nature can refer to a stable substrate of brute matter, the term has also signaled generativity, fecundity, Isis or Aphrodite, or the "Spring" movement of Antonio Vivaldi's *Four Seasons*.²⁰ This creativity can be purposive or not. The contrast between nature as brute or purposive matter and nature as generativity is nicely captured by the distinction, key to Baruch Spinoza's *Ethics*, between *natura naturata* and *natura naturans*. *Natura naturata* is passive matter organized into an eternal order of Creation; *natura naturans* is the uncaused causality that ceaselessly generates new forms. When the English Romantics and American transcendentalists sought to refine their senses, they did so in part to be able to better detect *natura naturans*. This universal creativity requires a special sensitivity because, as Samuel Taylor Coleridge noted, the productive power is "suspended and, as it were, quenched in the product."²¹ Nature as generativity is also emphasized in Alfred North Whitehead's process philosophy, according to which nature is "a continuous stream of occurrence."²²

Gilles Deleuze and Guattari, drawing on Spinoza, Romanticism, Whitehead, and others (including Friedrich Nietzsche, Franz Kafka, and Henri Bergson), put this spin on *natura naturans*: Nature is a "pure plane of immanence . . . upon which unformed elements and materials dance."²³ According to Spinoza's theory of bodies, sketched in chapter 2, all bodies are modes of a common substance, which can be called either

God or Nature. Perhaps wary of the connotation of a static homogeneity that tends to cling (despite Spinoza's own efforts) to the word *substance*, and also wary of Spinoza's (albeit quite heterodox) theism, Deleuze and Guattari inflect Spinozism to speak of Nature as "an immense abstract machine" of generativity, whose pieces "are the various assemblages and individuals, each of which groups together an infinity of particles entering into an infinity of more or less interconnected relations."²⁴ Like Spinoza's God or Nature, this abstract machine too operates not in the service of a pre-given end but for the sake of itself as process.²⁵

The sense of nature as creativity also seems a part of what the ancient Greeks meant by *phusis*, of which the Latin *natura* is an equivalent. *Phusis* comes from the verb *phuo*, which probably meant to puff, blow, or swell up, conveying the sense of germination or sprouting up, bringing forth, opening out, or hatching. *Phusis* thus speaks of a process of morphing, of formation and deformation, that is to say, of the becoming otherwise of things in motion as they enter into strange conjunctions with one another.

The point is this: an active becoming, a *creative not-quite-human force capable of producing the new*, buzzes within the history of the term nature. This vital materiality congeals into bodies, bodies that seek to persevere or prolong their run. Here the onto-tale again draws from Spinoza, who claims that conatus-driven bodies, to enhance their power or vitality, form alliances with other bodies. Despite this, it would be too much to say that Spinoza was a vital materialist. And it is beyond the scope of the present study to take up the vexed issue of whether his view that each mode can be understood interchangeably as a body or as an idea disqualifies him from any kind of materialism. But Spinoza's theory of bodies and their affective encounters can and does inspire ecological thinking today.

Michel Serres, for example, suggests that the process of collaboration and contestation between bodies is not random or unstructured, but conforms to the strange logic of vortices, spirals, and eddies, and this logic encompasses politics as much as physics, economics as much as biology, psychology as much as meteorology: it recurs at all scales and locations. Serres, here following Lucretius, posits but one isomorphic process, that of "flood and fire, of plethora and exhaustion, of vertical growth and sudden fall, of accumulation and drought, in which history

. . . rises and descends, as if on the high seas under the movements of the hurricane."²⁶ It is onevortical process, though it can be parsed theoretically into stages: first a "fall" or conative impulse of matter-energy,²⁷ then an aleatory swerve that produces crash encounters between protean bits, then a stage of confused turbulence, then a congealment or crystallization of matter into bodies, then a decay, decline, and dissemination of the form. And finally: a new fall, a fresh swerve, a different configuration of turbulent forces, another set of formations, a different rate and sequence of decay and decline. The vortical logic holds across different scales of size, time, and complexity, and the sequence of stages repeats, but each time with slight differences: "This is the stroke of genius in [Lucretian] . . . physics: there is no circle, there are only vortices . . . , spirals that shift, that erode."²⁸ Serres offers an account of the strange structuralism of vital materiality, a structuralism that includes the aleatory.

Blocks to and for a New Self-Interest

The monism I have just described is a story that may or may not resonate with the reader's experience. Even if, I as believe, the vitality of matter is real, it will be hard to discern it, and, once discerned, hard to keep focused on. It is too close and too fugitive, as much wind as thing, impetus as entity, a movement always on the way to becoming otherwise, an effluence that is vital and engaged in trajectories but not necessarily intentions. What is more, my attention will regularly be drawn away from it by deep cultural attachments to the ideas that matter is inanimate and that real agency belongs only to humans or to God, and by the need for an action-oriented perception that must overlook much of the swirling vitality of the world. In composing and recomposing the sentences of this book—especially in trying to choose the appropriate verbs, I have come to see how radical a project it is to think vital materiality. It seems necessary and impossible to rewrite the default grammar of agency, a grammar that assigns activity to people and passivity to things.

Are there more everyday tactics for cultivating an ability to discern the vitality of matter? One might be to allow oneself, as did Charles Darwin, to anthropomorphize, to relax into resemblances discerned across

ontological divides: you (mis)take the wind outside at night for your father's wheezy breathing in the next room; you get up too fast and see stars; a plastic topographical map reminds you of the veins on the back of your hand; the rhythm of the cicada's reminds you of the wailing of an infant; the falling stone seems to express a conative desire to persevere. If a green materialism requires of us a more refined sensitivity to the outside-that-is-inside-too, then maybe a bit of anthropomorphizing will prove valuable. Maybe it is worth running the risks associated with anthropomorphizing (superstition, the divinization of nature, romanticism) because it, oddly enough, works against anthropocentrism: a chord is struck between person and thing, and I am no longer above or outside a nonhuman "environment." Too often the philosophical rejection of anthropomorphism is bound up with a hubristic demand that only humans and God can bear any traces of creative agency. To qualify and attenuate this desire is to make it possible to discern a kind of life irreducible to the activities of humans or gods. This material vitality is me, it predates me, it exceeds me, it postdates me.

Another way to cultivate this new discernment might be to elide the question of the human. Postpone for a while the topics of subjectivity or the nature of human interiority, or the question of what really distinguishes the human from the animal, plant, and thing. Sooner or later, these topics will lead down the anthropocentric garden path, will insinuate a hierarchy of subjects over objects, and obstruct freethinking about what agency really entails. One might also try to elide or not get defensive about the perfectly reasonable objection that the "posthumanist" gestures of vital materialism entail a performative contradiction: "Is it not, after all, a self-conscious, language-wielding human who is articulating this philosophy of vibrant matter?" It is not so easy to resist, deflect, or redirect this criticism.²⁹ One can point out how dominant notions of human subjectivity and agency are belied by the tangles and aporias into which they enter when the topics are explored in philosophical detail. One can invoke bacteria colonies in human elbows to show how human subjects are themselves nonhuman, alien, outside, vital materiality. One can note that the human immune system depends on parasitic helminth worms for its proper functioning or cite other instances of our cyborgization to show how human agency is always an assemblage of microbes, animals, plants, metals, chemicals, word-sounds,

and the like—indeed, that insofar as anything “acts” at all, it has already entered an agentic assemblage:³⁰ for example, Hurricanes-FEMA-GlobalWarming; or StemCells-NIH-Souls; or Worms-Topsoil-Garbage; or Electricity-Deregulation-Fire-Greed; or E.Coli-Abattoirs-Agribusiness.

The voice of reason or habit is, however, unlikely to be mollified by such tactics and will again grasp for that special something that makes *human* participation in assemblages radically *different*. Here one might try to question the question: Why are we so keen to distinguish the human self from the field? Is it because the assumption of a uniquely human agency is, to use Kantian language, a “necessary presupposition” of assertion as such? Or is the quest motivated by a more provincial demand that humans, above all other things on earth, possess souls that make us eligible for eternal salvation? I do not imagine that any of these replies will end the conversation, but some of them together may open up new avenues within it.

There are many other pitfalls on the road to a vital materialism. For example, while I agree with Latour and Guattari that techno-fixes (smart ones that respect the vitality or quasi autonomy of materialities) must be pursued, and that there is nothing intrinsically wrong with them, I am ambivalent about Latour’s claim that life (for Americans and Europeans) has simply become too technologized for the idea of pristine nature to wield any inspirational value. As the popularity of Thoreau and his heirs (such as Wendell Berry and Barry Lopez) shows, the ideal of nature as the Wild continues to motivate some people to live more ecologically sustainable lives. But even if Latour is correct in his prediction that the power of this ideal will dwindle, attracting fewer and fewer human bodies to it, he has not thought through all the normative implications of its demise.

Neither, of course, have I. But one thing I have noticed is that as I shift from environmentalism to vital materialism, from a world of nature versus culture to a heterogeneous monism of vibrant bodies, I find the ground beneath my old ethical maxim, “tread lightly on the earth,” to be less solid. According to this maxim, I should try to minimize the impact of my actions so as to minimize the damage or destruction of other things with which I share existence. The ecologist James Nash describes this as the “earth-affirming norm” of frugality, a sparing “of the resources necessary for human communities and sparing of the other

species that are both values in themselves and instrumental values for human needs."³¹ If I live not as a human subject who confronts natural and cultural objects but as one of many conative actants swarming and competing with each other, then frugality is too simple a maxim. Sometimes ecohealth will require individuals and collectives to back off or ramp down their activeness, and sometimes it will call for grander, more dramatic and violent expenditures of human energy. I know that this last point is pitched at a very high level of abstraction or generality (as maxims must be, I suppose). And I know that more needs to be said to specify the normative implications of a vital materialism in specific contexts. I am, for now, at the end of my rope. So I will just end with a litany, a kind of Nicene Creed for would-be vital materialists: "I believe in one matter-energy, the maker of things seen and unseen. I believe that this pluriverse is traversed by heterogeneities that are continually *doing things*.³² I believe it is wrong to deny vitality to nonhuman bodies, forces, and forms, and that a careful course of anthropomorphization can help reveal that vitality, even though it resists full translation and exceeds my comprehensive grasp.³³ I believe that encounters with lively matter can chasten my fantasies of human mastery, highlight the common materiality of all that is, expose a wider distribution of agency, and reshape the self and its interests."

Notes

Preface

1. "The partition of the sensible is the cutting-up of the world and of world . . . a partition between what is visible and what is not, of what can be heard from the inaudible." Rancière, "Ten Theses on Politics."
2. Rancière claims that "politics in general is about the configuration of the sensible," meaning that politics consists in the contestation over just what is "the given." It is "about the visibilities of the places and abilities of the body in those places" (Rancière, "Comment and Responses"). I agree that politics is the arranging and rearranging of the landscape that humans can sense or perceive, but I, unlike Rancière, am also interested in the "abilities" of nonhuman bodies—of artifacts, metals, berries, electricity, stem cells, and worms. I consider Rancière's theory of democracy in chapter 7.
3. Bergson, *Creative Evolution*, 45.
4. Latour, *Politics of Nature*, 237.
5. On this point Latour says that the phrase *name of action* is more appropriate than *actant*, for "only later does one deduce from these performances a competence" (Latour, *Pandora's Hope*, 303, 308).
6. Deleuze and Guattari, *Thousand Plateaus*, 351–423.
7. Spinoza, preface to *Ethics*, 102–3.

8. Deleuze, *Expressionism in Philosophy*, 67.
9. Serres, *Birth of Physics*.
10. As Michael Saler notes, enchantment, at least since the Middle Ages, has "signified both [human] 'delight' in wonderful things and the potential to be placed under their spell, to be beguiled" (Saler, "Modernity, Disenchantment, and the Ironic Imagination," 138; my emphasis).
11. Deleuze and Guattari, *Thousand Plateaus*, 257.
12. Cole, "Affective Literacy," 5–9.
13. See Derrida, "The Animal That Therefore I Am (More to Follow)."
14. Adorno, *Negative Dialectics*, 14. I discuss Adorno's clownishness in chapter 1.
15. Bruno Latour describes this as treating people and things "symmetrically." For a good account of this, see Crawford, "Interview with Bruno Latour."
16. Brown, *Regulating Aversion*, 11, 203.
17. "Justification is not to be confused with motivation. The current imperial policies of the United States are wrought from power-political motivations that have little to do with the . . . discourses I have been discussing here" (Brown, *Regulating Aversion*, 175n251).
18. See Sargisson, *Utopian Bodies*.
19. See Dean, *Publicity's Secret*, for a good example of demystification at work. It is in the context of assessing the political power of Slavoj Žižek's work that she asks: "If all we can do is evaluate, critique, or demystify the present, then what is it that we are hoping to accomplish? Perhaps we can start and lay the groundwork for revealing the limits of communicative capitalism, to think the unthought of the present, in order to free ourselves for a new possibility. And if Žižek can use his celebrity to work toward this goal, than all the better, right?" (http://jdeanicate.typepad.com/i_cite/2005/05/what_is_the_unt.html; accessed 18 February 2009).
20. Foucault, "Confinement, Psychiatry, Prison," 209.
21. Diana Coole offers a history of this motif in *Negativity and Politics*.
22. For a good discussion of the place of the notion of active materiality in historical materialism, see Diana Coole's contribution to Coole and Frost, *New Materialism*.
23. Adorno, *Negative Dialectics*, 183.
24. Darwin, *Formation of Vegetable Mould*, 305.

1. The Force of Things

Sections of this chapter appeared previously as "The Force of Things: Steps toward an Ecology of Matter," *Political Theory* 32, no. 3 (2004).

1. There is too much good work in feminist theory, queer studies, and cul-

tural) studies to cite here. The three volumes of Feher, Naddaff, and Tazi, *Fragments for a History of the Human Body*, offer one map of the terrain. See also Rahman and Witz, "What Really Matters?"; Butler, *Bodies That Matter*; Butler, "Merely Cultural"; Brown, *States of Injury*; Ferguson, *Man Question*; and Gatens, *Imaginary Bodies*.

2. Mitchell, *What Do Pictures Want*, 156–57.
3. Spinoza, *Ethics*, pt. 3, proposition 6.
4. Mathews, *For Love of Matter*, 48.
5. Spinoza, *Ethics*, pt. 4, proposition 37, scholium 1.
6. *Ibid.*, 4, preface.
7. Spinoza links, in this famous letter, his theory of conatus to a critique of the notion of human free will: "Now this stone, since it is conscious only of its endeavor [conatus] and is not at all indifferent, will surely think that it is completely free, and that it continues in motion for no other reason than it so wishes. This, then, is that human freedom which all men boast of possessing, and which consists solely in this, that men are conscious of their desire and unaware of the causes by which they are determined" (Spinoza, *The Letters*, epistle 58). Hasana Sharp argues that the analogy between humans and stones "is not as hyperbolic as it seems at first glance. For Spinoza, all beings, including stones, . . . include a power of thinking that corresponds exactly to the power of their bodies to be disposed in different ways, to act and be acted upon. . . . Likewise every being, to the extent that it preserves its integrity amidst infinitely many other beings, as a stone surely does, is endowed with . . . a desire to . . . preserve and enhance its life to the extent that its nature allows" (Sharp, "The Force of Ideas in Spinoza," 740).
8. Levene, *Spinoza's Revelation*, 3. Yitshak Melamed goes further to say that "since the doctrine of the conatus . . . provide[s] the foundations for Spinoza's moral theory, it seems likely that we could even construct a moral theory for hippopotamuses and rocks" (Melamed, "Spinoza's Anti-Humanism," 23159).
9. De Vries, introduction to *Political Theologies*, 42.
10. *Ibid.*, 6.
11. De Vries seems to affirm this association when he wonders whether Baruch Spinoza's picture of interacting, conatus-driven bodies could possibly account for the creative emergence of the new: "It would seem that excess, gift, the event . . . have no place here" (de Vries, introduction to *Political Theologies*, 22). Why? Because the only plausible locus of creativity is, for de Vries, one that is "quasi-spiritual," hence Spinoza's second attribute of God/Nature, that is, *thought* or ideas. But what if materiality itself harbors creative vitality?
12. Gould, *Structure of Evolutionary Theory*, 1338.

13. On the effectivity of trash, see the fascinating Edensor, "Waste Matter"; and Hawkins, *The Ethics of Waste*.
14. See Dumm, *Politics of the Ordinary*, 7, for a subtle reckoning with the "obscure power of the ordinary." My attempt to speak on behalf of "things" is a companion project to Dumm's attempt to mine the ordinary as a potential site of resistance to conventional and normalizing practices.
15. Thoreau, *Writings*, 111 (Thoreau trained his gaze on things with the faith that "the perception of surfaces will always have the effect of miracle to a sane sense" [Thoreau, *Journal*, 2: 313]); Spinoza, *Ethics*, pt. 2, proposition 13, scholium 72; Merleau-Ponty, *Phenomenology of Perception*, 197.
16. For a good analysis of the implications of the trash-and-waste culture for democracy, see Buell and DeLuca, *Sustainable Democracy*.
17. Sullivan, *Meadowlands*, 96–97.
18. De Landa, *Thousand Years of Nonlinear History*, 16.
19. Kafka, "Cares of a Family Man," 428.
20. *Ibid.*
21. *Ibid.*
22. Deleuze, *Bergsonism*, 95.
23. Margulis and Sagan, *What Is Life*, 50.
24. Latour, "On Actor-Network Theory."
25. Latour, *Politics of Nature*, 75.
26. De Landa, *Intensive Science and Virtual Philosophy*, 123.
27. Tiffany, "Lyric Substance," 74. Tiffany draws an analogy between riddles and materiality per se: both are suspended between subject and object and engage in "transubstantiations" from the organic to the inorganic and from the earthly to the divine. In developing his materialism out of an analysis of literary forms, Tiffany challenges the long-standing norm that regards science as "the sole arbiter in the determination of matter" (75). He wants to pick "the lock that currently bars the literary critic from addressing the problem of material substance" (77).
28. Pietz, "Death of the Deodand."
29. Frow, "A Pebble, a Camera, a Man," 283.
30. De Landa, *A Thousand Years of Nonlinear History*, 26; my emphasis.
31. *Ibid.*, 26–27.
32. Although, as I will argue in chapter 2, it is more accurate to say that this efficacy belongs less to minerals alone than to the combined activities of a variety of bodies and forces acting as an agentic assemblage.
33. Margulis and Sagan, *What Is Life*, 49; my emphasis.
34. Lyotard, *Postmodern Fables*, 98.
35. Rorty, *Rorty and Pragmatism*, 199.
36. I will also argue, at the end of chapter 2, that the efficacy of moralism in addressing social problems is overrated. The antimoralism that is one of

the implications of a vital materialism is a dangerous game to play, and not one I wish to play out to its logical extreme. I aim not to eliminate the practice of moral judgment but to increase the friction against the moralistic reflex.

37. Adorno, *Negative Dialectics*, 189. Further references to this title will be made in the running text as *ND*.
38. Romand Coles offers a sustained interpretation of Adorno as an ethical theorist: negative dialectics is a "morality of thinking" that can foster generosity toward others and toward the nonidentical in oneself. Coles argues that Adorno seeks a way to acknowledge and thereby mitigate the violence done by conceptualization and the suffering imposed by the quest to know and control all things. Coles, *Rethinking Generosity*, chap. 2.
39. Adorno also describes this pain as the "guilt of a life which purely as a fact will strangle other life" (*ND*, 364). Coles calls it the "ongoing discomfort that solicits our critical efforts" (Coles, *Rethinking Generosity*, 89). Adorno does not elaborate or defend his claim that the pain of conceptual failure can provoke or motivate an ethical will to redress the pain of social injustice. But surely some defense is needed, for history has shown that even if the pangs of nonidentity engender in the self the idea that "things should be different," this moral awakening does not always result in "social change in practice." In other words, there seems to be a second gap, alongside the one between concept and thing, that needs to be addressed: the gap between recognizing the suffering of others and engaging in ameliorative action. Elsewhere I have argued that one source of the energy required is a love of the world or an enchantment with a world of vital materiality; Adorno sees more ethical potential in suffering and a sense of loss. He "disdained the passage to affirmation," contending that the experience of the "fullness of life" is "inseparable from . . . a desire in which violence and subjugation are inherent. . . . There is no fullness without biceps-flexing" (*ND* 385, 378). Nonidentity is dark and brooding, and it makes itself known with the least distortion in the form of an unarticulated feeling of resistance, suffering, or pain. From the perspective of the vital materialist, Adorno teeters on the edge of what Thomas Dumm has described as "the overwhelming sense of loss that could swamp us when we approach [the thing's] unknowable vastness" (Dumm, *Politics of the Ordinary*, 169).
40. "Preponderance of the object is a thought of which any pretentious philosophy will be suspicious. . . . [Such] protestations . . . seek to drown out the festering suspicion that heteronomy might be mightier than the autonomy of which Kant . . . taught. . . . Such philosophical subjectivism is the ideological accompaniment of the . . . bourgeois I" (*ND*, 189).
41. The gap between concept and thing can never be closed, and, according

- to Albrecht Wellmer, Adorno believes that this lack of conciliation can be withstood only "in the name of an absolute, which, although it is veiled in black, is not nothing. Between the being and the non-being of the absolute there remains an infinitely narrow crack through which a glimmer of light falls upon the world, the light of an absolute which is yet to come into being" (Wellmer, *Endgames*, 171; my emphasis).
42. Thanks to Lars Tønder for alerting me to the messianic dimension of Adorno's thinking. One can here note Adorno's admiration for Kant, who Adorno read as having found a way to assign transcendence an important role while making it inaccessible in principle: "What finite beings say about transcendence is the semblance of transcendence; but as Kant well knew, it is a necessary semblance. Hence the incomparable metaphysical relevance of the rescue of semblance, the object of esthetics" (ND, 393). For Adorno, "the idea of truth is supreme among the metaphysical ideas, and this is why . . . one who believes in God cannot believe in God, why the possibility represented by the divine name is maintained, rather, by him who does not believe" (ND, 401–2). According to Coles, it does not matter to Adorno whether the transcendent realm actually exists; what matters is the "demand . . . placed on thought" by its promise (Coles, *Rethinking Generosity*, 114).
43. There is, of course, no definitive way to prove either ontological imaginary. Morton Schoolman argues that Adorno's approach, which explicitly leaves open the possibility of a divine power of transcendence, is thus preferable to a materialism that seems to close the question. See Schoolman, *Reason and Horror*.
44. Lucretius, "On the Nature of the Universe," 128.
45. In response to Foucault's claim that "perhaps one day, this century will be known as Deleuzian," Deleuze described his own work as "naive": "[Foucault] may perhaps have meant that I was the most naive philosopher of our generation. In all of us you find themes like multiplicity, difference, repetition. But I put forward almost raw concepts of these, while others work with more mediations. I've never worried about going beyond metaphysics . . . I've never renounced a kind of empiricism. . . . Maybe that's what Foucault meant: I wasn't better than the others, but more naive, producing a kind of *art brut*, so to speak, not the most profound but the most innocent" (Deleuze, *Negotiations*, 88–89). My thanks to Paul Patton for this reference.
46. Mitchell, *What Do Pictures Want*, 149.
47. Lucretius, "On the Nature of the Universe," 126. There are no supernatural bodies or forces for Lucretius, and if we sometimes seem to have spiritual experiences, that is only because some kinds and collections of bodies exist below the threshold of human sense perception.

48. Althusser, "Underground Current of the Materialism of the Encounter," 169. "Without swerve and encounter, [primordia] would be nothing but abstract elements. . . . So much so that we can say that [prior to] . . . the swerve and the encounter . . . they led only a phantom existence" (ibid.).
49. Lucretian physics is the basis for his rejection of religion, his presentation of death as a reconfiguration of primordia made necessary by the essential motility of matter, and his ethical advice on how to live well while existing in one's current material configuration.
50. For Adorno, Heidegger, "weary of the subjective jail of cognition," became "convinced that what is transcendent to subjectivity is immediate for subjectivity, without being conceptually stained by subjectivity" (ND, 78). But it does not seem to me that Heidegger makes a claim to immediacy. See Heidegger, *What Is a Thing*.
51. For Marx, too, naive realism was the philosophy to overcome. He wrote his doctoral dissertation on the "metaphysical materialism" of Democritus, and it was against that naive objectivism that Marx would eventually define his own "historical materialism." Historical materialism would not focus on matter but on human power-laden socioeconomic structures.
52. This is Bill Brown's account of Arjun Appadurai's *The Social Life of Things* in "Thing Theory" (6-7).

2. The Agency of Assemblages

A version of this chapter appeared previously as "The Agency of Assemblages and the North American Blackout," *Public Culture* 17, no. 3 (2005), which was reprinted in *Political Theologies: Public Religions in a Post-Secular World*, eds. Hent deVries and Lawrence E. Sullivan (New York: Fordham University Press, 2006).

1. This list could be expanded to include Maurice Merleau-Ponty's radiant matter, for example, his scissors and leather pieces that "offer themselves to the subject as action" or the "motor intentionality" of a human arm whose directional impetus is irreducible to any subjective decision (Merleau-Ponty, *Phenomenology of Perception*, 106, 110). We could also add the athletic entities (basketballs that move like gymnasts, and vice versa; a group of cyclists that flow like a flock of birds, and vice versa) featured in a Nike television advertisement. Thanks to Matthew Scherer for drawing my attention to this ad.
2. Deleuze, *Expressionism in Philosophy*, 93.
3. Substance, writes Spinoza, "cannot be produced by anything external to itself. For in the universe nothing is granted, save substances and their modifications" (*Ethics*, pt. 1, proposition 6, corollary). Also, "By substance,

- I mean that which is in itself, and is conceived through itself" (*Ethics*, pt. 1, definition 3).
4. Lin, "Substance, Attribute, and Mode in Spinoza," 147.
 5. "Individual things are nothing but modifications of the attributes of God, or modes by which the attributes of God are expressed in a fixed and definite manner" (*Ethics*, pt. 1, proposition 25, corollary).
 6. Deleuze, *Expressionism in Philosophy*, 201.
 7. Lucretius, "On the Nature of the Universe," 135.
 8. See Deleuze, *Expressionism in Philosophy*, 230.
 9. Rosi Braidotti underscores the place of conflict in Spinozism: "Another word for Spinoza's conatus is . . . self-preservation, not in the liberal individualistic sense . . . , but rather as the actualization of one's essence, that is to say, of one's ontological drive to become. This is neither an automatic nor an intrinsically harmonious process, insofar as it involves interconnection with other forces and consequently also conflicts and clashes. Negotiations have to occur as stepping-stones to sustainable flows of becoming. The bodily self's interaction with his/her environment can either increase or decrease that body's conatus" (Braidotti, "Affirmation versus Vulnerability," 235).
 10. Spinoza, *Ethics*, pt. 4, appendix, no. 27.
 11. See Latour, *Reassembling the Social*; Varela, "Organism"; Hardt and Negri, *Empire*; and Hardt and Negri, *Multitude*.
 12. The term is Patrick Hayden's in "Gilles Deleuze and Naturalism." For Bergson, too, the universe is a nontotalizable sum, a "whole that is not given" because its evolution produces new members and thus an ever-changing array of effects. The world is "an indivisible process" of movement and creation, where there is "radical contingency in progress, incommensurability between what goes before and what follows—in short, duration." See Bergson, *Creative Evolution*, 29n1; and chapter 4 of the present volume.
 13. Mark Bonta and John Protevi define an assemblage (*agencement*) as "an intensive network or rhizome displaying 'consistency' or emergent effect by tapping into the ability of the self-ordering forces of heterogeneous materials to mesh together" (Bonta and Protevi, *Deleuze and Geophilosophy*, 54).
 14. Glanz, "When the Grid Bites Back."
 15. Nosovel, "System Blackout Causes and Cures."
 16. U.S.-Canada Power Outage Task Force, "Initial Blackout Timeline."
 17. *Ibid.*, 6. According to Nosovel, the "evaluation of disturbances shows that protection systems have been involved in 70% of the blackout events" (Nosovel, "System Blackout Causes and Cures," 2).
 18. Di Menna, "Grid Grief!"

19. The task force was appointed by the Canadian prime minister Jean Chrétien and the U.S. president George W. Bush. The first report of the task force (issued 12 September 2003) was a description of about twenty grid "events" occurring from 2:02 p.m. until 4:11 p.m. (EST) on 14 August 2003.
20. The grid is an AC (alternating current) system. For a fascinating historical account of the development of electrical systems, see Jonnes, *Empires of Light*.
21. U.S.-Canada Power Outage Task Force, "Initial Blackout Timeline," 2.
22. Novosel, "System Blackout Causes and Cures," 2.
23. Lerner, "What's Wrong with the Electric Grid?"
24. Hardin, "Tragedy of the Commons."
25. Latour, *Pandora's Hope*, 281. See also my discussion in chapter 7 of the current volume.
26. *Ibid.*
27. Casazza and Loehr, *Evolution of Electric Power Transmission*.
28. U.S.-Canada Power Outage Task Force, "Initial Blackout Timeline," 7; my emphasis.
29. Wald, "Report on Blackout." FirstEnergy was formed from the merger of seven utilities (Toledo Edison, Cleveland Electric, Ohio Edison, Pennsylvania Power, Pennsylvania Electric, Metropolitan Edison, and Jersey Central Power and Light) and has very close ties to George W. Bush. As indicated by Tyson Slocum, the "FirstEnergy President Anthony Alexander was a Bush Pioneer in 2000—meaning he raised at least \$100,000—and then served on the Energy Department transition team. H. Peter Burg, the company's CEO and chairman of the board, hosted a June event that raised more than half a million dollars for Bush-Cheney '04" (Slocum, "Bush Turns Blind Eye to Blackout Culprit").
30. See chapter 4, "Habit and the Will," in Augustine's *Confessions*. See also chapter 1, note 7 in the present work.
31. Connolly, *Why I Am Not a Secularist*, 166. Connolly cites this passage from Kant: "Now if a propensity to this does lie in human nature, there is in man a natural propensity to evil; and since this very propensity must in the end be sought in a will which is free, and can therefore be imputed, it is morally evil. This evil is radical, because it corrupts the ground of all maxims; it is, moreover, as natural propensity, inextirpable by human powers, since extirpation could occur only through good maxims, and cannot take place when the ultimate subjective ground of all maxims is postulated as corrupt; yet at the same time it must be possible to overcome it, since it is found in man, a being whose actions are free" (Kant, *Religion within the Limits of Reason Alone*, 18).
32. On this point, see Kauffman, *Reinventing the Sacred*, chap. 6.

33. Brumfield, "On the Archaeology of Choice," 249. Or, as the sociologist Margaret Archer puts it, human agents are "both free and enchained, capable of shaping our own future and yet confronted by towering . . . constraints" (Archer, *Realist Social Theory*, 65).
34. "The subject, when put in front of his scissors, needle and familiar tasks, does not need to look for his hands or his fingers, because they are not objects . . . but potentialities already mobilized by the perception of scissors or needles, the central end of those 'intentional threads' which link him to the objects given" (Merleau-Ponty, *Phenomenology of Perception*, 106).
35. As Diana Coole puts it, "the operation of agentic capacities in politics will always exceed the agency exercised by rational subjects" because the latter "acquire differential agentic capacities depending upon their intersubjective context" (Coole, "Rethinking Agency," 125-26).
36. *Ibid.*, 128.
37. See Latour, *Aramis*. See also the elegant account of *Aramis* in Laurier and Philo, "X-Morphising."
38. Latour, qtd. in Barron, "Strong Distinction," 81.
39. See Stiegler, *Technics and Time*. I am grateful to Ben Corson for this point. See his "Speed and Technicity."
40. It would be interesting to compare the idea of a swarm to Adorno's "constellation." See Adorno, *Negative Dialectics*, 166.
41. Mathews, *For Love of Matter*, 35.
42. Derrida, "Marx and Sons," 248. Disappointment is absolutely essential to messianicity: the "promise is given only under the premises of the possible retraction of its offering" (Hamacher, "Lingua Amissa," 202). Derrida argues that it is not only phenomena that obey this logic: language, and thus thought, also operate only in the promissory mode (Derrida, "Marx and Sons," 253-56).
43. Connolly, "Method, Problem, Faith," 342-43.
44. Arendt, "On the Nature of Totalitarianism." My thanks to John Docker for this reference. See also his "Après la Guerre."
45. Arendt, "On the Nature of Totalitarianism."
46. Jullien, *Propensity of Things*, 13.
47. Archer, *Realist Social Theory*, 66.
48. Recall that reactive power is when the waves of current and voltage in an electron stream are ninety degrees out of sync.
49. Hayden, "Gilles Deleuze and Naturalism," 187.
50. Latour, *Politics of Nature*, 67.
51. Marres, "Issues Spark a Public into Being," 216.

3. Edible Matter

A version of this chapter appeared previously in *New Left Review*, no. 45 (2007).

1. Mario Bunge, *Causality and Modern Science* (1979), qtd. in De Landa, *Intensive Science and Virtual Philosophy*, 137. Bunge notes that the belief in brute matter is "still held in esteem by those quantum theorists who hold that it is the experimenter who produces all atomic-scale phenomena," and De Landa adds that it is also assumed "by those critics of science who think that all phenomena are socially constructed" (*ibid.*).
2. Bayliss, *Physiology of Food*, 1.
3. This represents a 39 percent increase from 1950 and includes 440 twelve-ounce cans of soda per person per year, according to Warner, "Sweetener with a Bad Rap."
4. This amounts to seven pounds more red meat and forty-six pounds more poultry per year than in 1950.
5. This represents a 67 percent increase from 1950.
6. All food statistics, unless otherwise noted, are taken from U.S. Department of Agriculture, Office of Communications, "Profiling Food Consumption in America." In the *Agriculture Fact Book*, from which the chapter is taken, the term *consumption* refers to what is used up of the aggregate food supply; because of "spoilage, plate waste, and . . . other losses," "consumption" amounts are likely to be greater than the actual amount of food ingested or taken into human bodies. For example, if, as is estimated, Americans waste twenty of those fifty-three teaspoons of sugar, the ingestion of sugar could be as low as thirty-two teaspoons per day per person. The term *added fats* refers to fats "used directly by consumers, such as butter on bread, as well as shortenings and oils used in commercially prepared cookies, pastries, and fried foods. All fats naturally present in foods, such as in milk and meat, are excluded."
7. Gesch et al., "Influence." The modern Western diet has entailed a "staggering rise in the consumption of seed oils . . . , whose polyunsaturated fatty acid content is predominantly omega-6, at the expense of omega-3" (Hallahan and Garland, "Essential Fatty Acids and Mental Health," 277).
8. Richarson and Montgomery, "Oxford-Durham Study."
9. Su, Shen, and Huang, "Omega-3 Fatty Acids."
10. Perhaps the links among omega-3, mental health, and cognitive functions should not surprise, given that "the dry weight of the mammalian brain is approximately 80% lipid (the highest of any organ)" (Hallahan and Garland, "Essential Fatty Acids and Mental Health," 186).
11. Carroll, "Diets Heavy in Saturated Fats."

12. I take these points from John Buell, who directed me to the nonlinearity of the veining going on in the body-flesh-psyche-food assemblage (email correspondence, 2008).
13. Grégoire Nicolis and Ilya Prigogine, *Exploring Complexity: An Introduction* (1989), qtd. in De Landa, *Intensive Science and Virtual Philosophy*, 131.
14. De Landa, *Intensive Science and Virtual Philosophy*, 144.
15. Deleuze and Guattari, *Thousand Plateaus*, 324–25.
16. Serres, *Parasite*, 191. Serres suggests that it is the human that is the passive one in the eater-eaten relationship. For him, the eater is utterly dependent on (exists in a “parasitic” relation to) foodstuff. We eat only at the expense (on the tab) of another who is our host: “The host comes before and the parasite follows” (14). Thus the eater owes the eaten. (Perhaps this is why many say grace before meals.) I think Serres is right to note the moral obligations entailed by eating, but I also think that the figure of the parasite goes too far: it does not acknowledge the active power of the human body or any agentic capacity.
17. Goodman, “Ontology Matters,” 183.
18. Nietzsche, *On the Genealogy of Morals and Ecce Homo*, third essay, sec. 17, 130.
19. Nietzsche, *Daybreak*, 39.
20. Friedrich Nietzsche, “Why I Am So Clever,” *On the Genealogy of Morals and Ecce Homo*, sec. 1, 239.
21. The complete quotation is: “My virile food taketh effect, my strong and savoury sayings: and verily, I did not nourish them with flatulent vegetables! But with warrior-food, with conquerer-food: new desires did I awaken” (Nietzsche, *Thus Spoke Zarathustra*, pt. 4, “The Awakening”).
22. Cornaro, *Art of Living Long*, 55. In Cornaro’s “Second Discourse, Written at the Age of Eight-Six,” he gives a fuller inventory of his diet: “First, bread; then, bread soup or light broth with an egg, or some other nice little dish of this kind; of meats, I eat veal, kid, and mutton; I eat fowls of all kinds, as well as partridges and birds like the thrush. I also partake of such salt-water fish as the goldney and the like; and, among the various fresh-water kinds, the pike and others” (87).
23. *Ibid.*, 94.
24. Nietzsche, *Twilight of the Idols*, sec. 1, 47. Nietzsche seems not to have read Cornaro carefully enough, for Cornaro explicitly says that his particular diet is not for everyone: “No one need feel obliged to confine himself to the small quantity to which I limit myself. . . . For I eat but little; and my reason in doing so is that I find a little sufficient for my small and weak stomach” (Cornaro, *Art of Living Long*, 62); “I was compelled to be extremely careful with regard to the quality and quantity of my food and drink. However those persons who are blessed with strong constitutions

- may make use of many other kinds and qualities of food and drink, and partake of them in greater quantities, than I do" (ibid., 97).
25. The full quotation reads: "I . . . do not like these latest speculators in idealism, the anti-Semites, who . . . rouse up all the horned-beast elements in the people by a brazen abuse of the cheapest of all agitator's tricks, moral attitudinizing (that no kind of swindle fails to succeed in Germany today is connected with the undeniable and palpable stagnation of the German spirit; and the cause of that I seek in a too exclusive diet of newspapers, politics, beer, and Wagnerian music)" (Nietzsche, *On the Genealogy of Morals and Ecce Homo*, third essay, sec. 26, 158–59; my emphasis).
 26. Nietzsche, *On the Genealogy of Morals and Ecce Homo*, first essay, sec. 6, 32.
 27. See Haraway, *Modest_Witness@Second_Millennium*, 2.
 28. Nietzsche, "Why I am So Clever," *On the Genealogy of Morals and Ecce Homo*, sec. 10, 256.
 29. Thoreau, *Walden and Resistance to Civil Government*, 140.
 30. Whitman, "Song of Myself," lines 389–90, *Leaves of Grass*. My thanks to Hadley Leach for this reference.
 31. Thoreau, *Walden and Resistance to Civil Government*, 143. Thoreau notes in his journal that though his "coarse and hurried outdoor work compels me to . . . be inattentive to my diet," "left to my own pursuits, I should never . . . eat meat" (qtd. in Robinson, *Thoreau and the Wild Appetite*, 9).
 32. Thoreau, *Walden and Resistance to Civil Government*, 143. "Most men would feel shame if caught preparing with their own hands" the bloody meat dinner that is "everyday prepared for them by others," that is, by women (144).
 33. Ibid., 144.
 34. To those who wonder why he gives so much heed to little things like berries, Thoreau confidently replies that what are to the conformist self "great things are not great but gross. . . . little things are not little but fine—they are some huckleberries" (qtd. in Keiser, "New Thoreau Material," 253–54).
 35. Thoreau, *Walden and Resistance to Civil Government*, 146. He calls the blueberry the "Berry of berries," but he also offers high praise to wild blackberries, blueberries, raspberries, huckleberries, cranberries, and strawberries. Robinson notes that "it is hard to tell which berry Thoreau cherished most." Thoreau's promiscuity with regard to berry loving and berry eating leads Robinson to note a "kind of ritualistic ceremony of pagan exaltation" in Thoreau's description of himself as "going from water spring to water spring, his hands reddened afresh between successive water springs by wild strawberries" (Robinson, *Thoreau's Wild Appetite*, 22).
 36. Thoreau, *Walden and Resistance to Civil Government*, 116–17.

37. Thanks to Patchen Markell for this point.
38. Kass, *Hungry Soul*, 25–26. Kass was appointed by George W. Bush to the President's Council on Bioethics in 2001 and was at one time its chair.
39. *Ibid.*, 55.
40. *Ibid.*, 15.
41. Roe, "Material Connectivity." Rachel Colls makes a related point in her study of bodily "flab" as "mobile flesh," which is neither fully "material" nor fully "discursive" (Colls, "Materialising Bodily Matter").
42. Maud Ellman, *The Hunger Artists* (1993), qtd. in Eagleton, "Edible Écriture," 207.
43. Deleuze, "Metal, Metallurgy, Music, Husserl, Simondon."
44. See Slow Food USA, "Manifesto."
45. Kingsolver, "Good Farmer," 13.
46. Jackson et al., "Manufacturing Meaning along the Food Commodity Chain." Michael Pollan's *The Omnivore's Dilemma* serves as a good example here. It gives a genealogy of four American meals—one from McDonald's, one made from items bought at a Whole Foods supermarket, one whose ingredients come from a small, self-sustaining farm, and one created from items that Pollan has hunted or gathered.
47. Good examples here include Cheri Lucas Jennings's and Bruce H. Jennings's exposé of the poverty wages and poisonous working conditions embedded in the shiny red, wormless supermarket apple and Greg Critser's account of the link between agribusiness interests, subsidized corn production, high-fructose corn syrup, and obesity. See Jennings and Jennings, "Green Fields/Brown Skin"; and Critser, *Fat Land*. For a critique of its claim that high-fructose corn syrup is a significant factor in America's obesity problem, see Warner, "Does This Goo Make You Groan?"

4. A Life of Metal

1. Kafka, "Report to an Academy," 257.
2. For a good summary of the relevant research, see Kate Douglas, "Six 'Uniquely' Human Traits Now Found in Animals."
3. The geographer Nick Bingham develops a notion of "nonhuman friendship" as a "certain quality of being open," or a "capacity to learn to be affected" by an out-side. Though his examples of nonhumans are organisms (bees and butterflies), his essay raises the question of whether it is possible to "befriend" inorganic material. See his "Bees, Butterflies, and Bacteria."
4. Deleuze, "Immanence," 3–4.
5. *Ibid.*, 4. In "The Novelty of Life" (unpublished manuscript), Paola Marrati

argues that the concept of life in Deleuze has no empirical or biological content but is closer to the Bergsonian idea of duration. Life “becomes coextensive with the virtual reality of time and its open-ended power of differentiation, which is to say of the creation of novelty” (7). A copy of this source is on file in my private collection.

6. Deleuze, “Immanence,” 5.
7. Das, *Life and Words*, 97.
8. Deleuze and Guattari, *Thousand Plateaus*, 407; my emphasis.
9. Deleuze, “Immanence,” 5.
10. Deleuze and Parnet, “On the Superiority of Anglo-American Literature,” 50.
11. Deleuze and Guattari also affirm Nietzsche’s criticism of a metaphysics of “atoms” or stable “objects.” There are only, says Nietzsche in *The Will to Power*, entry 522, “complexes of events apparently durable in comparison with other complexes.” But Deleuze and Guattari eschew the tendency toward a linguistic constructionism occasionally evident in Nietzsche’s formulations, wherein the event is reduced to the human forces operative in it. This occurs, for example, when Nietzsche says that “things . . . atoms, too . . . do not exist at all. . . . A ‘thing’ is the sum of its effects, synthetically united by a concept, an image” (Nietzsche, *Will to Power*, entry 551). It also occurs when he makes this note to himself: “What things . . . may be like, apart from our sense receptivity and the activity of our understanding, must be rebutted with the question: how could we know that things exist? ‘Thingness’ was first created by us. The question is . . . whether that which ‘posits things’ is not the sole reality; and whether the ‘effect of the external world upon us’ is not also only the result of such active subjects” (entry 569).
12. Aeschylus, *Prometheus Bound*, 65.
13. Deleuze and Guattari, *Thousand Plateaus*, 411.
14. “So how are we to define this matter-movement, this matter-energy, this matter-flow, this matter in variation that enters assemblages and leaves them? It is a destratified, deterritorialized matter. . . . [It is] a region of vague and material essences (. . . vagabond, anexact and yet rigorous), distinguishing them from fixed, metric and formal, essences. . . . They relate to a corporeality (materiality) that is not to be confused either with an intelligible, formal essentiality or a sensible, formed and perceived, thinghood” (ibid., 407).
15. Hobbes, “De Corpore,” pt. 2, 8.10.
16. Deleuze and Guattari, *Thousand Plateaus*, 262.
17. Ibid., 407–11.
18. Ibid., 411.
19. Kass, *Hungry Soul*, 36.

20. Ibid., 41.
21. Marks, "Introduction," 5.
22. Latham and McCormack, "Moving Cities," 701. Massumi's phrase is quoted on page 705.
23. Foucault, "Theatrum Philosophicum," 169–70. Jonathan Goldberg notes that "Foucault in fact recalls a controversy that haunts Epicureanism from the start: if atoms are themselves imperceptible, colorless, tasteless—if they lack almost every feature by which bodies can be known, virtually every characteristic that characterizes matter—in what sense are atoms material?" (Goldberg, *The Seeds of Things*, 34). Goldberg continues to explore the strange fact that the condition of the possibility of visibility or of the phenomenological experience of things is *unseen* matter in "Lucy Hutchinson Writing Matter."
24. Where Foucault speaks of an "incorporeal materiality," Latham and McCormack speak of "the immaterial" within the material. "The immaterial" is that which gives materiality "an expressive life and liveliness independent of the human subject" (Latham and McCormack, "Moving Cities," 703). I hesitate about this definition because of its implication that materiality requires something *else*, something other to itself, to animate it. In so doing, it recalls the nineteenth-century vitalist claim that while matter is (in its essence) inert, because material bodies move, there must be at work a vital principle that while profoundly implicated in matter, is not "of" matter. Latham and McCormack repeat this gesture when they assign to "thinking" and its "conceptual vehicles" the task of "charg[ing] . . . and activat[ing] . . . the detail of the world with an enlivening potential" (709).
25. Ibid., 702.
26. Anderson, "Time-Still'd Space-Slowed." Anderson makes a persuasive case for how the affect of boredom—which is "stilling and slowing" rather than vital and generative—complicates an image of materiality that assumes "an almost unlimited [internal] plenitude [and] . . . 'richness'" (745). In a lucid introduction to a special issue on materiality in *Geoforum*, Ben Anderson and Divya Tolia-Kelly note "two specific figurations of matter." The first is the realist equation of matter with "unmediated, static, physicality" and "the second is the use of 'the material,' or 'material conditions,' to refer to an ostensive social structure that over-determines 'the cultural'" (Anderson and Tolia-Kelly, "Matter(s) in Social and Cultural Geography," 669–70).
27. Smith, "Texture of Matter," 8–9n.
28. Smith, *A History of Metallography*, 134.
29. Smith, "Texture of Matter," 8–9n.
30. Ibid., 27; my emphasis.

31. Smith, *A History of Metallography*, 73.
32. *Ibid.*, 101.
33. *Ibid.*, 134.
34. *Ibid.*, 244.
35. The durability of a particular metal is a function of how much internal resistance is offered to the flow of the crack: if "populations of these line defects are free to move in a material, they will endow it with the capacity to yield locally without breaking, that is, they will make the material tough. On the other hand, restricted movement of dislocations will result in a . . . more brittle material. . . . Toughness or strength are emergent properties of a metallic material that result from the complex dynamic behaviour of some of its components" (De Landa, "Uniformity and Variability").
36. Deleuze, "Metal, Metallurgy, Music, Husserl, Simondon."
37. This may also be what they mean by the perverse notion of "a materiality possessing a *nomos*" of its own (Deleuze and Guattari, *Thousand Plateaus*, 408).
38. Qtd. in Margulis and Sagan. *What Is Life?* 49.
39. Smith also celebrates the metallurgical focus on "middle-sized aggregates," whereas more theoretical inquiry into nature has tended to focus on the infinite universe (as in cosmology) or the infinitesimal bit (as in particle and subparticle physics). See Smith, "Texture of Matter," 3. Heidegger makes a similar point about the methodological bias of modern science in favor of scales of organization that reside at the extremes: "Everywhere . . . the gigantic is making its appearance. In so doing, it evidences itself simultaneously in the tendency toward the increasingly small" (Heidegger, "Age of the World Picture," 134). *A Thousand Plateaus* is sometimes pitched at the level of the minuscule, as when Deleuze and Guattari focus on the motility of intensities, and also sometimes pitched at the level of the gigantic, as when they invoke a vagabond or deterritorializing matter constituting a veritable cosmos of becoming. This is not, however, a big, undifferentiated flow of becoming, but a self-parsing, self-splaying "life" that has always already distributed itself into various subgroupings or swarms, eddies, circuits, cascades, and assemblages. *A Thousand Plateaus* proceeds both by grand metaphysics and by analyses of material processes operating more "locally," as capitalism, militarism, music, metallurgy.
40. Perniola defines the human as a "feeling thing" (*cosa che sente*). See Conrardi and Perniola, "Sex Appeal of the Inorganic"; and Perniola, *Sex Appeal of the Inorganic*, 2-4. In the first piece, Perniola says: "The notion of 'feeling thing' derives from an encounter between two different traditions of thought: that which meditated around the thing [*das Ding*] and that which meditated around feeling [*das Fühlen*]. The first goes back to Kant (the thing-in-itself), Heidegger (the question of the thing), and Lacan (the

Freudian thing); the second also goes back to Kant (sentiment), to Hegel (pathos) and the aesthetics of empathy. I took away the dimension of feeling that this second tradition attributes to the subjective feature. I replace 'I feel' [io sento] with an anonymous and impersonal 'it is felt' [si sente], something which I had laid out in my previous book *Del sentire*. . . . In *The Sex Appeal of the Inorganic*, the 'it is felt' assumes a more specific sexual connotation" (brackets in original).

5. Neither Vitalism nor Mechanism

1. Frederick Burwick and Paul Douglass argue that "critical vitalism" emerged "in the 19th century transition from a matter-based physics to an energy-based physics" (Burwick and Douglass, introduction, 1). For a good conceptual history of "energy," see Caygill, "Life and Energy."
2. Quirk, *Bergson and American Culture*, 1–2. Quirk also places the works of Willa Cather and Wallace Stevens in this context: "Both Cather and Stevens believed in the 'creative power,' and both . . . linked this power to a vital force, biological in nature and primordial in origin" (8). See also the debates between Arthur O. Lovejoy and H. S. Jennings about vitalism during the period 1911–15: Lovejoy, "Meaning of Vitalism"; Lovejoy, "Import of Vitalism"; Jennings, "Driesch's Vitalism and Experimental Indeterminism"; Lovejoy, "Meaning of Driesch and the Meaning of Vitalism"; and Jennings, "Doctrines Held as Vitalism."
3. Driesch, *The Science and Philosophy of the Organism* . . . 1908, 321.
4. Quirk, *Bergson and American Culture*, 1. Linked to the public discussion of vitalism was the political movement of Progressivism; see Eisenach, *Social and Political Thought of American Progressivism*.
5. In his *The History and Theory of Vitalism*, Driesch makes "an exception" to the book's usual practice of providing only brief summaries of each theory of vitalism: "In the case of Kant, [we will] . . . analyse his *Critique of Judgment* with particular thoroughness, our reason [being] . . . the extraordinary and far-reaching influence which this book has exerted up to the present day" (66).
6. Kant, *Critique of Judgment*, sec. 78, #411. Further references to this title will be made in the running text.
7. Because of the nature of our understanding, which Kant says requires us to explain the relation between things through the idea of mechanistic causality, we run up against an impasse when we encounter organisms. Organisms exceed mechanistic causality, but we do not have an adequate concept to capture the excess.
8. Before he invokes the *Bildungstrieb*, Kant speaks in the text of a "formative

- force" (*bildende Kräfte*) operative in organisms but not in dead matter: "An organized being is not a mere machine. For a machine has only motive force. But an organized being has within it *formative force* [*bildende Kräfte*], and a formative force that this being imparts to the kinds of matter that lack it (thereby organizing them). This force is therefore a formative force that propagates itself" (*Judgment* sec. 65, #374).
9. The translation is Robert J. Richards's in "Kant and Blumenbach on the *Bildungstrieb*."
 10. *Bildungstrieb* can be placed alongside other notable figures of vital force in the eighteenth century, including Georges Buffon's *moule intérieur*, Albrecht von Haller's *irritability* (a force in muscles that made them twitch in response to stimuli), and Caspar Wolff's *vis essentialis*. For a broader history of figures of vital force, see Battye, *What Is Vital Force*; Driesch, *The History and Theory of Vitalism*; and Wheeler, *Vitalism*.
 11. Qtd. in Richards, "Kant and Blumenbach on the *Bildungstrieb*," 11.
 12. *Ibid.*, 11–12.
 13. Johann Friedrich Blumenbach, *Über den Bildungstrieb und das Zeugungsge-schäfte* (1781), qtd. *ibid.*, 18.
 14. By allowing that *Bildungstrieb* is "a principle that is inscrutable to us," Blumenbach "leaves an indeterminable and yet unmistakable share to natural mechanism" (*Judgment* sec. 81).
 15. Lenoir, "Kant, Blumenbach, and Vital Materialism," 84. According to Blumenbach, "The cause of the *Bildungstrieb* is no more capable of explanation than attraction or gravity or any other generally recognized natural forces. It suffices that it is an independent force whose undeniable existence and extensive effects manifest themselves through experience of the entire organized creation and whose constant phenomena give an easier and brighter insight into development and several other important facets of life than any other theory" (Johann Friedrich Blumenbach, *Handbuch der Naturgeschichte* [1791], qtd. in Lenoir, "Kant, Blumenbach, and Vital Materialism," 89n39).
 16. Lenoir puts the point this way: "Having lost a substantial portion of its primary generative substance, the force of the *Bildungstrieb* had been weakened" (Lenoir, "Kant, Blumenbach, and Vital Materialism," 84).
 17. In the debates of Kant's time over how to explain the growth of organisms and their reproduction across generations, one camp favored the theory of "preformation," as in Charles Bonnet's notion of *emboitement*, according to which "God had created a multitude of germs, each encapsulating an embryonic organism, which in turn carried yet smaller organisms within its own germs, down through ever smaller encased individuals"; and another camp affirmed "epigenesis," or the theory that transformations within the organism entailed the gradual movement from less to

- more specialization, from formless matter to an increasingly articulated structure of parts. See Richards, "Kant and Blumenbach on the *Bildungstrieb*," 14–18. Kant was more or less on the side of epigenesis, as long as that could "also be entitled the system of generic preformation, because the productive faculty of the generator, and consequently the specific form would be virtually preformed according to the inner purposive capacities [*Anlagen*] which are part of its stock [*Stamm*]" (*Judgment* sec. 81, qtd. in Lenoir, "Kant, Blumenbach, and Vital Materialism," 88).
18. In the system of natural causality of which humans form a part, humans make for a special part: "There is only one kind of being with a causality that is teleological, i.e., directed to purposes, but also so constituted that the law of which these beings must determine their purposes is presented . . . as unconditioned and independent of conditions in nature" (*Judgment* sec. 84, #323; my emphasis).
 19. See Serres, *Birth of Physics*.
 20. Driesch, *The Science and Philosophy of the Organism* . . . 1908, 115.
 21. Driesch, *The History and Theory of Vitalism*, 208.
 22. Driesch, *The Science and Philosophy of the Organism* . . . 1908, 144.
 23. *Ibid.*, 250.
 24. *Ibid.*, 316.
 25. *Ibid.*, 115. "In Nature conceived scientifically—as here-now-such, there is no room for 'psychical' entities at all" (Driesch, *The Problem of Individuality*, 33). Driesch makes the same point in Driesch, *The Science and Philosophy of the Organism* . . . 1908, where he says that "there 'are' no souls . . . in the phenomenon called nature in space" (82).
 26. Driesch, *The Science and Philosophy of the Organism* . . . 1907, 50; my emphasis. On this point Driesch echoes Kant's claim that in judging organized beings, "we must always presuppose some original organization that itself uses mechanism" (*Judgment* sec. 80, #418; my emphasis).
 27. Driesch, *The Problem of Individuality*, 34.
 28. Driesch does not elaborate on his differences with Aristotle and says only that he will retain Aristotle's idea that "there is at work a something in life phenomena 'which bears the end in itself'" (Driesch, *The Science and Philosophy of the Organism* . . . 1907, 144).
 29. Blumenbach had said that *Bildungstrieb* "initially bestows on creatures their form, then preserves it, and, if they become injured, where possible restores their form"; Driesch here describes the tasks of entelechy in similar terms. (Blumenbach, *Über den Bildungstrieb*, qtd. in Richards, "Kant and Blumenbach on the *Bildungstrieb*," 18). A blastocyst is the name for the developmental stage of a fertilized egg at which it has changed from a solid mass of cells into a hollow ball of cells around a fluid-filled cavity.
 30. "The organism is different . . . from all combinations of crystals, such as

those called dendrites . . . which consists of a typical arrangement of identical units. . . . For this reason, dendrites . . . must be called aggregates; but the organism is not an aggregate" (Driesch, *The Science and Philosophy of the Organism* . . . 1907, 25).

31. Driesch, *The Science and Philosophy of the Organism* . . . 1908, 61; my emphasis.
32. *Ibid.*, 79. Here Driesch echoes Kant's claim that organisms actively "produce" themselves rather than blindly follow a path of "development." Kant writes: "For in considering those things whose origin can be conceived only in terms of a causality of purposes," we must regard "nature as itself producing them rather than as merely developing them" (*Judgment* sec. 81, #424).
33. Driesch, *The History and Theory of Vitalism*, 213. Or, as he puts the point in *The Science and Philosophy of the Organism* . . . 1908, there is an "'individuality of correspondence' between stimulus and effect" (67).
34. Driesch, *The Problem of Individuality*, 38. In the vocabulary of today, it might be said that the stem cells have not yet been channeled into their respective "fate paths."
35. *Ibid.*, 39.
36. Driesch, *The History and Theory of Vitalism*, 213.
37. Driesch, *The Science and Philosophy of the Organism* . . . 1908, 72; my emphasis.
38. "Indeed, as far as morphogenesis and physiological adaptation and instinctive reactions are concerned, there *must* be a something comparable metaphorically with specified knowing and willing" (Driesch, *The Science and Philosophy of the Organism* . . . 1908, 143).
39. *Ibid.*
40. Joseph Chiari defends Bergson's vitalism precisely because *élan vital* is "the informing spirit which, through man, evolves into consciousness and therefore gives man his favored position as the goal and the apex of creation" (Chiari, "Vitalism and Contemporary Thought," 254).
41. Driesch, *The History and Theory of Vitalism*, 210. On this point Driesch follows Kant quite closely. Kant writes: "If parts are removed from the watch, it does not replace them on its own; nor, if parts were missing . . . , does it compensate for this [lack] by having the other parts help out, let alone repair itself on its own when out of order: yet all of this we can expect organized nature to do. Hence an organized being is not a mere machine" (*Judgment* sec. 65, #374).
42. Driesch, *The Science and Philosophy of the Organism* . . . 1907, 110.
43. Driesch distinguishes, in his empirical proofs for vitalism (which are better described as disproofs of the sufficiency of a mechanistic account of morphogenesis), between the process of "the *differentiation* of the har-

monious systems" and the development of the original cell within which differentiation will occur. The latter is "not what comes out of the complex systems, but what they themselves come from. And we shall take the ovary as one instance standing for them all. The ovary develops from one special single cell which is its *Anlage*, to use a German word not easy to translate" (Driesch, *The Problem of Individuality*, 21–22).

44. Driesch, *The History and Theory of Vitalism*, 212.
45. Bakhtin, "Contemporary Vitalism," 89.
46. Driesch, *The Science and Philosophy of the Organism . . . 1908*, 169. What could it mean to be exclusively an "order of relation"? Driesch sheds some light on this notion by describing entelechy as an "agent that arranges" elements into a harmonious whole. Driesch sees evidence of this arranging power in instinctive movements: although "physiological factors" play a role in instincts, "there would be something else also at work, a 'something' that may be said to *make use of the factors*" (Driesch, *The Science and Philosophy of the Organism . . . 1908*, 51). This "new and autonomic natural factor . . . unknown to the inorganic world" (*ibid.*, 114) is also "at the root of the transformism of the species" (Driesch, *The Science and Philosophy of the Organism . . . 1907*, 287). In addition, such an arrangement must have been operative in the process of inheritance. A mechanical explanation would speak only of the transfer of material units "localized in the nucleus," but, again, these material conditions cannot be "the main thing. Some agent that arranges is required, and this arranging agent of inheritance cannot be of a machine-like, physico-chemical character" (Driesch, *The Problem of Individuality*, 23). Why not? Because, the physico-chemical is by definition incapable of the arranging agency required. Arranging agency requires both precision and flexibility, an ad hoc judging exquisitely attuned to the singularity of the parts it is to arrange and the singularity of the context in which the organism swims. Physico-chemical elements, qua inert matter, are too obedient to generic laws to perform the required juggling, too routinized to arrange artfully.
47. Driesch, *The Science and Philosophy of the Organism . . . 1907*, 16.
48. Driesch, *The Science and Philosophy of the Organism . . . 1908*, 295.
49. *Ibid.*, 180.
50. *Psuche* marks the difference between a living human and an inactive corpse. It is "composed of a very tenuous stuff, which resides in the body while the individual is alive, flies away through some orifice at death and goes down to Hades"; it is "simply that whose presence ensures that the individual is alive" (Adkins, *From the Many to the One*, 15).
51. Driesch, *The Science and Philosophy of the Organism . . . 1908*, 326.
52. Bakhtin, "Contemporary Vitalism," 95–96. Bakhtin names this alternative machine-image "modern dialectical materialism," in contrast to Driesch's

- "naive-mechanist point of view with its fixed and immovable machines" (96). K. S. Lashley made a similar point in 1923: "The vitalist cites particular phenomena—morphogenesis, regeneration, habit-formation, complexities of speech, and the like—and denies the possibility of a mechanistic account of them. But he thereby commits what we might term the egoistic fallacy. On analysis his argument reduces every time to the form, 'I am not able to devise a machine which will do these things; therefore no one will ever conceive of such a machine.' This is the argument from inconceivability of Driesch and McDougall, put badly. To it we may answer, 'You overvalue your own ingenuity.'" (Lashley, "Behavioristic Interpretation of Consciousness," 242).
53. Bakhtin, "Contemporary Vitalism," 95–96.
 54. So do Deleuze and Guattari. In *A Thousand Plateaus* they describe Nature as a plane of morphogenesis, which they call a "war-machine." Paul Patton suggests that a better term would have been "metamorphosis machine": "The 'war-machine' . . . is a concept which is betrayed by its name since it has little to do with actual war and only a paradoxical and indirect relation to armed conflict. [Its] . . . real object . . . is not war but the condition of creative mutation and change" (Patton, *Deleuze and the Political*, 110).
 55. "All reality is . . . tendency, if we agree to call tendency a nascent change of direction." Bergson, *The Creative Mind*, 188.
 56. Bergson, *Creative Evolution*, 202–3. Further references to this title will be made in the running text as CE.
 57. Driesch, *The Science and Philosophy of the Organism* . . . 1907, 50.
 58. Deleuze describes *élan vital* as "a virtuality in the process of being actualized, a simplicity in the process of differentiating, a totality in the process of dividing up" (Deleuze, *Bergsonism*, 94).
 59. The first quote is taken from Bergson, *The Creative Mind*, 95.
 60. Deleuze, *Bergsonism*, 106.
 61. Bergson, *The Creative Mind*, 93.
 62. Bergson continues, "Now, it finds only one way of succeeding in this, namely, to secure such an accumulation of potential energy from matter, that it can get, at any moment, . . . by pulling a trigger. The effort itself possesses only that power of releasing" (CE, 115).
 63. Bergson, *The Creative Mind*, 31.
 64. Driesch, *The Science and Philosophy of the Organism* . . . 1907, 108.

6. Stem Cells and the Culture of Life

1. Driesch, *Problem of Individuality*, 80, 74–75.
2. Canguilhem, *Aspects du vitalisme*, 124.

3. Harrington, *Reenchanted Science*, 190. After Hitler came to power in 1933, "Driesch was one of the first non-Jewish German professors to be forcibly retired," she writes (191).
4. Stolberg, "House Approves a Stem Cell Bill."
5. Cole, "Bush Stands Against 'Temptation to Manipulate Life.'"
6. The lower estimate is from iraqbodycount.org, the larger one from Les Roberts and Gilbert M. Burnham of the Center for International Emergency, Disaster, and Refugee Studies at the Johns Hopkins Bloomberg School of Public Health; Richard Garfield of Columbia University; and Riyadh Lafta and Jamal Kudhairi of Baghdad's Al-Mustansiriya University College of Medicine.
7. George W. Bush said, "We should not legislate defeat in this vital war" (United States, Office of the White House Press Secretary, "President Bush Discusses Iraq War Supplemental").
8. It is not, as Driesch put the point before the concept of the stem cell was invented, a "potency" able to "play every single part in the totality of what will occur in the whole system" (Driesch, *Science and Philosophy of the Organism* . . . 1907, 120-21). See also U.S. Department of Health and Human Services, National Institutes of Health, "Stem Cells."
9. Maicenschein, "What's in a Name."
10. Tom DeLay, qtd. in Baer, "In Vitro Fertilization." There is some dispute over whether a pregastrulated mass is an "embryo." If an embryo is defined as a fertilized egg, then the answer is yes. But others define an embryo as a dividing egg that has passed through gastrulation: "Many biologists . . . don't call these early stages of development an embryo, but a preimplantation embryo or pre-embryo. The preimplantation embryo passes through three stages during its week of development: a zygote (one cell), morula (multiple cells in a cluster, all the same), and blastocyst [blastula] (when it develops sections, including a yolk sac, and has an inside and outside but still none of the defined structures of an embryo)" (Spike, "Bush and Stem Cell Research," 45).
11. In November of 2007 two research laboratories reported "a new way to turn ordinary human skin cells into what appear to be embryonic stem cells without ever using a human embryo" (Kolata, "Researcher"). The new technique has many obstacles to overcome if it is to translate into human medical treatments: "Scientists have yet to fully understand how DNA is programmed and reprogrammed for therapeutic use. In addition, initial experiments were done with retroviruses that can cause tumors and cancer. . . . Still, the production of the stem cells avoids the moral and ethical objections raised by President Bush and others to the harvesting of cells from discarded human embryos" ("Stem Cell Breakthrough").
12. Paulus PP, "Evangelium Vitae."

13. Best, "Prepared Statement."
14. Ibid.
15. Driesch, *The History and Theory of Vitalism*, 1. Bergson affirms something close to this when he says that "while analysis will undoubtedly resolve the process of organic creation into an ever-growing number of physico-chemical phenomena, . . . it does not follow that chemistry and physics will ever give us the key to life" (Bergson, *Creative Evolution*, 31). Driesch says that he "know[s] very well that . . . 'autonomy' usually means the faculty of giving laws to oneself, and . . . is applied with regard to a community of men; but in our phrase autonomy is to signify the being subjected to laws peculiar to the phenomena in question" (Driesch, *Science and Philosophy of the Organism* . . . 1907, 143). Although Driesch means to focus on the ability of organisms to self-arrange and self-restore, his use of the term *autonomy* still retains something of the Kantian sense of freedom, freedom from determinism.
16. Driesch, *The History and Theory of Vitalism*, 57–58.
17. It is worth noting here that one need not be an atheist to reject the particular constellation of ideas inside the culture of life: pantheisms of various sorts discern divinity in all things, human and nonhuman, organic and inorganic; many "Jewish and Muslim scholars . . . regard life as starting . . . 40 days" after fertilization; some believers affirm that God would approve of embryonic stem cell research as a fuller realization of the potential within the process of morphogenesis. See Maienschien, "What's in a Name," 14.
18. Cole, "Bush Stands Against 'Temptation to Manipulate Life.'"
19. Driesch, *The History and Theory of Vitalism*, 223–24.
20. Bakhtin, "Contemporary Vitalism," 92. The fuller quotation reveals Bakhtin's own deterministic materialism: "It obviously goes without saying that at every place and every time, some specific conditions prevail. Therefore it is completely absurd to say [as Driesch does] that any particular possibility of development is really contained in a given blastomere. The potential is contained within it . . . to the same degree that it is part of the complex of its surrounding conditions. What is Driesch doing? He strays from any real conditions, locating abstract blastomere outside of the frames of time and space. . . . Talk of several potentials and possibilities serves only one purpose: it allows for the presupposition that they are all equally possible . . . and that therefore it is possible to choose one of them freely. Freedom of choice, not determinism in organic life, is the ground of all of Driesch's constructions" (ibid.).
21. Driesch, *Science and Philosophy of the Organism* . . . 1908, 72; my emphasis.
22. Bergson, *Creative Evolution*, 47.
23. Two quotes: Terrorists kill because "they hate freedom" (United States,

- Office of the White House Press Secretary, "Remarks by President and Mrs. Bush"); "The more free the Iraqis become, the more electricity is available, the more jobs are available, the more kids that are going to school, the more desperate these killers become, because they can't stand the thought of a free society. They hate freedom. They love terror" (United States, Office of the White House Press Secretary, "President Bush, Ambassador Bremer Discuss Progress in Iraq").
24. Canguilhem, *Aspects du vitalisme*, 121.
 25. Sumner, Review of *The History and Theory of Vitalism*.
 26. Deleuze and Guattari, *Thousand Plateaus*, 255.
 27. Althusser, "Underground Current of the Materialism of the Encounter," 190.
 28. Serres, *Birth of Physics*.
 29. "Executive Summary" in U.S. Department of Health and Human Services, "Stem Cells," 9; my emphasis.
 30. For a discussion of Bergson and the open whole, see Marrati, "Time, Life, Concepts."
 31. Emerson, *Journals and Miscellaneous Notebooks*, 10:335.
 32. Johann Gottfried von Herder, "God: Some Conversations" (1787), qtd. in Zammito, *Genesis of Kant's Critique of Judgment*, 244.

7. Political Ecologies

1. Darwin, *Formation of Vegetable Mould*, 313. Further references to this title will be made in the running text.
2. These "small agencies" ought not to be "undervalued" simply because they are undesigned (*ibid.*, 2).
3. In the sixteenth century, a miller was put on trial for heresy for a similarly materialist view, as Carlo Ginzburg recounts in his *The Cheese and the Worms*. God did not create the world out of nothing at all, Mennochio opined, for in the beginning, "all was chaos, that is, earth, air, water, and fire were mixed together; and out of that bulk a mass formed—just as cheese is made out of milk—and worms appeared in it, and these were the angels. . . . among that number of angels, there was also God, he too having been created out of that mass at the same time" (6).
4. The story is told in Latour, *Pandora's Hope*, chap. 2; the quotation is from page 53.
5. *Ibid.*, 76.
6. Deleuze and Guattari, *Thousand Plateaus*, 324–25.
7. Levine, *Darwin Loves You*, 150.
8. Lorimer, "Nonhuman Charisma." Lorimer notes that "jizz" has affinities

with what Deleuze and Guattari term “a ‘singularity’ — the congealing of a particular mode of individuation” (915). The article offers a rich account of the degrees of “detectability” (for us) of different bodies.

9. Jullien, *Propensity of Things*, 113, 115. Unlike the European system of assigning to each sound a note or symbol on a written score, “Chinese musical notation does not indicate the sounds themselves . . . but simply the precise gesture required to produce them” (116).
10. Johnson, *Emergence*, 18. In contrast both to simple systems with linear causality and to giant systems best described in terms of statistical probability, systems of “organized complexity” are marked by self-organizing patterns created from the bottom up, where no single element plays the role of a central or higher authority. There is no “pacemaker,” only a creative “swarm.” Organized complexity produces outcomes that are “emergent,” that is, do not issue from either a consummate central agent or an automatic process.
11. Noortje Marres notes that for Dewey (and also Walter Lippmann), the “public is precisely not a social community. . . . those who are jointly implicated in the issue must organize a community. What the members of the public share is that they are all affected . . . , but they do not already belong to the same community” (Marres, “Issues Spark a Public into Being,” 214).
12. “The ramification of the issues . . . is so wide and intricate, the technical matters involved are so specialized, the details are so many and so shifting, that the public cannot for any length of time identify and hold itself. It is not that there is no public, . . . there are too many publics” (Dewey, *Public and Its Problems*, 137).
13. A public “consists of all those who are affected by the indirect consequences of transactions to such an extent that it is deemed necessary to have those consequences systematically cared for” (ibid., 16).
14. Ibid., 137.
15. Dewey, *Art as Experience*, 59.
16. “Humans, for millions of years, have extended their social relations to other actants with which, with whom, they have swapped many properties, and with which, with whom, they form collectives” (Latour, *Pandora’s Hope*, 198). Latour says in that book that he rejects the category of “Nature” (as a pure realm devoid of human culture), because such an idea “renders invisible the political process by which the cosmos is collected in one livable whole” (304). I would emphasize that it is equally important to reject the idea of passive matter, because that renders invisible the material agencies at work in a polity.
17. “Action is not what people do, but is instead the ‘*fait-faire*,’ the making-do, accomplished along with others in an event, with the specific opportuni-

ties provided by the circumstances. These others are not ideas, or things, but nonhuman entities, or . . . *propositions*" (ibid., 288; my emphasis).

18. Ibid., 288.
19. Ibid., 247. But this fermentation seems to require some managing to ensure, for example, that all the ingredients are in the pot. It seems to require humans to exercise this "executive" function.
20. "Whenever we make something we are not in command, we are slightly overtaken by the action: every builder knows that." And, likewise, the momentum of nonhumans is also slightly overtaken by "the *clinamen* of our action" (ibid., 281).
21. Dewey, *Public and Its Problems*, 16.
22. A democratic collective is one "which brings together starts, prions, cows, heavens, and people . . . into a 'cosmos' instead of an 'unruly shambles'" (Latour, *Pandora's Hope*, 261).
23. "The most urgent concern for us today," says Latour, "is to see how to fuse together humans and non-humans in the same hybrid forums and open, as fast as possible, this Parliament of things" (Latour, "What Rules of Method"). Kevin Murray notes that the suggestion to include nonhuman voices at first provokes "the medieval comedy of endangered Amazonian forests tapping microphones to be heard above the bellowing megafauna. Yet, such a mind change is necessary if the planet is not to be speedily consumed by the interests of short-term capital" (Murray, "Cabinet of Helmut Lueckenhausen," 19).
24. "I call the distribution of the sensible the system of self-evident facts of sense perception that simultaneously discloses the existence of something in common and the delimitations that define the respective parts and positions within it. A distribution of the sensible therefore establishes at one and the same time something common . . . and exclusive parts. . . . The distribution of the sensible reveals who can have a share in what is common to the community based on what they do and on the time and space in which this activity is performed. . . . There is . . . an 'aesthetics' at the core of politics that has nothing to do with Benjamin's discussion of the 'aestheticization of politics.' . . . This aesthetics . . . can be understood . . . as the system of a priori forms determining what presents itself to sense experience. It is a delimitation of spaces and times, of the visible and invisible, of speech and noise. . . . Politics revolves around what is seen and what can be said about it, around who has the ability to see and the talent to speak, around the properties of spaces and the possibilities of time" (Rancière, *Politics of Aesthetics*, 12–13).
25. Rancière, *Disagreement*, 99.
26. Rancière and Panagia, "Dissenting Words," 125.
27. Rancière, *Disagreement*, 33. Democracy is the "staging of the very contra-

- diction between police logic and political logic," as when the feminist Jeanne Deroin presented herself, in 1849, "as a candidate for a legislative election in which she cannot run" (41).
28. "One does not practice democracy except under the form of these mise-en-scènes that reconfigure the relations of the visible and the sayable" (Rancière and Panagia, "Dissenting Words," 125).
 29. Rancière, *Disagreement*, 79. Democracy happens when the incommensurability between "the order of the inegalitarian distribution of social bodies" and "the order of the equal capacity of speaking beings in general" becomes visible (42).
 30. *Ibid.*, 99.
 31. *Ibid.*, 24–25. The plebes forced the patricians to relate to them as if they had intelligence, as if they were worthy of discoursing with. The plebs erected "a sphere for the name of the people to appear," carving out "in the heart of the city [a] . . . place where liberty is to be exercised, . . . where the power of the demos that brings off the part of those who have no part is to be exercised" (66).
 32. I posed the question to Rancière at a conference engaging his work. It was called "Fidelity to the Disagreement" and was sponsored by the Post-structuralism and Radical Politics group of the British Political Studies Association, held at Goldsmiths College, London, 16–17 September 2003.
 33. Rancière and Panagia, "Dissenting Words," 124.
 34. For Mark Warren, for example, participation in the (voluntary) associations he says are central to a democratic culture depends on a fluency in "talk, normative agreement, cultural similarity, and shared ambitions—that is, forms of communication that are rooted in speech, gesture, self-presentation" (Warren, *Democracy and Association*, 39).
 35. Connolly, *Pluralism*, 76. Connolly also describes the politics of "enactment" through which "new identities are forged out of old differences, injuries, and energies" in *The Ethos of Pluralization* (xiv). Unlike Rancière, Connolly emphasizes the interdependence between new drives to pluralization (new entrants into the demos) and existing pluralist settlements.
 36. According to the *Encyclopaedia Britannica*, the Diet of Worms was "a meeting of the Diet (assembly) of the Holy Roman Empire held at Worms, Germany, in 1521 that was made famous by Martin Luther's appearance before it to respond to charges of heresy" (online edition, <http://www.britannica.com>).
 37. Are they "agencies" or "agents"? As I struggle to choose the right term, I confront a profound ambiguity in both terms regarding wherein lies the cause and wherein the effect.
 38. It might even be said that humans need nonhumans to function more than nonhumans need humans, for many nonhumans—from a can rusting at

the bottom of a landfill to a colony of spores in the Arctic—fester or live beyond the proximity of humans.

39. A public is what Karen Barad describes as an “intra-action” of humans and nonhumans: she coins the term “to signify the inseparability of ‘objects’ and ‘agencies of observation’ (in contrast to ‘interaction,’ which reinscribes the contested [subject-object] dichotomy)” (Barad, “Scientific Literacy,” 232).
40. Latour, *Pandora’s Hope*, 297.

8. Vitality and Self-interest

1. I take the phrase “fatalistic passivity” from Félix Guattari: “The increasing deterioration of human relations with the socius, the psyche and ‘nature,’ is due not only to environmental and objective pollution but is also the result of a certain incomprehension and fatalistic passivity towards these issues as a whole, among both individuals and governments. Catastrophic or not, negative developments [evolutions] are simply accepted without questions. . . . We need to ‘kick the habit’ of sedative discourse” (Guattari, *Three Ecologies*, 41; brackets in original).
2. “Blowback” is a CIA term first used in March 1954 in a recently declassified report on the 1953 operation to overthrow the government of Mohammed Mossadegh in Iran. It is a metaphor for the unintended consequences of the U.S. government’s international activities that have been kept secret from the American people. The CIA’s fears that there might ultimately be some blowback from its egregious interference in the affairs of Iran were well founded. Installing the Shah in power brought twenty-five years of tyranny and repression to the Iranian people and elicited the Ayatollah Khomeini’s revolution. The staff of the American embassy in Teheran was held hostage for more than a year. This misguided ‘covert operation’ of the U.S. government helped convince many capable people throughout the Islamic world that the United States was an implacable enemy” (Johnson, “Blowback”).
3. Naturewriters such as Barry Lopez and Wendell Berry have also found the category of “environment” wanting: it is for them unable to express the beautiful complexity of nonhuman nature or the degree of our intimacy with it. Though they also seek to cultivate an enhanced attentiveness to the out-side, they do not go as far as I do in playing up the essential role of the nonhuman in the human.
4. See Mathews, *For Love of Matter*; Latour, *Politics of Nature*; Haraway, *How Like a Leaf*; Hawkins, *Ethics of Waste*; Ingold, *The Perception of the Environment*; Hayles, *How We Became Posthuman*; Barad, *Meeting the Universe*

Halfway; Whatmore, "Materialist Returns"; Bingham and Hinchliffe, "Reconstituting Natures"; Ihde, *Postphenomenology and Technoscience*; and Mitchell, *What Do Pictures Want*.

5. Wade, "Bacteria Thrive in Crook of Elbow."
6. Guattari, *Three Ecologies*, 28. He speaks of "social ecology, mental ecology and environmental ecology" (41).
7. *Ibid.*, 27.
8. *Ibid.*, 38.
9. See, for example, Luke, *Capitalism, Democracy, and Ecology*; and Luke, *Eco-critique*.
10. Guattari, *Three Ecologies*, 51.
11. The environmentalist Scott Russell Sanders, for example, makes the same point in "Stillness": "We need to resist attacks on air, soil, water, and wild lands. But we also need to change our culture, not just our leaders and technology. We need to speak out and act for more conserving, more sustainable, more peaceful, and more just practices in our homes, our workplaces, our schools, and our public assemblies. We must refuse to shut up, refuse to give up, in the face of corporate consumerism and a mass culture peddling the narcotics of entertainment. We need to articulate and demonstrate a more decent and joyous way of life" (5).
12. "The Trinity is One. We do not confess three Gods, but one God in three persons, the 'consubstantial Trinity.' The divine persons do not share the one divinity among themselves but each of them is God whole and entire." And yet, "The divine persons are really distinct from one another. 'God is one but not solitary.' 'Father,' 'Son,' 'Holy Spirit' are not simply names designating modalities of the divine being, for they are really distinct from one another: 'He is not the Father who is the Son, nor is the Son he who is the Father, nor is the Holy Spirit he who is the Father or the Son.' . . . The divine Unity is Triune" ("The Dogma of the Holy Trinity"; emphasis added).
13. Guattari, *Three Ecologies*, 41–42.
14. Latour, "It's the Development, Stupid," 6–7.
15. "Second Nature" was the title of the 2007 Graduate Student Conference in Political Theory at Northwestern University. For papers from this conference, see Archer, Maxwell, and Ephraim, eds., *Second Nature*.
16. Latour, *Politics of Nature*, 12.
17. Guattari, *Three Ecologies*, 68.
18. *Ibid.*, 66–67. Latour echoes Guattari's advocacy of an active, energetic, and pro-technological greening. This call to arms is also at the heart of Shellenberger and Nordhaus, *Break Through*, the book to which Latour is responding in "It's the Development, Stupid." *Break Through* argues that environmentalism is inadequate to the new ecological crises. Overcoming

- global warming, for example, will require a new kind of economic development, that is, big and bold technological investments in the future.
19. The historian of ideas A. O. Lovejoy lists sixty-six senses of the term. See the appendix of Lovejoy and Boas, *Primitivism and Related Ideas in Antiquity*; see also Lovejoy, "Nature as Aesthetic Norm."
 20. The first sense is the "nature" of a Hobbesian or Lockean or Rousseauian "state of nature," but it also resonates with what Sigmund Freud calls drives and instincts and what Martin Heidegger points to in calling our thrownness primordial. Maurice Merleau-Ponty describes the relationship between nature as stable substrate and nature as creativity as "chiasmatic," as flowing into and back from one another endlessly.
 21. Coleridge, *The Literary Remains of Samuel Taylor Coleridge*, 2:341. Spinoza, *Ethics*, pt. 1, proposition 29: "By nature viewed as active (*natura naturans*) . . . we should understand . . . those *attributes* of substance . . . , in other words . . . God, in so far as he is considered as a free cause. By nature viewed as passive (*natura naturata*) I understand all that which follows from the *necessity* of [God or nature] . . . that is, all the modes of the attributes of God, in so far as they are considered as *things*" (my emphasis).
 22. Whitehead, *Concept of Nature*, 172.
 23. Deleuze and Guattari, *A Thousand Plateaus*, 255.
 24. *Ibid.*, 254.
 25. Here is how Spinoza puts the point: "There is no need to spend time in going on to show that Nature has no fixed goal and that all final causes are but figments of the human imagination" (*Ethics*, pt. 4, appendix).
 26. Serres, *The Birth of Physics*, 64. Serres argues that Lucretius's text, *De Rerum Natura*, exemplifies this isomorphism: "The Book V, on the world and nascent humanity, is traversed by the same laws as the Book IV, on perception; and these are the laws of matter found in Book II. Always the same whole, a multiplicity of elements, and always the same operations at work on these wholes. The method by structural invariants, generalised to the global stability of flowing movements, establishes materialism" (*ibid.*, 54).
 27. "The world, objects, bodies, my very soul are, at the moment of their birth, in decline. This means, in the everyday sense, that they are mortal and bound for destruction. It also means that they form and arise. Nature declines and this is its act of birth. And its stability. Atoms join together, conjunction is the strength of things, through declination. This signifies the whole of time. The past, the present, the future, the dawn of appearance and death, tenacious illusions, are only the declinations of matter. They decline and are declined like the tenses of a verb, a word made up of atom-letters. . . . Existence, time, meaning and language go down the inclined plane together" (*ibid.*, 34).

28. Ibid., 58.
29. For a thoughtful account of the performative contradiction, see Gulshan Ara Khan, "Habermas's Charge of a Performative Contradiction: Paradox of Contradiction?" (unpublished manuscript, 2008). A copy of this source is on file in my private collection.
30. Velasquez-Manoff, "Worm Turns," 17.
31. Nash, "On the Subversive Virtue," 427.
32. See also Pickering, *Mangle of Practice*, 6.
33. The phrase "resists full translation and exceeds our comprehensive grasp" is Romand Coles's in "The Wild Patience of Radical Democracy," 78.

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JANE BENNETT

is a professor of political science at Johns Hopkins University. She is the author of *The Enchantment of Modern Life: Attachments, Crossings, Ethics* (2001), *Thoreau's Nature: Ethics, Politics, and the Wild* (1994), and *Unthinking Faith and Enlightenment* (1986).

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